Land Utilization in East-Central Europe Case Studies

Geographia Polonica 5

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INSTITUTE OF GEOGRAPHY • POLISH ACADEMY OF SCIENCES
GEOGRAPHIA POLONICA 5

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Wydawnictwa Geologiczne
Warszawa 1965

Adress of Editorial Board

Krakowskie Przedmieście 30, Warszawa 64
POLAND

Printed in Poland

WYDAWNICTWA GEOLOGICZNE — WARSZAWA 1965

Wydanie I. Nakład 1390+110 egz. Objętość 45 ark. wyd., 31,25 ark. druk. + wklejki. Maszynopis wysłano 4. III. 1964 r. Podpisano do druku 29. IV. 1965. Druk ukończono w maju 1965. Zam. 264/64
Cena zł 157.—

Krakowskie Zakłady Graficzne nr 3, ul. B. Joselewicza 24

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LAND UTILIZATION. CASE STUDIES:

ORIGINS, AIMS, METHODS, TECHNIQUES

In the Spring of 1960 a conference of geographers from East-Central and East-European countries was held in Poland devoted to methods and problems of land utilization research [1]. Having discussed the methods followed in the particular countries and the various research problems there, the conference adopted a resolution [2], which reaffirmed the importance of land utilization studies from the point of view of both, science and its application for practical ends. The conference resolution also resolved to have cooperation established which would consist not only of an exchange of experiences in the form of publications, and in the discussion of results of future international conferences, but also of an exchange of research workers for short or long term training [3], as well as exchange of research teams to carry out field studies in the other countries in order to have both a better opportunity to get acquainted with various methods of land utilization research, by trying them out under differential natural, and very frequently, too, social and economic conditions, and also acquiring comparative material with regard to ways, orientations and effects of land utilization in other countries.

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[1] Report from the conference, see: Land Utilization. Methods and Problems of Research. Institute of Geography. Polish Academy of Sciences. Geographical Studies 31, Warsaw 1962 (in English, French and Russian). 250 pp.

[2] See the introduction to the above volume. p. 15—16.

[3] Such training in Poland passed: G. Enyedi (Hungary), J. Ilič (Yugoslavia), I. Velcea (Rumania); in the USSR: W. Biegajło and W. Kusiński (Poland), I. Velcea (Rumania), and G. Enyedi (Hungary). On two occasions students of the Moscow University led by P. I. Gloushakov took part in field research in Poland.

This volume is a first result of the implementation of the latter point of the resolution.

Under an agreement on scientific cooperation between the Universities of Sofia and of Warsaw a group of research workers and undergraduates of the Institute of Geography of the University of Warsaw went to Bulgaria in September 1960 to carry out joint research in the country with Bulgarian geographers. For field studies the Bulgarians selected the villages of Petarch not far from Sofia, and Dermantsi and Lazar Stanevo in the district of Lovech situated in the Northern foothills of the Balkan range [4]. On account of the very short period of field studies the methods of land utilization survey worked out in Poland had to be somewhat simplified, particularly in so far as grasslands and forests were concerned, with regard to which the classification followed in Poland could not, in fact, be fully applied. On the other hand, the fact that the units under study happened to be large scale collective forms, made the work much easier, for their managements provided all the statistical materials required, all the plans and all the revelant information [5]. Consequently, field observation was limited only to areas which could not be classified on the basis of information supplied. Collecting data through interviews, usually a tedious job, taking much time, was therefore eliminated.

It was decided already in the course of the field work that the collected material would be worked on jointly. On the basis of field surveys and the material assembled S. Hauzer prepared land utilization maps for each of the three villages and L. Velchev and

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[4] On the Polish side in the research took part: J. Kostrowicki, W. Kusiński, W. Stola, and S. Hauzer and undergraduate students: J. Izdebska, L. Pałasz, and M. Pałczyńska; on the Bulgarian side in the village of Petarch: I. Penkov, L. Dinev, I. Velchev, Z. Borisov while in the villages of Dermantsi and Lazar Stanevo: — I. Velchev, Z. Borisov and 3 undergraduate students.

[5] Tremendous kindness of the local authorities: political, administrative and economic and the friendliness of the local people deserve a special mention. This made is possible to accomplish a considerable amount of work in a short time. A particularly valuable help and care was forthcoming from the manager of the collective farm in the village of Petarch — I. Mirski and of the chairman of village council V. Mitov while in the village of Dermantsi most helpful were: party secretary T. Grăncharov, manager of the collective farm D. Ninov, chairman of the village council I. Ivanov, school director I. Ninov; in the village of Lazar Stanevo help was extended by: manager of the collective farm D. K. Ivanov, head agronomer D. M. Petkov, chairman of the village council N. N. Kalchev. The authors deem it their pleasant duty to thank all those people warmly again.

Z. Borisov worked out the natural conditions. Finally, on the basis of research reports by S. Hauzer, W. Kusiński and W. Stola as well as on the basis of his own notes the whole work was prepared by J. Kostrowicki. The text was reviewed and amendments were entered by L. Velchev and Z. Borisov. Acknowledgements are also due to the translator M. P. Bachvarov, then a graduate student at the University of Warsaw, who was active during the preparation of the final text.

Under an agreement on scientific cooperation between Poland and Yugoslavia a team of the Institute of Geography of the Polish Academy of Sciences in the Summer of 1962 carried out land utilization research also in Yugoslavia. On the Yugoslav side the research were arranged by the Institutes of Geography in Belgrade and Lubljana which were also responsible for the selection of research projects, in consultation with the Polish party.

The research was centred in four points: 1) in the area of Barsko Polje on the Montenegro Adriatic coast, 2) in the karst area near the locality of Trebinje in Hercegovina, 3) in the villages of Kriz and Šmarca in the vicinity of Kamnik at the foothills of Slovenian Alps, and 4) in the village of Železnik and Ritopek within the Belgrade suburban zone [6].

Just as in the case of the Bulgarian materials it was decided in the course of the research that the information assembled would be worked upon jointly. At the same time, also the idea was conceived of combining the results of the research work, already done and to extend them to embrace other countries and finally to publish a volume incorporating various papers and giving an account of the results of cooperation of the geographers of the socialist countries of East Central Europe in the field of land utilization research. The purpose of this publication was on the one hand, to demonstrate through example of several case studies the research methods followed in those countries and, on the

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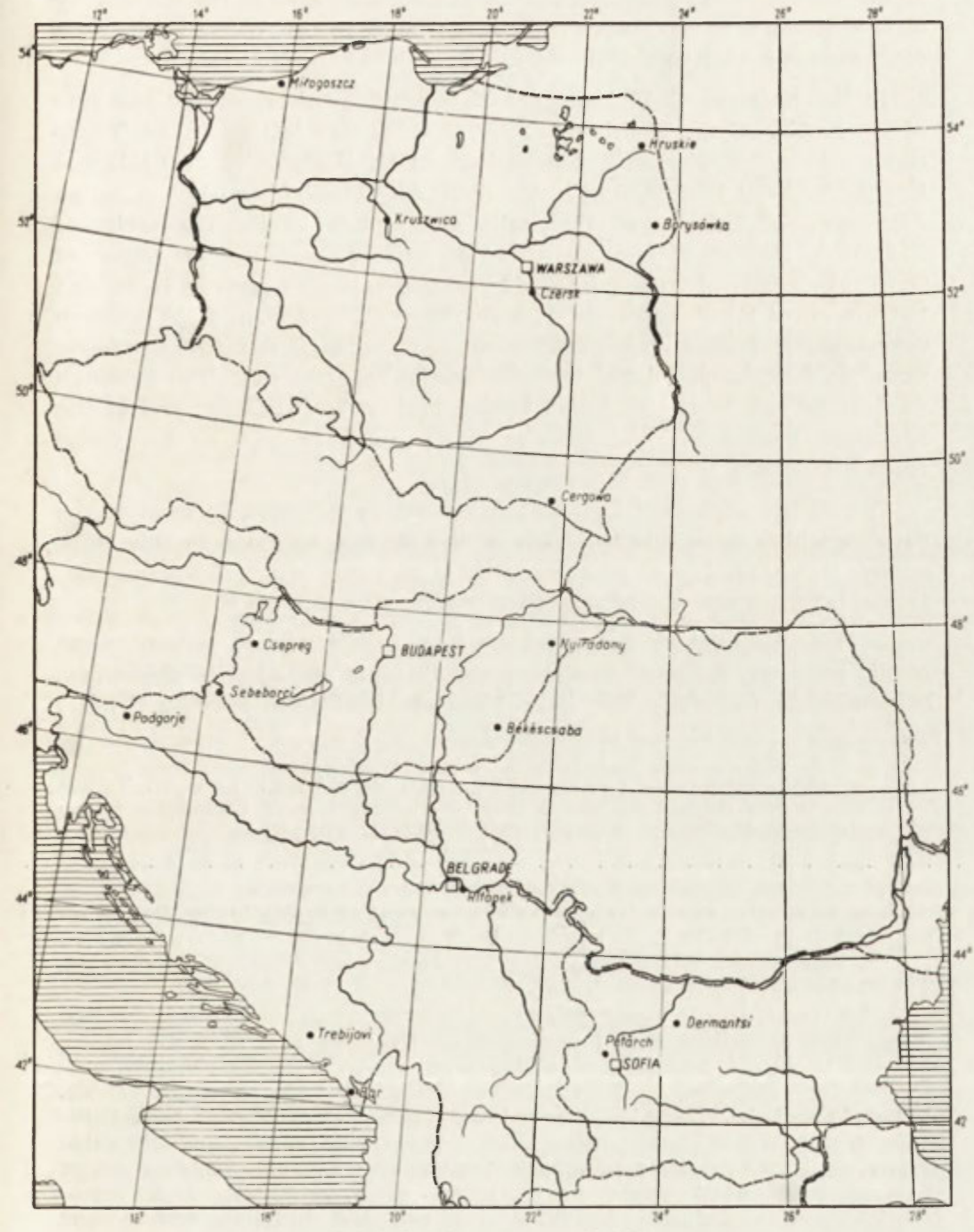
[6] On the Polish side in the research participated: J. Kostrowicki, R. Szczęsny, D. Kowalczyk, and W. Jankowski. From Yugoslavia in the area of Barsko Polje — M. Sušič from Institute of Geography in Belgrade who was working on a monograph of this area; in the area of Trebinje — a team of research workers from Institute of Geography of Ljubljana University led by V. Klemenčič and composed of P. Habič D. Jelič, M. Jersič, C. Vojvoda, M. Vojvoda; in the area of Kamnik — the above mentioned plus S. Ilesič; in the area of Belgrade — M. Lutovač, V. Djurič, J. Ilič, and L. Sretenowič from the Jovan Cvijič Institute in Belgrade and the University of Belgrade.

other hand, to check and develop, on the basis of uniform studies of the concrete examples taken from countries under various natural and socio-economic conditions, the methods of a geographical typology of agriculture, this is a problem of fundamental importance both, for scientific reasons, and as a starting point for areal planning and programming of agriculture (regionalisation and specialisation) — indeed a problem of considerable practical value.

The Department of Agricultural Geography of the Institute of Geography of the Polish Academy of Sciences took upon itself the realisation of this task. Hungarian, Rumanian and Czechoslovak geographers working on those problems were also approached and the ready Bulgarian papers were sent on to them as a model. The relevant Polish examples were prepared too. Because of the limited size of the publication the abundance of material collected, had to be considerably reduced. The final selection included 5 Polish papers. 5 Yugoslav. — of which 3 were prepared independently by the Institute of Geography of the University of Ljubljana and 2 (Barsko Polje and Ritopek) were a result of joint field research, Trebinje was omitted in favour of the more characteristic Trebijovi, Križ and Šmarca in favour of the nearly Podgorje. Omitted was also Železnik which was found not to have much interesting. Then 2 Bulgarian papers dealing with Petărch and Dermantsi (omitted was Lazar Stanevo situated nearby and with few differences) and finally 3 Hungarian papers sent in by the Institute of Geography of the Hungarian Academy of Sciences. The editor and the authors of this study are particularly indebted to Miss Elizabeth Gunn, graduated at the University of Cambridge, Britain, who read and corrected the English translations of all the papers, to Mr W. Jankowski and Mr W. Gadomski active preparing for printing and checking maps, graphs and tables and to Mrs D. Kowalczyk and Mrs W. Tyszkiewicz who were busy with organizational matters of this publication.

This volume contains, therefore, 15 papers in all, the remaining ones to be published at a later date, which is the more justified as the cooperation in this field is under way. In the Spring of 1963 a group of Yugoslav geographers[7] stayed in Poland carrying out field research

[7] The team was composed of: V. Djurič and M. Milojevič of Belgrade and V. Klemencič, M. Vojvoda from Ljubljana. On the Polish side in this research participated: W. Biegajlo, D. Kowalczyk, S. Hauzer, W. Tyszkiewicz, W. Stola, H. Piskorz-Skocka, W. Gadomski from the Institute of Geography, Polish Academy of Sciences and M. Matusik and M. Klinkosz from the Higher Scool of Education in Gdańsk.



Map 1 Distribution of investigated areas

in the county of Kartuzy, on the Cassubian lake district, in the county of Jelenia Góra in the Sudeten mountains and in the Warsaw suburban zone (in the vicinity of Wilanów).

In the Summer of 1963 a team of research workers of the Institute of Geography of the Polish Academy of Sciences [8] left again for Yugoslavia where together with geographers of the University of Ljubljana they carried out joint studies in the district of Maribor and in the Julian Alps north of Bohinj and then with geographers of the University of Zagreb — joint studies on the Croatian Adriatic coast in the region of Omiš near Split. In August 1963 Slovak geographers [9] arrived in Poland to train about Polish research methods. They also did some field research near Warsaw. In September 1963 a Polish team [10] left for Hungary to do some field research jointly with Hungarian geographers. The research was carried out in the region of Badacsonyi on lake Balaton and in the region of Kalocsa on the Danube in the southern part of the Great Hungarian Plain.

The Polish method of land utilization survey followed in most of the surveys which constitute the basis of the studies, included in this work as well as the method of presenting them on maps is a well known one. It has been presented and described on many occasions [11].

In this introductory paper I should like, however, to present some of the methods, followed in the papers that are included in this work, of processing materials that have been obtained from surveys. Unlike

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[8] Consisting of: W. Biegajło, S. Hauzer, D. Kowalczyk, W. Tyszkiewicz on the Polish side and a team of the Institute of Geography of the University of Zagreb led by I. Crkvenčič, that of the Institute of Geography of the University of Ljubljana led by V. Klemenčič as well as M. Bračič and B. Belec from the Higher School of Education in Maribor.

[9] V. Lobotka and J. Paulov while on the Polish side in the field work participated: H. Piskorz-Skocka, R. Szczęsny, and. W. Gadomski.

[10] Consisting of: R. Szczęsny, W. Jankowski, D. Kowalczyk, W. Stola.

[11] Instrukcja szczegółowego zdjęcia użytkowania ziemi. (Instruction for the detailed land utilization survey). Dokumentacja Geograficzna. 1962, 2, 129 pp. J. Kostrowicki. Badania nad użytkowaniem ziemi w Polsce (Research studies on land utilization in Poland). Przegl. geogr. 31 (1959), 3—4, pp. 517-533. J. Kostrowicki. The Aims, Concept and Method of the Polish Land Utilization Survey. Dokum. geogr. 1960 3. J. Kostrowicki. Polish Land Utilization Survey. Problem of Applied Geography. Institute of Geography. Polish. Acad. of Sciences. Geographical Studies No 25, pp. 45—69, Warsaw 1961. J. Kostrowicki. Le survey Polonais de l'utilisation du sol. Land Utilization. Methods and Problems of Research, op. cit. pp. 31—58.

a number of surveys made earlier [12] those studies apart from analysis and description of subject, object, ways and orientations of land utilization include also a large section devoted to a deeper analysis of production effects which makes it possible to define productivity and orientation of farming in the area under study thus providing a basis for typology of agriculture.

All the papers concerned start off with a presentation of the site and the natural conditions of the area under study, which was taken from the viewpoint of their utilization, chiefly agricultural utilization. The analysis, however, does not offer much new in the way of method. None of the authors has made an attempt to prepare a qualification map of the natural conditions from the viewpoint of any form of its utilization, or for that matter, a more precise evaluation of the natural conditions of the kind that may be found, say, in British surveys [13], and in works of the Soviet [14] or American [15] geographers.

Much attention is attached in all the papers to the subject of land utilization, that is social and ownership relations and all problems connected with agrarian structure. The authors discuss the differences between private, collective and state farming as well as those observed within private peasant farming. In this connection a distinction has been made between large scale farming, which under the socialist system are exclusively collective or state farms. These units are considered individually, and the small scale farming which because of the scale of studies is approached within the settlement units, that is villages. In the latter case an analysis is made of both subdivision of farms,

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[12] Cf. W. Biegajło. Gospodarka rolna na Żuławach Gdańskich. Wieś Radunica (Farming in Gdańsk-Żuławy. Village of Radunica). Przegl. Geogr. 29 (1957), 1, pp. 11—143. A. Jelonek. Z badań nad użytkowaniem ziemi w powiecie limanowskim (Quelques investigations sur l'utilisation du sol dans le district Limanowa). Zeszyty Naukowe Uniwersytetu Jagiellońskiego. Prace Geograficzne 1961, z. 4. W. Stola. Gospodarka rolna w strefie podmiejskiej. Wieś Bielawa. (Rural Economy in a Suburban Area on the Example of Bielawa Village). Przegl. geogr. 1962, z. 1.; as well as three volumes of the Dokum. geogr. (nr 1959, 1, 1960, 1, and no 1962, 6) containing a number of studies, based on Survey materials.

[13] Cf. L. D. Stamp. The land of Britain its use and misuse. III ed. London 1962.

[14] cf. J. P. Guerassimov. The Geographical Study of Agricultural Land. Geogr. Journ., 124. 1958 No 4. L. D. Armand. Geograficheskiye issledovaniya po otnosheniyu ispolzovaniya selskokhozyaystvennikh zemel. Sovetskaya Geografia. Moscow 1960, pp. 462—474; Vopr. geogr. vol. 43, Kachestvenny ouchot i otsenka zemel. Moscov 1958, and others.

[15] For example: cf. The Rural Land Classification Program of Puerto Rico. Northwestern University Studies in Geography No 1. Evanston, Illinois 1952.

fragmentation of land and the field pattern. Without inquiring into the origins of those patterns, as is the case in a number of French and German studies; the papers distinguish and consider the patterns from the point of view of how far reasonable they are, those connected with nucleated settlement as, for instance, strip („*łan*"), common („*niwa*"), allotment (block) patterns and those connected with dispersed settlement as, for instance, colony and large farm patterns.

Other problems, that are ways, orientations and sometimes effects of land utilization are considered within the framework of the particular forms of land utilization. It will be observed here that in every case quantitative proportions between the particular forms of agricultural and non-agricultural land utilization are studied. For reasons that are quite clear, in most cases, arable land attracts most of the attention. In this case under close study are methods of land cultivation, manuring, level of mechanisation, crop rotation systems and so on and finally, according to the method worked out in the Polish Land Utilization Survey, so called orientations in the utilization of arable lands are defined. This method calls for some explanations.

Having in mind the fact that arable land utilization changes from year to year and, therefore, there is no point to mark topographically on maps the areas occupied by crops actually grown as they will not, probably, be valid the next year; and taking into account also that marking the particular plots in the accepted scale of 1 : 25 000 or 1 : 10 000 would be hardly feasible, the Polish Land Utilization Survey resolved at the very inception of its operation to present arable land utilization according to proportions between areas under particular crops within the smallest investigated units which it was agreed — as was already mentioned — would be villages in the case of small scale farming, and particular farms in the case of large scale farming (minimum 100 ha in size). However considering the large number of crops grown and their complementary character, an analysis of the share of the particular crops [16] would fail to produce a clear-cut picture and so it was decided at the very outset to group them as is customary in Polish agricultural literature by division into cereals, ridged up crops, fodder crops and industrial crops. When applied practically it turned out very soon, however, that this grouping was inconsistent and though based on various criteria [17], is inadequate as a basis for quantitative studies of land

[16] As J. C. Weaver did in his studies, (see for instance Crop Combination Regions in the Middle-West. The Geographical Review 44(1954), 2 and later works by this author).

[17] Polish statistics single out, for example, cereal plants, pod plants, ridged up plants, fodder plants and industrial plants. This grouping confuses agronomic

utilization orientations. It was agreed therefore that in such a situation a new system of grouping was necessary for these studies, one based on agronomic foundations, that is on differences between particular crops in as far as their requirements are concerned with regard to the habitat, ways and means of cultivation and taking care, their part played in crop rotation and particularly the part they play as fore-crops, and last but not the least — on the volume of input (intensity). This system of grouping divides crops into three sections: 1. intensifying or intensive crops, 2. structure forming or structure building crops and 3. group which can be termed as exhaustive, extractive, extensive or soil depleting crops. In agreement with the premises accepted within the group of intensifying crops were included plants calling for greater input of labour and means, demanding more careful land cultivation and manuring so that they enrich the site and are beneficient for subsequent crops. The structure forming plants do not necessitate considerable inputs but owing to their provision of nitrogen into the soil they manage to keep its crumb structure and therefore are also a welcome fore-crop. The third group are the soil exhausting or depleting plants the cultivation of which leaves soil in a state which calls for a special action or a proper rotation in order to restore its fertility, otherwise soil tends to become degraded.

Distribution of all cultivated plants into these three groups does not offer major difficulties although there exist a number of transitional forms as, for instance, some industrial plants like rape, flax etc. which can be either good or bad fore crops depending on the methods of their cultivation. Depending, therefore, on the way they are cultivated we have included them in group one or group three. On account of their importance for intensive agriculture these papers have included them, though perhaps, not always quite correctly, into the group of intensive crops. Since they are nowhere cultivated over large areas a possible error will not distort much the over-all picture.

This grouping constitutes the basis for defining the orientations of arable land utilization as presented on the land utilization map and

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criteria (ridged) and economic (industrial, fodder plants), while certain groups are classified according to the shape of the pericarp and so on. The inconsistence of this grouping is brought out by the fact that in accordance with accepted criteria a number of plants can be well classified into several groups at the same time. For example, sugar beet is both an industrial and ridged up plant, maize is cereal and ridged crop, fodder beet — both ridged plant and fodder plant; lupine, serradella and field peas — are pod crops as well as fodder plants and so on. Grouping systems followed in other countries are also inconsistent to smaller or greater extent.

distinguished in the text of this work. The distinction is based on an analysis of the share that particular groups of plants have in the total sown area, then, also on domination or co-domination of particular plants in each of the groups. Just as in the Polish land utilization survey special symbols have been used [18] in order to facilitate recognition of the characteristics of the particular orientations.

Separately dealt with were the perennial crops, that is tree and bushy plants in the first place (orchards, small fruit bushes, vineyards) and the semi-perennial plants, that is herbaceous plants cultivated on one site for several years without crop rotation (hops, strawberries, rhubarb, and such like). Methods of approach to this group of plants have not been developed as well as those with regard to plants cultivated on arable land; one of the reasons being that they do not occupy large areas in areas dealt with most of the papers. First of all a line is drawn between home-yard orchards- on the one hand, and orchards or plantations that are commercial in character, on the other, and then also a point is made of whether they are areas with a uniform cultivation or, perhaps, where inter-cultivation is a regular feature and so on. However, since only one paper deals with an area (Barsko Polje) where interminglement of the perennial and annual crops becomes a common feature so much so that is hardly possible to separate the areas occupied by them (so called *coltura promiscua*) — the method of presentation of this problem both in a study and on a map has merely a tentative character and it ought to be corroborated with further works.

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[18] The orientation of arable land utilization is determined on the basis of the share of the three fundamental agronomic groups of crops and on the prevalence in them of particular plants. As limit values have been accepted 20, 30, 40, 60, 80% of the area sown. Unless the share of the given group is not in excess of 20% of sown land — it is ignored. A share ranging from 20 to 30% is regarded as accompanying, that from 30 do 40% as secondary, that from 40 do 60% as equal, that over 60% as prevailing and that over 80% as dominant. The dominant crop is the one whose share within a group is relatively prevalent, granting, however, that if the next crop takes over 80% of the area of the first one it is regarded as co-dominant. For the sake of comparison purposes symbol *E* has been accepted to denote exhaustive crops, *I* — means intensifying crops, *S* — structure forming, while non-capital letters for particular crops: *wh* — wheat, *ry* — rye, *pt* — potatoe etc. (table I). The approach to after and inter crops is controversial. In the papers in question after crops were taken into account when determining orientation, provided there was available data to do this. In such cases the area actually sown, and not total area of arable land provides the basis for calculations. On the other hand, crops intercultivated with perennial crops, that is to say unconnected with arable land in the strict sense of the term, were not taken into consideration.

Permanent grasslands, on the other hand, play a prominent role in all the papers concerned. They are extensively discussed from the point of view of the method and extent of their cultivation- i.e. uncultivated, partly cultivated, drained, irrigated, fully improved — and so on and from the point of view of the way they are utilized- i. e. mown, grazed or mixed. A point is also made as to the product they chiefly supply.

Since all phytosociological classifications followed either here or elsewhere, for that matter, are divergent as well as difficult in application in field studies of larger areas, most of the papers concerned accept, to bring out the differences in quantity and quality of the forage produced — the classification followed in the Polish land utilization survey which is based in the main on the habitat conditions. Because neither in Poland nor in entire Central Europe there are many natural associations of grassy vegetation (alpine meadows, xerothermic associations) while an overwhelming majority of grasslands came into existence as an effect of forest clearance and the continual interference by man in the form of mowing or grazing which prevented forest growth, this classification makes a reference to the original forest habitat and especially to the four main types of forest of Central Europe, that is:

1. *Bor* or coniferous forest occuring mainly on a sandy substratum or a sandy-clayey (loamy) substratum under which, podzolization processes go on, which yield, as a result, acid, infertile habitats (poorly humous), that in the case of forest being driven out are overgrown with either dwarf shrub associations (heather, various bilberries, bog whortleberry, marsh tea — *Ledum palustre* and so on) or with poor grasses hardly of any fodder value (mat-grass, dune grasses and so on).

2. *Grond* or broad leaved forest occuring on a more compact substratum i.e., clay or silt deposits, more or less abounding in calcium carbonate under the layer of which more humous brown forest soils there are formed. Among the grond forests beech gronds, beech-fir gronds, hornbeam-oak gronds and oak gronds or *dąbrowa* are singled. In this group are included also the various natural shrub associations bearing the character of wooded steppe. Grond forest clearings are overrun by grassy plants, mostly low, dense and rather dry but of high quality and valuable as fodder. The productivity and type of these associations does not depend only on the original habitat but also on the way natural fertilization actually followed. The poorest are associations situated on hill tops, irrigated only by rainfall which means actually that they are not fertilized from anywhere. Much better are associations situated below the forest belt and inundated by

water flowing from them, the extent to which they are fertilized depending on the wealth of the forest ground cover and litter. The best, however, are so called *popławа* associations, that is the ones which are fertilized by water coming down from fields. The wealth of those associations depends in this instance also on the natural fertility and on the manuring of the fields. It results from the above, therefore, that the overall quantity and quality of fodder obtained from the *grond meadows* may differ greatly.

3. *Łęg,* that is broad-leaved, deciduous forest, typical of periodically inundated habitats with a good horizontal water-flow which means they are constantly fertilized and free of acidity. On the disappearance of forest they turn into grassy associations composed in the main of grasses whose exuberance is conditioned by the quantity of water and kind of river alluvia (alluvial muds, sands, stones).

4. *Ols,* that is broad-leaved decidous forest, mainly that of alder--trees occuring mostly in permanently waterlogged habitats with insufficient drainage and with the resulting development of peat bog forming processes. On destruction of the forest the habitats (valley bogs) turn into bog meadows (*bielawa*) fairly exuberant but of small fodder value on account of the predominance of sedges [19].

Closer studies have brought out that this classification does not fully correspond to the conditions prevailing in countries farther to the South like Bulgaria or Yugoslavia. To be more adequate, this classification ought to be extended particulary in as far as the large area associations of secondary xerophylous vegetation, either grassy or mixed, grass--shrubby, an extreme example of which may be provided by the Mediterranean associations of evergreen shrubby vegetation known as *maquis, macchia, garrigue, šibljak, frigana* and so on.

Under the Polish land utilization survey forest classification was originally based on the above mentioned habitat typology. With the development of research it appeared that a considerable number of forests embraced by the studies forms artificial associations having but slight connection with the original habitat, this typology has been retained for the sake of comparison only, while the actual characteristics of forests has been based on the existing stand structure taking into account primarily the forest building elements [20]. In addition an exami-

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[19] For more see: J. Kostrowicki. The Agricultural Problems Involved in the Polish Land Utilization Survey. Land Utilization. Methods and Problems of Research. op. cit. pp. 92—110.

[20] Marked on the map are only those trees whose share constitutes at least 20% of the stand and no more than three different species (see key to the map).

nation is made of methods of management and utilization of forests, exploitation without management and the methods adopted, clear cutting system, selective or group felling system, partial exploitation (protective forest) or absence of exploitation and management (natural reserves) and in case of clear cutting system-also stand age structure Degraded or under-developed forms of forest, that is thinned stands, coppice stands, shrub and dwarf-shrub associations and so on are also taken into account.

In the areas under examination waters did not play a major role. In other studies they are examined from the point of view of both, types of waters, manner and purpose of their utilization and their character in the sense of their utilization for fishing as for instance: 1. fresh waters, among which a distinction is made between oligotrophic, eutrophic and distrophic waters, 2. brackish waters and 3. salty waters.

In as far as settlement is concerned the studies make a distinction, first of all, between dispersed and nucleated settlements and among the latter category — a distinction between loose or compact lay out low building, middle and high building. A description is provided of the building materials used, the sort of roof cover and so on. Mention is also made of industrial, mining, industrial-agricultural, commercial, road transport, public utility and recreational areas etc.

Finally, a description is also provided of the type and possibility of improvement of natural and artificial waste land, wherever it occurs.

The second part of every paper is devoted to agricultural production and most of the papers strive to define productivity and orientation of agricultural production in the areas under study, while some of them go as far as to check on labour efficiency and farming marketability as well.

Definition of plant production does not offer difficulties generally speaking for all the papers could make use of more or less precise data on the productive areas and yields. Only the yields collected from meadows and pastureland are based on approximate estimates. Some papers make a mention also of such side-products as grain straw, sugar beet foliage etc. whose production has been defined according to estimates as well.

A much more difficult proposition is the defining of animal production. All the papers try, first of all, to analyse intensity of livestock breeding by means of indices illustrating the number of animal heads per area unit, for particular kinds of animals, and by having reduced them to comparable units through adoption of so called big animal

units [21]. On the other hand, as far as the production proper is concerned, the authors never had full data at their disposal. At best in some cases they could obtain data on the sale of animal products by state farms or collective farming. At the same time no data on the amount of production consumed on the spot was available and particularly the production obtained by members or labourers of those farms whose share in the overall animal production is usually quite considerable. As regards small scale peasant farming there were no data available at all on animal production. What the authors could obtain were such elements only as age structure (not as a rule) of livestock, average cow ar sheep lactation, average weight of animals, average wool yield per sheep, eggs per hen and so on. From these data it was possible to evaluate the amount of milk, wool, eggs production and so on, whereas it was much more difficult to evaluate meat stock production where data on numbers sold, or destined for slaughtering, were not usually available and had to be calculated out from estimates derived approximately from herd structure, and from basis of their probable rotation (birth rate, number of culled stock to be slaughtered in proportion to herd age structure, and the like) with a definite orientation of animal production (beef or dairy in cattle breeding, bacon, pork or lard in pig breeding and so on).

Since a part of the plant production of every farm is fed to livestock on the spot, thereby turning into animal production, taking into account the one and other results in certain elements of agricultural production being counted twice and this means distortion of the orientation definition through a privileged treatment of plant production. In this connection there arose a problem of what to accept as the final effect of agricultural production - should it be the total production, brutto or gross, or, perhaps, should it be the total production minus the products that have been used up on the farm productive ends, that is to say net production. Also, because data on the part of such multi--purpose products as potatoes or grain used up on farms as fodder were hard to come by, and the point was to create a common basis for definition of not only production orientation but of productivity, efficiency, marketability and so on — the study adopted gross production as a basis for further calculations.

Again, since the various elements of agricultural production are

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[21] So called big (500 kilogrammes) animal units generally accepted in Central Europe. cf. A. Blohm. Angewandte Landwirtschaftliche Betriebslehre. Stuttgart 1957 (table II).

counted in different units and it is established that the weight of the various products can hardly serve as measure reflecting their importance or utility, it was recognised as indispensable to accept an appropriate comparable unit as a common measure. Such an unit may either be a currency unit or a conventional unit based on a natural basis.

Because of the comparative character of this work adoption of the currency unit would not be appropriate, despite all its advantages, for currency values for the various countries cannot possibly be compared. The point is not that the exchange rates of the currences of the socialist countries do not fully reflect differences in their purchasing power nor is it that there are different prices on agricultural products in the various socialist countries. As a matter of fact in very few countries nowadays are agricultural prices governed by a free interplay of supply and demand. In most countries prices are shaped by the economic policy of the given country, through subsidies, customs tariffs etc. and therefore, they are not comparable between various countries. Again, prices for agricultural products within one country are also highly variable in time and space (though in the socialist countries this is less obvious than in other). In a word the currency unit as a measure of the agricultural production has been found inadequate at least for comparative studies carried out for different countries. For these reasons all the papers included in this volume, with the exception of Hungarian ones, have adopted as a common measure, a conventional unit viz: a grain unit which despite all its deficiences is better suited for comparative areal studies than any other [22].

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[22] So called grain units nowadays widely used in Central Europe have been worked out on the basis of starch and protein content given in calories, with relationship to the amount of those components in cereals. A certain shortcoming of this measure unit is first of all the fact that a number of cultivated plants or animal products is not meant to provide either starch or protein (fruits, for instance) or even is not meant for consumption at all (fiber plants, wool, sheepskin, tobacco and so on). Measure units in such cases have been worked on the basis of different criteria, mainly input-output comparisons with relation to cereals. There are opinions voiced that grain units reduce the importance of animal products for which they were worked out on the basis of quantity of fodder required for their production. Compare E. W o e r m a n n. Ernahrungswirtschaftliche Leistungsmasstabe. Mitteilungen für die deutsche Landwirtschaft. 39 Jahrg. Heft 36 (1946) or Richtzahlen und Tabellen für die Landwirtschaft. Institut für Agrarokonomik des DAL. Berlin 1955. Those measure units are also quoted by A. Blohm. op. cit.

The above mentioned tables did not embrace all agricultural products harvested in the countries under examination, particularly in Yugoslavia and Bulgaria. In this connexion measurements units have been worked out according

Productivity of a given farm as a whole [23], or, of particular sections of agricultural land has been obtained from the divisions of the sum of grain units produced at the farm by the area of agricultural land, while approximate data on labour efficiency have been found from division of the sum of grain units by the number of people employed in agriculture.

The share of particular branches and sections of agriculture in the gross agricultural production has also been the basis for the definition of farming orientation or orientation of agricultural production in the given area.

And here again, because of their great number, it was realized that it was necessary to group together the particular elements of plant and animal production which have similar characteristics or similar productive ends. Since, as it was mentioned earlier, the grouping method followed so far has been found divergent and inconsistent and, hence, incompatible with quantitative field research while a special grouping method adopted for land utilization research purposes was based primarily on agronomic criteria, less important for examination of effects of production, the papers included in this volume (with the exception of the Hungarian ones) adopted another grouping that was based on economic criteria. In accord with the purpose or destination of the given product this grouping divides crops into food, fodder, and industrial crops, granting — in each of them — a number of sub-groups. Despite the fact that this division system adopted is fairly evident it cannot be looked upon as universal, because one and the same plant may well serve different purposes in various countries or regions.

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to the above principles, on the basis of products closest to those mentioned in the tables (tabl. 3).

Hungarian geographers object to the use uf grain units. This matter is discussed by G. Enyedi. A mezogasdasagi korzetek kutatasanak uj módszererol. Agrartudomanyi Egyetom agrarkozgasdasagi kar kiadvanyi. 3 (1957), who applies average market price for one kilogram of product in the whole of Hungary and multiplies it by the yields of particular plants harvested and so obtains productivity in forints per hectare. This method has been followed in the three Hungarian papers included in the volume. However, to make the data comparable with those in other papers the editor of this work has gone all the way to calculate them into grain units as well.

[23] The following scale of productivity has been worked out:
1 — under 12 grain units from 1 ha — very low
2 — 12 — 24 grain units from 1 ha — low
3 — 24 — 36 grain units from 1 ha — mean
4 — 36 — 48 grain units from 1 ha — high
5 — over 48 grain units from 1 ha — very high

Besides, the fact that one and the same plant products are utilized in various proportions for various purposes even at the same farm offers certain difficulties in the application of this grouping.

In the papers in question being based, in the main, on field studies it was possible to define the manner of utilization of the agricultural products. This is to say that, as a result, the share of particular groups and elements of plant production in the gross production could be determined and this has created the basis for determining orientations of plant production as a whole. Following a similar method as for determining orientations of arable land utilization one can, in case of need, also determine orientations of the various sections of plant production, as, for instance, food crops, fodder crops or industrial crops and even more: determine within those groups for example orientation of production of grains, fruits, rough fodders and so on.

In as far as animal production is concerned the grouping method for determining orientation is not very clear so well. The most frequent grouping followed is that according to kinds of animals and one speaks, for example, about cattle breeding orientation, pig orientation, sheep orientation and so on. This method, however, is far from adequate for the same kind of animals may provide various products while different kinds of animal often provide similar, complementary products to mention only cow and sheep milk; beef, pork, mutton and so on. An intermediate method has been, therefore, adopted in those papers determining the orientation on the basis of both: kind of animal and sort of product. Consequently there are singled out orientations of: meat, milk, wool and so on with predominance of dairy or beef cattle, pork or lard pigs, then milch, wool, sheepskin or mutton sheep, egg or meat poultry and so on.

A comparison drawn between plant and animal production allowed one to determine agricultural production orientations as vegetable, animal, or vegetable-animal, then vegetable with animal and finally animal with vegetable. Appropriate symbols[24] had to be introduced

[24] The following method has been employed. First considered is the proportion between plant production (V) and animal production (A) with the scale of 20%, 40%, 60% and 80% as a basis. A share of any of the branches of agricultural production that falls under 20% was resolved to be regarded as irrelevant, that between 20 and 40% — as accompanying (1), that between 40 and 60% — as equal ((2), that between 60 and 80% — as prevailing (3) and that over 80% — as dominant ((4). Proceeding in this way the main orientation was found to be either highly vegetable (A ⟨ 20%), or highly animal (V ⟨ 20%), vegetable (V_3A_1) or animal (V_1A_3) (or mixed one — vegetable—animal or animal—vegetable (V_2A_2). Then, within

here for the purposes of comparison, similarly as in the case of determination of orientations in arable land utilization.

The particular papers were only slightly concerned with marketability of agricultural production. Leading in this respect are the Hungarian papers with give a most comprehensive treatment to this issue. The remaining papers either merely enumerate the commercial elements of agricultural production or ignore them altogether. This is a consequence most frequently of lack of data on marketability of peasant farming as well as the absence or ignorance of the proper methods of evaluation.

Although they obviously failed to provide a fully display of typological features of agriculture the 15 papers included in this volume became a basis for an attempt at a typological synthesis of land utilization and agriculture in the areas covered by the studies which follows at the end of this publications.

Because of a too scanty representation, a lack of a number of typological features and in many cases a defficiency of research methods suitable for spatial studies on agriculture the factual results of the synthesis must not be overestimated. It constitutes solely an attempt at arranging and checking through concrete, factual material the research tool and techniques worked out for the sake of a typological spatial synthesis of agriculture.

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the framework of vegetable or animal production particular sections were taken into account (food production, fodder production, industrial production, dairy production, meat production and so on) whose share in gross production was in excess of 20% and in that way the element that prevailed in the given section could be singled out. If 2 or 3 elements prevail relatively (that is to say that the second in turn constitutes over 80% of the first) they are taken into account. If neither section of agricultural production exceeds 20%, element or elements relatively prevailing are taken into consideration. In that way, for instance, $V_3(a_1wh,ry + f_1mz + i_1bs) + A_1(dc \times pk)\ m,\ l$ means that this is a vegetable orientation $80\% \rangle V \rangle 60\%$ while animal production with $40\% \rangle A \rangle 20\%$ of the gross production is the accompanying element; alimentary crops (*a*) occupy 20—40% with relative prevalence of wheat (*wh*) and rye (*ry*) — the share of the latter being over 80% of the share of wheat; fodder crops (*f*) provide also 20—40% of the gross production with maize (*mz*) prevailing, industrial crops likewise give 20—40% with prevalence of sugar beet.

In animal production prevalent are equally both milk (*l*) and meat (*m*) production. The cattle of dairy orientation (*dc*) prevailing and pigs with meat (pork) orientation prevailing (*pk*) dominate together over other kinds of productive animals. The share of neither of them exceeds 20% of the gross production.

The whole symbol is preceded by a figure indicating the degree of agriculture productivity 1, 2, 3, 4, 5 (see note 24).

APPENDIX

LIST OF ABBREVIATIONS IN THE FORMULAS

A — animal production
a — food crops
ap — apples
at — apricots
b — beef
bf — fodder beets
bl — barley
bs — sugar beets
bu — buffaloes
c — cattle
cb — beef cattle
cd — dairy cattle
ch — cherries
cs — sour cherries
cv — clover
d — dairy
E — extensive (exhaustive) crops
e — eggs
f — fodder crops
fg — figs
fr — fodder roots
ft — fruit crops
g — grain crops
gt — goats
h — rough forage
hn — honey
I — intensive crops
i — industrial crops
l — milk
lc — lucerne
lp — lupine
m — meat
mb — malting barley
mh — meadow hay
mx — mixtures
mz — maize
ol — olives
or — oranges
ot — oats
p — pigs
pc — peaches
pg — pomegranates
pk — pork
pl — poultry
ps — pastures
pt — potatoes
r — root crops vegetable
rp — rape
rr — rearing
S — structure forming crops
s — succulent forage
sh — sheep
sm — mutton sheep
sr — serradella
st — straw
sw — strawberries
V — vegetable (plant) production
v — grapes
vg — vegetables
w — wool
wh — wheat
wm — wool sheep
++— full manuring
+ — part manuring

LIST OF MEASURES

c — centigrade
cm — centimetres
ha — hectares
hl — hectolitres
kg — kilograms
km — kilometres
l — litres
m — metres
min — minutes
mm — milimetres
ps — pieces
q — quintals
t — metric tons

BIG ANIMAL UNITS

Horses	
foals up to 1 yr old	— 0.6
horses 1—3 yrs old	— 1.0
horses over 3 yrs old	— 1.2
Donkeys	— 0.5—0.7
Mules	— 0.7
Cattle	
veals up to 6 months	— 0.12
heifers 6—12 months old	— 0.4
heifers 1—3 years old	— 0.7
cows	— 1.0
bulls, oxen	— 1.2
Buffaloes	
veals	— 0.3—0.7
cows	— 1.0
bulls	— 1.2
Pigs	
piglets up to 6 months	— 0.05
pigs 6—10 months old	— 0.25
pigs over 10 months old	— 0.3
Sheep	
lambs up to 1 year	— 0.05
sheep grown up	— 0.1
Coats	— 0.08
Poultry	
hens	— 0.004
chicken	— 0.002
ducks	— 0.005—0.006
geese	— 0.007—0.008
turkeys	— 0.006—0.008

4. GRAIN UNITS

a. Plant Production

for 100 kg

almonds	— 2.0	figs	— 0.6
apples	— 0.4—0.5	flax, seed	— 1.0
apricots	— 0.5	flax, straw	— 0.25
barley	— 1.0	fodder mixtures, grain	— 1.0
beans, grain	— 1.2—1.5	fodder mixtures, green	— 0.13
beans, snap	— 0.25—0.30	fodder mixtures, hay	— 0.4
beet, root	— 0.15	fodder roots	— 0.1
beet, fodder	— 0.1	garlic	— 0.3
buckwheat	— 1.0	gooseberries	0.5
cabbage	— 0.15	gourds	— 0.2—0.3
carrots	— 0.15	grapes	— 0.5
carrots fodder	— 0.1	hay, meadow	— 0.2—0.4
castor oil plant	— 2.0	hemp, seed	— 0.7
cauliflower	— 0.15	hemp, straw	— 0.25
cherries	— 0.4—0.5	kale	— 0.1
cherries, sour	— 0.4—0 5	leguminous mixtures, green	— 0.13
chicory	— 0.25	leguminous mixtures, hay	— 0.4
chive	— 0.3	lemons	— 0.5
clover, green	— 0.15	lucerne, green	0.15
clover, hay	— 0.4—0.5	lucerne, hay	— 0.4—0.5
clover, seed	— 5.0	lucerne, seed	— 5.0
coriander	— 2.0	lupine, grain	1.5
cucumber	— 0.25	lupine, green	— 0.13
currants	— 0.5	lupine, hay	— 0.4
field pea, green	— 0.15	maize, grain	— 1.0
field pea, hay	— 0.4	maize, husks, stems, foliage	— 0.15—0.25

maize, milk ripe stage	— 0.13	potatoes	— 0.25
maize, siloed	— 0.11	pumpkins	— 0.2—0.3
mandarines	— 0.5	quinces	— 0.4—0.5
mangolds, foliage	— 0.1	rape, seed	— 2.0
mashlum	— 1.0	rape, straw	0.7
meadow hay	— 0.2—0.4	raspberries	— 0.75
melon	— 0.3	root crops, seedlings	— 2.0—3.0
meslin	— 1.0	rye	— 1.0
millet	— 1.0	rye, green	— 0.11
mixed corn	— 1.0	rye, siloed	— 0.11
mixtures grain	— 1.0	sainfoin, seed	— 5.0
mixtures hay	— 0.4	serradella, green	— 0.11
mixtures green	— 0.13	serradella, hay	— 0.3—0.4
olives	— 1.5	serradella, seed	— 2.0
onion	— 0.3	straw (spring cereales)	— 0.15
oranges	— 0.5	straw (winter cereales)	— 0.1
paprika	— 0.3	strawberries	— 0.60—0.75
pasture	— 0.2—0.4	sugar beets, foliage	— 0.1
peaches	— 0.5	sugar beets, root	— 0.25
pears	— 0.4—0.5	sunflower	— 2.0
peas	— 1.2	tobacco	— 2.0
peas, green	— 0.3	tomatoes	— 0.15
peas, field, green	— 0.15	vetch, green	— 0.13
peas, field, hay	— 0.4	vetch, hay	— 0.4
persimmons	— 0.45	walnuts	— 2.0
plums	— 0.5	watermelon	— 0.3
pomegranates	— 0.4	wheat	— 1.0
poppy, seed	— 2.0	yezhova glava, seed	— 3.0

b. Animal Production

eggs (100 pieces)	— 0.25	pork	— 5.0
honey (100 kg)	— 2.0—4.0	poultry	— 6.0
meat (100 kg live weight)		veal	— 5.0—6.0
beef	— 6.0	milk (100 l.)	
buffalo	— 6.0	buffalo	— 0.9
veal buffalo	— 5.0	cow	— 0.70—0.75
fish	— 4.0—6.0	goat	— 0.75—0.90
lamb	— 6.0	sheep	— 0.80—0.90
mutton	— 6.0	wool (100 kg)	— 40.0
piglets	— 5.0		

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BORYSÓWKA, GRODZISKO AND HRUSKIE VILLAGES IN THE NORTH-EASTERN UNDEVELOPED CORNER OF POLAND

The land use survey, and several other investigations carried on in 1955—1957 by the Institute of Geography of the Polish Academy of Sciences revealed that in the voivodship of Białystok situated in the north-eastern corner of Poland, the three field system in its classic form with fallow lying land, as well as in various transformed forms is still practiced especially in the south-eastern part of the region [1].

The preservation of this traditional system of farming up to the present time evolves from the coincidence of several natural, social-economic and technical conditions and factors.

The three field farming system appeared in the area of the present voivodship of Białystok, then a part of the Great Principality of Lithuania, not earlier than in the XVI century, and was introduced as a result of the agrarian reform of King Sigismund August [2]. From

[1] W. Biegajło, J. Tobjasz, Zagadnienie trójpolówki z ugorem. Wieś Grabowiec. (Three-field crop rotation with fallow system. The village of Grabowiec). Przegl. geogr., 25, 1957, No. 1, pp, 111—141.
W. Biegajło, Système d'assolement triennal en Pologne. „Kwartalnik Historii Kultury Materialnej" Ergon II Fascicule supplémentaire (1960), pp. 370—373.
W. Biegajło, Sposoby gospodarowania w rolnictwie województwa białostockiego. (Ways of farming in the voivodship of Białystok). Prace Geograficzne, Warszawa 1962, No. 35, p. 187.
W. Biegajło, The ways of transition from the three field system to modern farming as currently observed in Poland's underdeveloped region of Białystok. (Geographia Polonica, 2 (1964), pp. 153—158).

[2] L. Kolankowski, Pomiara włóczna. „Ateneum Wileńskie", Wilno 1927, IV.
W. J. Picheta, Agrarnaja reforma Sigismunda Avgusta v litovskorusskim gosudarstve. Moscow 1919, 2 vols.
D. L. Pokhilevich, Zemleustroystvo i pozemelnii katastr v Byelorussi, Litve Ukraine v XVI—XVII. Materiali po Istorii Zemledelia SSSR. Moscow 1952, v. 1.

the time of this reform until the time of land granting to peasants, i. e. until 1861—1864 the three field system dominated the farming of this region. It should be stressed that the Province of Białystok ranks among those areas in Poland in which the serfdom relations in agriculture were preserved for the longest time. This fact as well as the peripherial position of the Province, the peculiar policy of the czar's government towards the western borderland of the Russian Empire in the period of the partition of Poland, together with the poverty of the internal market and the unfavourable structure of agriculture was reflected in the heavy fragmentation of lands, the common use of grasslands, the preservation of various other rights of common grazing between village and landed estates and the exceptionally low level of farming education in this region. All these factors contributed to the fact that the traditional ways of land utilization, the application of more primitive tools, methods and systems of farming were preserved in the agriculture of this province for a longer time than anywhere alse.

The villages: Borysówka, Grodzisko and Hruskie given as examples in this paper were not chosen at random but selected intentionally. Those villages are characterized by similar social and economic status, similar agrarian structure, and fragmentation of heavily subdivided

phot. J. Tobjasz

Fig. 1. Białystok region, near Krynki. Rye on winter crop field harvested with sickle

land; they differ, however, from each other in site, natural environment and history.

At the same time these villages represent different stages of agriculture development in the framework of the traditional system of three field farming. The small villages of Borysówka (328,5 ha) and Grodzisko (176 ha) bordering upon each other are situated in the commune of Łosinka in the north-eastern part of Hajnówka county. The villages are in the vicinity of the highway from Hajnówka to the small country town of Narew, along which runs a bus service; in addition the railway line from Hajnówka to Narewka stops at Nowosady a distance of 5—7 km from the villages.

Both villages gravitate towards the small town of Narew and they participate in its periodical fairs and weekly markets; although they are situated only 10—12 km from the larger county town of Hajnówka, this is a relatively new industrial settlement and has not developed sufficiently its service functions. The territories of both villages border in the east the great complex of Puszcza Białowieska (Primeval Forest of Białowieża); here in small clearings are situated the common pastures where the cattle belonging to the inhabitants of Borysówka and Grodzisko villages graze. The proximity of the great forest areas enables the local population to profit in the summer period by collecting berries and mushrooms for sale, and in winter time to get an additional job in the seasonal work of lumbering and timber transport.

The site of the village of Hruskie is similar with small exceptions relating to transport facilities.

The village of Hruskie covering an area of 240 ha is situated in that part of Augustów county which borders the outskirts of the great forest of Augustów (Puszcza Augustowska). The road from Augustów to the small town of Lipsk runs at a distance of 1 km from the village, and Augustów the county town is 20 km away.

1. NATURAL CONDITIONS

The natural conditions of Borysówka and Grodzisko villages considered from the standpoint of agricultural requirements, can on the whole be considered as rather favourable.

The territory of the villages is part of the ground moraine plain of Bielsk which lies at about 175 m above sea level.

The area is almost completely flat. The slight undulations east of the village of Borysówka do not exceed 5 m and are no hindrance in developing modern mechanized farming methods.

The soil conditions of the villages — in spite of the relatively small areas covered — are varied as is characteristic of areas of Quaternary glaciation.

Relatively good — light and medium podzolic soils formed on boulder clay deposits — are found in the village of Grodzisko. Somewhat lighter soils — heavy loams and clayey sands — appear in patches in the central area of the village, Field 1 and 2 (Fig. 1). Those soils which rank among the III and IV classes of soil productivity yield good crops of wheat, clover and sugar beet. Their stoniness is however a disadvantageous feature.

A similar soil type — of light and medium boulder clay podzolic soils — appears in the area of Borysówka village in the area bordering the village of Grodzisko which is covered by Field 1 (Fig. 1). The percentage of sandy soils (light loams and clayey sands) increases southwards where it forms a dominant soil type in Field 3. In addition waterlogged sandy soils (*saps*) or boggy soils are found in local depressions. On account of their bad drainage they are at present of small use.

The soils of the village of Borysówka when compared with those of the Grodzisko village are less fertile — being mainly of the IV and V class of fertility — they permit average crops of less exigent plants, i.e. rye, oats, potatoes etc.

The climatic conditions of the area under investigation [3] in spite of the more severe thermic conditions do not produce any difficulties in the cultivation of cereals, root crops and fodder plants, which are typical for central and eastern Poland. The medium annual temperature (for the period of thirty years) — 6,5°C. For the same period the medium monthly temperatures of the warmest months (July) and those of the coldest ones (January) are relatively + 17,5°C and — 5,5°C.

The vegetation season — on an average — about 200 days is sufficiently long not only, for growing and ripening the main crops, but also for their harvesting without special accumulation of work in the summer and autumn period, and for performing the after harvest ploughing, sowing of after crops, and winter ploughing. The spring frosts which appear here often as late as in the first 10 days of May cause a great deal of trouble for agriculture and particularely for fruit and vegetable growing.

The absolute minimum temperatures amounting in some years (1950 — Bialowieża) to — 38,7°C are also dangerous for fruit growing

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[3] Z. Kaczorowska, Klimat województwa białostockiego (Climate of the Voivodship of Białystok). Dokum. Geogr. 1958, No. 6.

and for some root plants (winter rapeseed, wheat) especially when there is no snow cover.

The rainfall amounts to about 550—600 mm per annum. This quantity covers almost entirely the needs of cultivated plants in these particular conditions because the coefficient of evaporation here is relatively small. In addition the distribution of rainfall over the year is very favourable, for about 2/3 of the rainfall falls in the vegetation season.

And within the vegetation season itself in particular months the quantity — of rainfall approximates to the optimum requirements for water of the main plants grown. Only in May and sometimes in April does the rainfall vary producing in the range of 70 to 80% of the water requirements of winter and spring cereals and fodder plants.

The drainage conditions are the most unfavourable factor of all the natural features of the region. The area of Borysówka village and the adjacent area of the village of Grodzisko cover the zone of the local watershed between the tributaries of the Narew River.

Small and rather numerous depressions on the scarcely permeable substrata (of clays, and loamy sands) become waterlogged owing to the lack of an adequately developed surface outflow network.

The high level of the ground water table causes considerable delay in beginning work in the field in spring, and often causes drenching of winter cereals crops. Water control is indispensable for the economic utilization of the potential possibilities of the natural conditions in this region.

The natural conditions of Hruskie village are quite different, being an example of an area in which the agricultural system is immensely influenced by unfavourable natural conditions.

As far as the geomorphology of the area is concerned the village is situated on a small hillock 132 m above sea level surrounded by boggy meadows belonging to the great complex of marshes and swamps of the ancient river valley (pradolina) of Biebrza.

The macro-climatic conditions do not differ much from those described above for the villages of Borysówka and Grodzisko. The vegetation season is here shorter by some 8—10 days due to the position of the village further to the north. On the other hand, the local climate conditions are different here. Greater humidity of air, more frequent and longer lasting mist, lower temperatures than those of the surrounding areas and other features are caused by the location of the village in the zone of a great depression of the pradolina.

The hillock which is a morainic island (about 55 ha); is shaped like an elongated ellipse and is almost flat, surrounded by gentle depressions.

As far as the soil conditions on the hillock area are concerned – fertile, medium podzolic soils tend to prevail; light podzolic soils, loamy and even partly clayey sands appear in the northern part, while fertile black earths cover the depressions which is 20—40 m wide. The peat soils almost entirely under permanent grassland cover the greater part of the pradolina area.

The drainage of the area — as in Borysówka — is the most unfavourable factor of all the natural conditions.

The grasslands which cover the greater part (3/5) of the village area are situated within the area of the local basin which is permeated with stagnant water which flows down from the waterlogged area of Augustów Forest. Due to excessive moisture and lack of adequate drainage, the grassland soils are fairly acid and are covered by scarce grassy vegetation in which sedges prevail.

Moreover it is not possible to use mowing machines and therefore the cropping of poor grass can only be performed manually. The drainage is better only in a small area on a narrow strip bordering the arable land. A small stream flowing across the area drains some part of the flat land and this has made possible the utilization of this area as common pasture. And for this reason again this area has been left as a common pasture inspite of the consolidation of land which was carried out in this village.

The improvement of the grasslands in Hruskie village and their increase in the total plant production depends upon the regulation of water conditions. This regulation, however, can be undertaken only as part of a vast programme of reclaiming covering the whole area of the Biebrza Pradolina.

2. POPULATION AND OWNERSHIP RELATIONS

All the three villages of Borysówka-Grodzisko and Hruskie consist of individual small holdings managed by their owners, who practice semi-subsistence farming.

The size of farm holdings, the fragmentation of land and the traditional system of farming are here the decisive factors.

The highest percentage of small farm holdings is to be found in the village of Grodzisko (Table 1). Here more than 58% of the total number of farm holdings are only 5 hectares or less. The village of Hruskie has a more favourable structure of farm holdings with farms of over 10 ha in area prevailing; however swampy meadows and infertile pastures predominate in this village.

Table 1

Size of land holdings

Size groups of land holdings	Borysówka				Grodzisko				Hruskie			
	Number	%	Area ha	%	Number	%	Area ha	%	Number	%	Area ha	%
0.5— 2	1	1.5	1.4	0.5	4	9.8	7.2	4.1	—	—	—	—
2 — 5	12	21.7	44.8	13.7	20	48.7	64.2	36.5	6	22.2	24.4	10.1
5 —10	39	69.8	236.7	73.0	17	41.5	104.6	59.4	10	37.1	77.7	32.4
10 —14	4	7.0	45.6	12.8	—	—	—	—	9	33.3	105.2	43.8
over 14	—	—	—	—	—	—	—	—	2	7.4	32.6	12.7
Total	56	100.0	328.5	100.0	41	100.0	176 0	100.0	27	100.0	239.9	100.0

Source: Agricultural Census 1959

As is apparent from Table 2 all three villages are almost entirely inhabited by on agricultural population. The density of population per 100 ha of farmed land is very high, and in fact almost double the average for the counties of Hajnówka (48,8) and of Augustów (34,4). This is the result of the fact that the three field system of farming connected with the fragmentation of farms produces great difficulties in the application of agricultural machines and therefore requires a much greater labour reserve. The population density when calculated only in relation to arable lands, for the grasslands here remain on the whole neglected and the grazing areas are utilized as common pastures — is even higher.

Table 2

Professional structure

Specification	Borysówka	Grodzisko	Hruskie
Population — Total	274	202	108
men	127	94	44
women	147	108	64
Farm population	258	196	106
people living exclusively by farming	148	132	58
having additional seasonal employment outside agriculture %	42.7	32.7	45.4
people employed outside agriculture	16	6	2
Farm population per 100 ha of farmed land	81.6	114.1	52.5
Farm population per 100 ha arable land	113.6	175.0	220.0

Source: Agricultural Census 1959

The predominance of small farm holdings with a high density of population means all the inhabitants of these villages must look for additional sources of income. The proximity of the great forests enables a high percentage of the population (1/3—1/2) to find seasonal job — beyond the agriculture — mainly in forestry.

3. LAND UTILIZATION

All three villages: Borysówka, Grodzisko and Hruskie have a high index of agricultural land use. In the first two villages farmed land (Table 3) cover over 96% of their total area.

Table 3

Structure of land uses

Specification	Borysówka		Grodzisko		Hruskie	
	Area		Area		Area	
	ha	%	ha	%	ha	%
1. Arable lands	227.4	69.2	112.2	63.5	53.8	22.4
a) fallow	51.0	22.5 [1]	—	—	—	—
b) idle land	5.9	2.7	—	—	—	—
2. Orchards	2.3	0.7	1.0	0.6	0.3	0.1
3. Permanent grassland	86.9	26.5	58.5	33.4	153.6	64.0
meadows	70.9	21.6	43.7	25.0	142.0	59.2
pastures	16.0	4.9	14.8	8.4	11.6	4.8
Total farmed land	316.6	96.4	171.7	97.5	207.7	86.5
4. Forest land	6.4	1.9	—	—	29.0	12.1
forest	4.0	1.2	—	—	—	—
shrubs	2.4	0.7	—	—	29.0	12.1
5. Settlement area	5.5	1.7	4.3	2.5	2.7	1.1
6. Waste land	—	—	—	—	0.5	0.3
Total	328.5	100.0	176.0	100.0	239.9	100.0

Source: Agricultural Census 1959

1) Fallow and idle land in % of arable land.

Of land under cultivation both in Borysówka and Grodzisko, arable land predominates. The structure of land uses, and the proportions of arable land to permanent grassland enables the farmers in this area to apply a mixed plant-animal orientation in farming.

Emphasis should be laid, however, on the unfavourable location of meadows and pastures in relation to settlement. Separated from the main bulk of village lands they are situated in the valley of the Narew

River at a distance of 10—12 km from the villages[4]. In addition pastures of both Grodzisko and Borysówka villages are scattered in several small enclaves over the area of the Białowieża Forest at a distance of 1,5—2 km from the farmsteads.

a. Arable Lands

The arable lands surrounding all three villages under investigation, are strongly fragmented.

The greatest fragmentation of land is found in the village of Grodzisko in which, on average, 15 broken plots of arable land belong to 1 farm holding. The number of arable plots to one farm holding in the village of Borysówka is smaller (about 7) but their strip shape is much more unfavourable for agricultural use.

The strips which are 2,5 m wide and 2,8 km long appear mostly in the first field (Map 1). In the Fields 2 and 3 the length of strips decreases while their width increases. The width of individual plots is in close relation to the size of farm holdings.

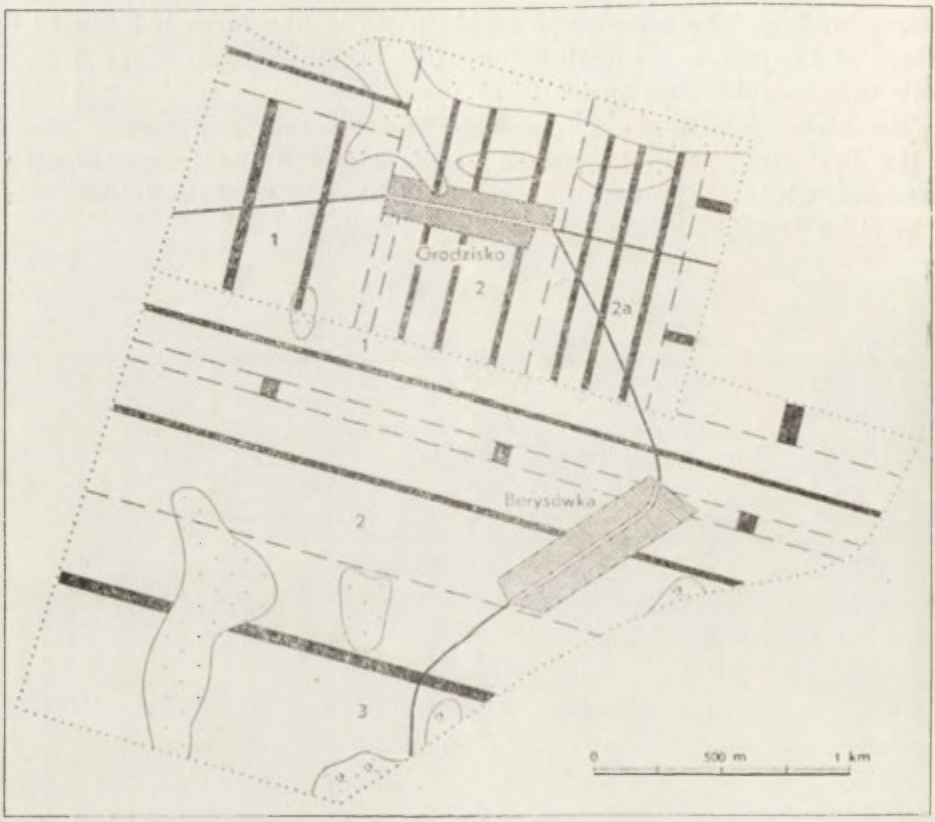
phot. W. Biegajło

Fig. 2. Grodzisko — A width of strips on fragmented village lands

[4] The meadows located separately in the valley of the Narew River, and the midst-forest enclaves are not presented on the attached land-use map of Borysówka and Grodzisko villages.

Until the consolidation of its lands in 1958, the Hruskie village had also — in spite of its limited area of arable land — fragmented fields [5].

The fragmentation of fields — apart from the waste of land involved is a serious obstacle to rational farming preserves the three field system of farming. Detailed investigations revealed that the area covered by field fragmentation in the Białystok voivodship amounts to over 204 thousand ha and the losses in agricultural land due only to the existence of numerous balks, boundary strips, furrows, access roads, etc. account to about 10 thousand ha of arable lands [6]. In addition



Map 1 Borysówka and Grodzisko, Field pattern. Fragmentation of farms

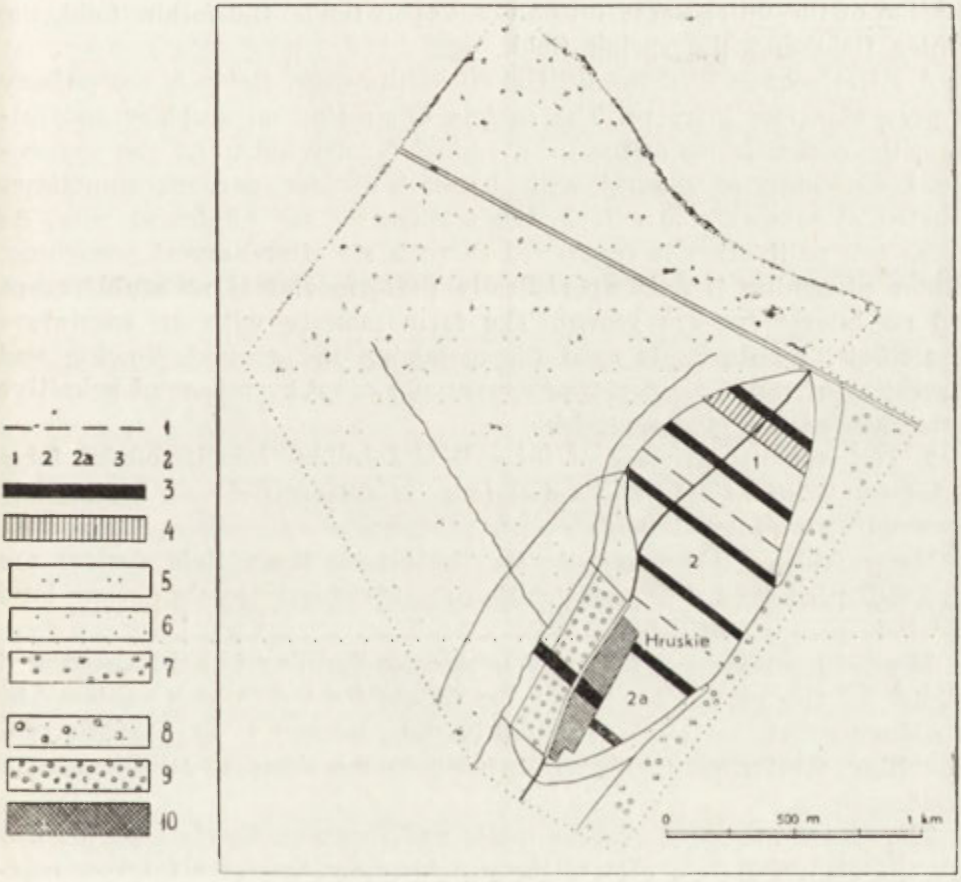
[5] In 1958 the consolidation of farms limited only to arable land was performed in Hruskie village. In Map 1 the pattern of arable lands in the period before the consolidation and after it represents the difference in the layout of fields belonging to one farm holding.

[6] W. Biegajło, Szachownica gruntów i gospodarka trójpolowa na terenie województwa białostockiego (The land strip pattern and the three-field system in the Białystok voivodship). Przegl. geogr. 25, 1957, No. 3, pp. 533—559.

the fragmentation of farms provides a serious obstacles in the application of agricultural machinery and doubles the labour consumption in agricultural production.

The three field system of farming is closely correlated with the area of field fragmentation. It occurs in general in the south-eastern part of the voivodship, i.e. in the counties of Siemiatycze, Bielsk Podlaski, Hajnówka, Białystok, Sokółka and Dąbrowa inhabited in considerable percentage by a Byelorussian population.

Four varieties of the three field system have been distinguished in



Map 2 Hruskie. Field pattern. Fragmentation of farms

Legend to the maps 1 and 2:

1 — boundaries of the main fields, 2 — 1 winter crop field, 2, 2a spring crop field, 3 fallow field; 3 — plots of arable land belonging to one farm; 4 —plots of arable land after consolidation; — meadows; 6 — pastures; 7 — brush; 8 —forests; 9 — gardens; 10 — built up areas

the area of Białystok voivodship[7]. They represent successive stages in the transition from the traditional three field system to fallowless multi-course crop rotation systems.

1. The three field system with bare fallow is an example of the traditional, most primitive system of farming preserved here in its almost classic form from the period of the XVIth century agrarian reform *„pomiara włóczna"*. This system appears as a relict form in only those villages with the fragmented fields. The system is still being practiced over an area of about 45 thousand ha.

The characteristic feature of this form of three field system is the division of the village area into 3 main open fields: the fallow field, the winter field and the spring field.

A strict sequence in the utilization of the main fields is compulsory to prevent a loss in crops. The custom of grazing on stubbles and fallows, the common use of pastures, and of farm woods, and the conventional enclosing of ground with better soils for gardens sometimes situated at same distance from the settlement, are all found here. As far as soil cultivation is concerned there is no after-harvest ploughing. Winter ploughing is only sporadically performed, and no stubblecrops and no inter-crops are grown. The farm manure with an admixture of artificial fertilizers is used for manuring the ground. Sowing and harvesting of cereals is performed manually often by means of primitive tools such as a scythe and sickle.

2. The transitional stage of three field farming from its classic form to the more intensively cultivated form is also only found in the villages with fragmented fields.

Many features characteristic for the classic three field system are here still preserved. The modification relates chiefly to the fallow land which is partly cultivated.

The field compulsion so unfavourable for farming is here abandoned because of the partial sowing of the fallow field — which enables the introduction of such positive cultivation measures as after-harvest ploughing, winter ploughing or increase in the share of papilionaceous fodder plants.

The abandonment of grazing cattle and sheep on the fallows permits also the exclusion of a part of the meadows and pastures (narrow mid-field strips) from common use.

3. The improved three field system is found in only a number of villages with land fragmentation which have good soils and where arable lands take up a large percentage in the structure of land use.

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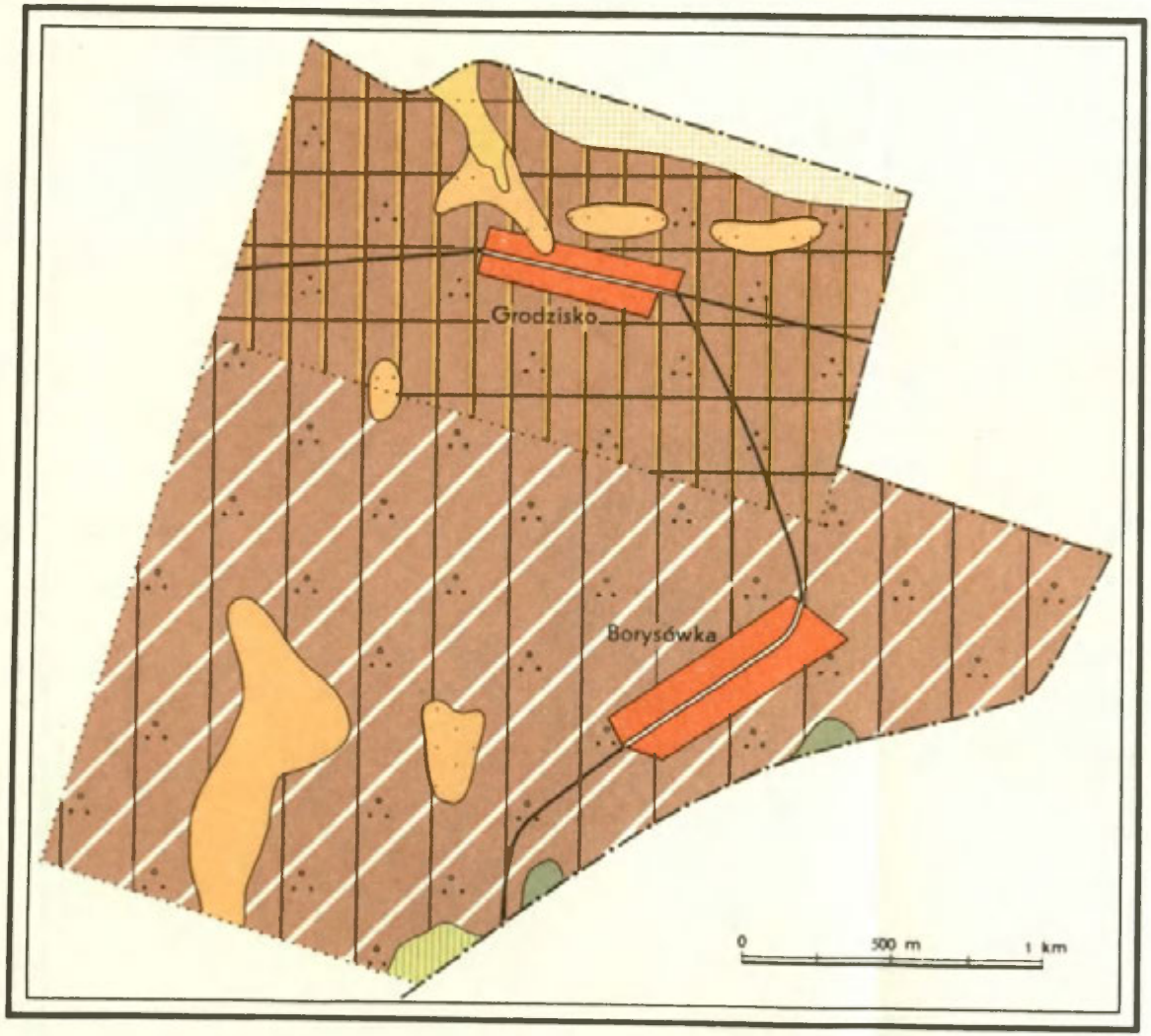
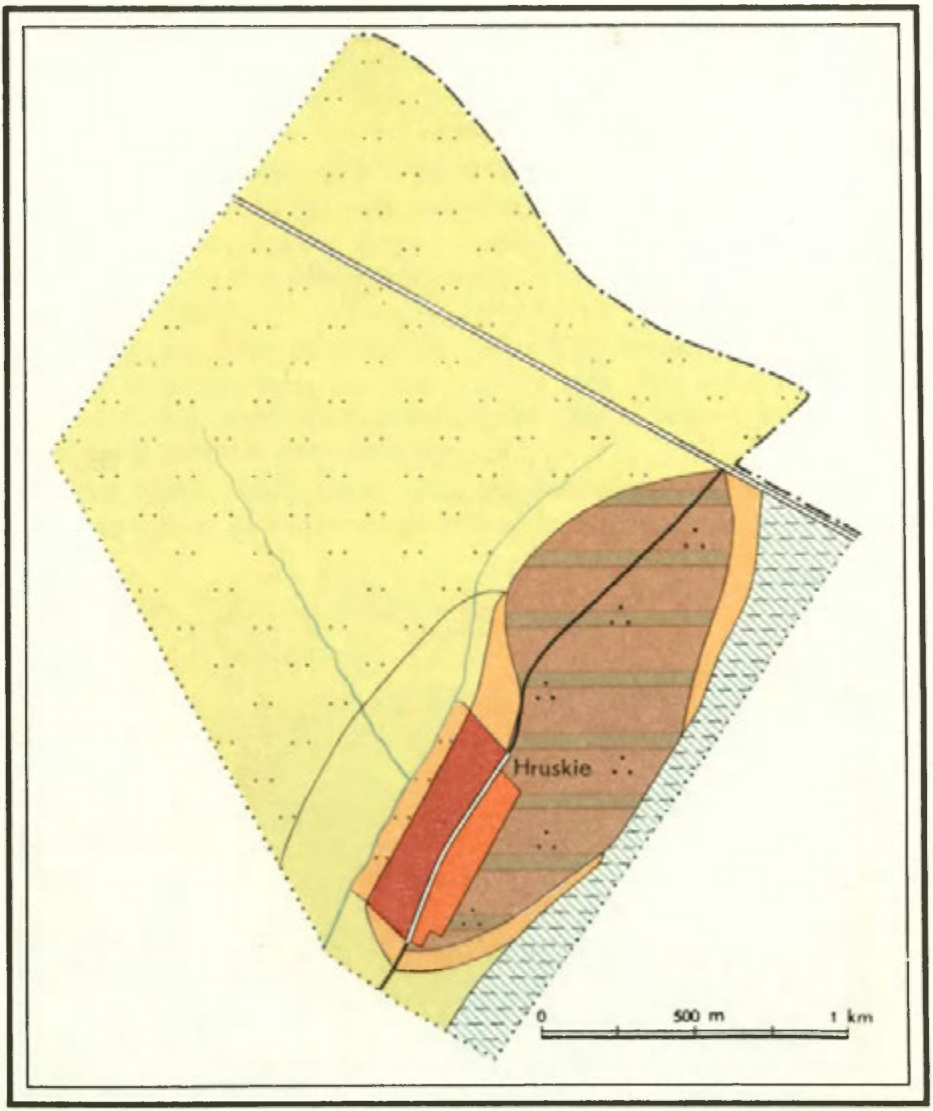
[7] W. Biegajło, Sposoby gospodarowania... Op. cit.



Map 3. The villages of Borysówka and Grodzisko. Land utilization map



Map 4. The village of Hruskie. Land utilization map

The traditional division of the village land into 3 fields with the exclusively sowing of winter cereals on one field — without field compulsion however — is here preserved. A considerable share of land under papilionaceous plants is a characteristic feature of this form of the system. The meadows are often systematically managed in contrast to the pastures which are still in common use. The cultivation of soil, manuring and treatment of crops is both rational and careful.

4. The three field system with a cultivated fallow is the most frequent form of farming in the voivodship of Białystok; and is sometimes found outside villages with field fragmentation.

A regular three year crop rotation with a limited number of cultivated crops including spring crops — oats, barley, potatoes; winter crops — rye, and wheat without field compulsion are the characteristic features of the system.

This form of the three field system prevails in small farm holdings up to 5 ha or in farms along the river valleys with only a limited area of arable land. The agronomic practices in this system are correct and trimming of crops is very accurate.

The classic three field system with the following crop rotation of main fields: 1) fallow, 2) winter crops (wheat, rye), 3) spring crops (oats,

phot. W. Biegajło

Fig. 3. Hruskie — Potatoes cultivated on spring crop field

Agricultural land utilization

Specification	Borysówka				Grodzisko				Hruskie			
	ha	Percent of			ha	Percent of			ha	Percent of		
		arable land	agricultural land	the given group		arable land	agricultural land	the given group		arable land	agricultural land	the given group
I. Arable lands	227.4	100.0	71.8		112.2	100.0	65.3		53.8	100.0	25.9	
A. Exhaustive crops	118.6	52.2	37.4	100.0	65.7	58.6	38.3	100.0	32.8	61.0	15.8	100.0
winter wheat	8.6	3.8	2.7	7.3	14.2	12.7	8.3	21.6	—	—	—	—
spring wheat	—	—	—	—	—	—	—	—	4.7	8.8	2.3	14.3
rye	63.0	27.7	19.9	53.1	34.4	30.8	20.1	52.6	16.7	31.1	8.1	51.0
winter barley	—	—	—	—	2.1	1.9	1.2	3.2	—	—	—	—
spring barley	1.0	0.5	0.3	0.8	—	—	—	—	0.6	1.1	0.2	1.8
oats	43.5	19.1	13.7	36.7	14.5	12.8	8.4	21.7	10.8	20.0	5.2	32.9
buckwheat, millet	2.5	1.1	0.8	2.1	0.5	0.4	0.3	0.9	—	—	—	—
B. Intensifying crops	19.9	8.8	6.2	100.0	20.8	18.5	12.1	100.0	20.1	37.3	9.7	100.0
potatoes	14.4	6.3	4.5	72.4	11.5	10.3	7.0	56.3	16.8	31.2	8.1	83.5
sugar beet	0.4	0.2	0.1	2.0	2.2	2.0	1.2	10.6	—	—	—	—
mangolds	0.8	0.3	0.3	4.0	0.8	0.7	0.5	3.8	—	—	—	—
flax	2.0	1.0	0.6	10.0	3.4	3.0	2.0	16.4	—	—	—	—
hemp	0.8	0.3	0.3	4.0	1.2	1.1	0.6	5.7	—	—	—	—
tobacco	—	—	—	—	—	—	—	—	3.0	5.6	1.5	15.0
vegetables [1]	1.5	0.7	0.4	7.6	1.5	1.4	0.8	7.2	0.3	0.5	0.1	1.5
cabbage	0.6	0.3	x	x	0.7	0.7	x	x	0.1	0.2	x	x
carrot	0.4	0.2	x	x	0.5	0.5	x	x	0.1	0.2	x	x

beet root	0.4	0.2	x	x	0.3	0.3	x	x	—	—	—	—
onion	0.1	—	x	x	0.2	0.1	x	x	0.1	0.1	x	x
C. Structure forming crops	32.9	14.5	10.6	100.0	27.3	24.1	15.9	100.0	0.9	1.7	0.4	100.0
vetch	5.7	2.5	1.9	17.3	4.8	4.5	2.8	17.8	—	—	—	—
fodder mixtures	1.3	0.6	0.4	4.0	1.4	1.2	0.8	5.2	—	—	—	—
bitter lupin	4.0	1.8	1.3	12.2	1.4	1.2	0.8	5.2	—	—	—	—
fodder lupin	11.4	5.3	3.6	34.7	1.4	1.2	0.8	5.2	—	—	—	—
clover	3.0	1.3	1.0	9.1	14.5	12.5	8.5	53.5	0.9	1.7	0.4	100.0
serradella	5.5	2.2	1.7	16.6	—	—	—	—	—	—	—	—
pea	2.0	0.8	0.7	6.1	3.8	3.5	2.2	14.1	—	—	—	—
D. Un-sown area	56.0	24.5	17.6	100.0	—	—	—	—	—	—	—	—
fallow	50.1	22.0	15.8	89.5	—	—	—	—	—	—	—	—
idle land	5.9	2.5	1.8	10.5	—	—	—	—	—	—	—	—
Total	227.4	100.0	71.8	x	113.6	101.2	65.3	x	53.8	100.0	25.9	x
II. Perennial crops orchards	2.3	x	0.7	100.0	1.0	x	0.6	100.0	0.3	x	0.1	100.0
Total	2.3	x	0.7	x	1.0	x	0.6	x	0.3	x	0.1	x
III. Permanent grasslands	86.9	x	27.5	100.0	58.5	x	34.1	100.0	153.6	x	74.0	100.0
meadows	70.9	x	22.4	81.6	43.7	x	25.4	74.7	142.0	x	68.3	92.4
pastures	16.0	x	5.1	18.4	14.8	x	8.7	25.3	11.6	x	5.7	7.6
Total land use	316.6	x	100.0	x	171.7	x	100.0	x	207.7	x	100.0	x

Source: Agriculture Census 1959.

[1] Data on vegetables are estimated on information given by the farmers of the villages or obtained from own field observations.

potatoes, papilionaceous annuals, buckwheat, flax, etc.) is practiced in only one of the villages under investigations, i.e. in Borysówka.

The village of Hruskie presents an example of a three field rotation with cultivated fallow and limited numbers of cultivated crops: 1) potatoes+, 2) oats, barley (spring crops), 3) rye. The structure of land use is here a petrifying factor, for this form of three field system.

The village of Grodzisko represents the improved form of the three field system of farming. The division of lands into three main fields still exists, and the traditional names of the fields are also preserved (fallow field, winter and spring field). The whole area of the fallow field is however sown; it is marked in the Map 1 as spring field „2a".

The subdivision and fragmentation of lands, small size of individual plots as well as the prevalence of small farms and the great density of agricultural population mean that all the field work is manual. In all three villages there are no such agricultural machines as harvesters, mowers, potato diggers, sowers etc.

The classic three field system with field compulsion is practised in the village of Borysówka while the custom of uniform sowing of the main fields in the Grodzisko village is also preserved so that agronomic techniques are applicable for whole villages.

The dung in rations of 25—30 tons per 1 ha, given every three years on the same field, is the main basis of field manuring. The dung is mainly applied to fields under potatoes, vegetables and flax as well as those under wheat, and in the village of Borysówka to the fallow field under rye. Mineral fertilizing is sporadically applied on a few farms, mostly in the villages of Grodzisko and Hruskie.

Table 4 shows that the utilization of arable lands, with the exception the village of Borysówka in which almost 1/3 of the area is covered by fallows and lupin grown for green manure, — is complete. Stubble crops: such as turnip, lupin, buckwheat and very often inter-crops — such as serradella, and clover are applied in the village of Grodzisko although on a limited area.

The largest area of arable lands is covered by the exhaustive crops. They cover: in the village of Borysówka 52,5%, in Grodzisko 58,6% and in Hruskie up to 61% of the area. The percentage of the exhaustive crops (almost exclucively cereals) of the sown area in the villages of Borysówka amounts to 70%.

In this group rye has a definite prevalence in all the villages for its share amounts to over 51%. Oats are also important and in the village of Grodzisko winter wheat. Some barley, buckwheat and millet are also cultivated for personal needs.

The area of arable lands under intensifying plants varies greatly in particular villages. In Borysówka village with its three field system with fallow it accounts for only about 9% (12,3% of sown area), whereas in the Hruskie village it accounts for over 37%. Potato, the dominant species among the intensifying plants, in the village of Hruskie covers over 31% of the sown area. Sugar beet is of somewhat greater importance and accounts at Grodzisko for 10,6%; flax — at Borysówka accounts for 10%, and at Grodzisko for 16,4% while tobacco at Hruskie for 15% of the area under intensifying crops. Other species: such as mangold, hemp and vegetables cover a tiny area of arable lands. It seems that both the soil conditions, the manuring capacity and the quantity of manpower should enable a considerable increase in the share of intensifying crops particularely those of sugar beet, flax and in the Borysówka village of potatoes.

Structure building crops appear solely in the villages of Borysówka and Grodzisko covering in the latter village a somewhat greater area of arable land.

There is an interesting correlation between the structure forming crops and the determined form of the three field farming system. In Borysówka village where the classic three field system with a compulsory field system is practised — one-year plants with the prevalence of fodder lupin and bitter lupin covering a small part of fallow field dominate.

On the other hand, in the village of Grodzisko where the three field system with a cultivated fallow is practised — the cultivation of biennial papilionaceous, mainly clover, has been introduced on a broader scale. In Hruskie village structure forming crops are almost absent largely because the fodder demands are met by the permanent grasslands and the intensive manuring of the whole area of arable land secures a proper structure of the soil.

An analysis of the utilization of the arable land (Table 4) reveals distinct differences in the orientation of land utilization within the framework of the three field system with fallow. In Borysówka village there is a distinct dominance of exhaustive crops with a prevalence of rye and with a share of oats, while only a minimum share of the intensifying and structure forming crops. Thus the orientation in the utilization of arable land in this village can be defined as strongly cereal with a prevalence of rye (E_4ry).

The village of Grodzisko in which the three field system with a cultivated fallow is practised has also a dominance of exhaustive crops with a prevalence of rye but with a more considerable share of intensifying and structure forming crops. Thus, the orientation in

arable land use in the village of Grodzisko can be determined as a cereal with fodder, rye with clover one ($E_3ry + S_1cv$).

The village of Hruskie in which an improved three field system, evolved from the limited area of arable lands, is applied has a dominance of exhaustive crops with a prevalence of rye and a very high share of intensifying crops.

Thus the orientation of arable land use in the village of Hruskie can be defined as cereal with root crop, rye with potato ($E_4ry + I_2pt$).

b. Perennial Crops

Perennial crops (Table 4) cover only a small area of the villages under investigation. Small homeyard orchards with apple- and sour cherry-trees predominate. Single pear-trees, plum-trees and sometimes the raspberry-, currant- and gooseberry bushes are often intercultivated.

c. Permanent Grasslands

The permanent grasslands cover different areas in particular villages. The smallest percentage of meadows and grazing lands — 27,5% of the agricultural land — is in the village of Borysówka. The grasslands in the Grodzisko village cover 34,1% and in the Hruskie as much as 74% of the area.

Meadows which make up over 75% of the total grassland prevail. The majority of meadows apart from a small strip of the dry „grond" type and inundated „post łęg" type in the Grodzisko and Hruskie villages, ranks as bog meadows. These meadows are waterlogged and acid with a poor plant cover mostly of sedges. This is the cause of their exceptionally low productivity. The crop of poor hay in particular years may vary from 8 to 15 q per 1 ha. The interference of man has been limited to the exploitation only.

Two mowings are made in years of both favourable rainfall and when there is a low water level in the river valleys in spring time. In most of cases, however, one cannot get more then one swath a year.

The meadows of post grond type and particularly the flowed ones (*popławа*) in the Grodzisko village are mowed twice in the year and yield a considerably larger crop of about 30 to 35 q hay per 1 ha.

The pastures which cover small areas in all three villages are common.

Because in the three field system every farmer can graze any number of all species of animals on the common pasture independently of the area of his land — therefore the numbers of livestock are too

phot. W. Biegajło

Fig. 4. Hruskie — The common grazing of sheep on pastures of grond type on the margins of arable land

great in relation to the grazed area, while the pastures lack treatment and manuring. In result the pastures are being overgrazed and seriously degraded.

The grazing lands of the village of Borysówka and those of Grodzisko cover exclusively the post-bor areas, whilst in the Hruskie village they also include meadow bogs. The fallow field and the winter field after harvesting (where the custom is preserved of grazing down the stubbles — mainly by sheep) constitutes an additional basis of grazing. Common grazing of livestock on forests is also generally practised both in Borysówka village and in Hruskie.

d. Forests

Small areas of farm forest occur only in Borysówka and Hruskie villages. In the first the forest area is scattered and scarcely covers 4 ha. It is made up of clumps of trees which vary in size situated near Białowieża State Forest, southeast of the settlements. The woods are mostly pine stands of various age and closure while thinned young stands of coppice alder cover some small areas. These areas are all utilized as common grazing land.

The brushwood in Hruskie village forms a much greater and more compact area. It includes areas of a low and transitional peat-bogs with occasional dwarf birches and clumps of bushy willows (osier, grey willow, etc.) and alder coppice. This area depending on its accessibility is utilized periodically, as common grazing land. It is however exploited very extensively, for grazing animals do not find here much fodder and only a small quantity of the wood can be used as fuel.

4. SETTLEMENT

The structure of the nucleated settlements of Borysówka and Grodzisko villages is typical of villages with a three field farming system.

They both have an elongated rectangular shape, and are situated on the central main field. The farmstead plots are regularly and rather compactly built-up. The dwelling houses are situated very often with their backs to the street which runs through the middle of the village.

The farm buildings which are mainly barns (byres are often combined with farm houses under common roof) are situated at the border of the settlement plot at a distance of 60—80 m from dwelling houses. The

phot. W. Biegajło

Fig. 5. Grodzisko — An old farmhouse

area between these two rows of buildings is occupied by small home-yard orchards or gardens.

The present settlement pattern of Borysówka and Grodzisko villages has not changed since the period of granting land to peasants, i. e. since 1861. Then the area of the settlement was reduced to a regular form often like a rectangle. The settlement plots were intentionally alloted as fairly long strips taking into account: the necessity of precautions against fire (i.e. a safe distance of the lodgings from the barns), and the supplying of an area for orchards and gardens in the framework of settlements, since in the three field system of farming with a compulsory field sequence, detaching an area for vegetables or orchards beyond the settlements is often difficult.

The layout of the village of Hruskie is somewhat different. The settlement area also takes the form of a regular rectangle with a similar pattern of elongated settlement plots. The buildings appaer here, however, only on one side of the road. The dwelling houses are located close to the road and the farm buildings (byres and barns) at a distance of scarcely 10—20 m from them. In effect, the settlement as a whole is very compact. The gardens are permanently located on the other side of the road (see Fig. 2). Such a layout of the settlements seems to be the result of the shortage of arable lands. The detachment of garden plots was possible there because they were sufficiently remote from the main cultivated fields.

In all the villages there, wooden buildings with thatched roofs are almost exclusive. Only the dwelling houses are sometimes roofed with fireproof material. The dominance of wooden buildings is undoubtedly the result of the proximity of the great forest areas. Thus the provision of building materials was never a matter of any difficulty.

5. PLANT PRODUCTION

The yields per 1 ha in the villages under investigations are very different. The lowest yields are found in the village of Borysówka (Table 5). The average yields of the 4 principal cereals account for about 11,5 q per 1 ha, somewhat lower then the average for Hajnówka County (which is 12,3 q per 1 ha), and this should be recognized as unsatisfactory for these soil and climatic conditions. The unfavourable structure of soil as a result of the one-sided cereal orientation in the use of arable land, and the small share of structure forming plants is undoubtedly reflected here, in addition.

Plant production

Specification	Borysówka					Grodzisko					Hruskie				
	Yield per ha	Crop q	Production in grain units	% plant production	% in the group	Yield per ha	Crop q	Production in grain units	% plant production	% in the group	Yield per ha	Crop q	Production in grain units	% of plant production	% in the group
I. Food crops			1289.9	41.6	100.0			1331.0	40.2	100.0			510.4	26.9	100.0
a. Grain crops	x	x	931.6	29.1	72.2	x	x	1037.5	31.8	79.1	x	x	398.0	21.0	78.0
wheat	14	120.4	120.4	3.9	9.2	22	312.4	312.4	9.6	33.8	15	70.5	70.5	3.7	13.7
rye	12	756.0	756.0	24.5	58.8	18	619.2	619.2	18.9	47.2	19	317.3	317.3	16.7	62.1
barley	12	12.0	12.0	0.4	x	16	33.6	33.6	1.0	2.5	17	10.2	10.2	0.6	2.0
buckwheat, millet	6.5	16.2	16.2	0.5	x	7.8	3.9	3.9	x	x	—	—	—	—	—
leguminous edible (peas, beans)	9	18.0	27.0	0.8	2.2	12	45.6	68.4	2.1	5.2	—	—	—	—	—
b. Roots and vegetables	x	x	247.9	8.0	19.2	x	x	249.5	7.1	17.5	x	x	100.4	5.3	19.6
cabbage	240	144.0	21.6	x	x	280	196.0	29.4	x	x	320	32.0	4.8	x	x
carrot	160	64.0	9.6	x	x	200	60.0	9.0	x	x	230	23.0	3.5	x	x
beet root	190	76.0	11.4	x	x	230	69.0	10.3	x	x	—	—	—	—	—
onion	150	15.0	4.5	x	x	180	36.0	10.8	x	x	210	21.0	6.3	x	x
other vegetables intercultivated in orchards	80	104.0	20.8	0.7	1.6	100	50.0	10.3	0.3	0.8	120	24.0	4.8	0.3	0.8
potatoes [1])	120	720.0	180.0	5.8	14.0	160	640.0	160.0	5.0	12.2	180	324.0	81.0	4.3	15.9
c. Fruits (diverse)	120	276.0	110.4	3.5	8.6	110	110.0	44.0	1.3	3.4	100	30.0	12.0	0.6	2.4
II. Fodder crops			1735.5	56.2	100.0			1690.7	51.8	100.0			1296.6	68.2	100.0
a. Grains	x	x	526.2	17.0	30.7	x	x	271.7	8.4	16.1	x	x	205.2	10.8	15.8
oats	11	478.5	487.5	15.5	27.5	17	246.5	246.5	7.6	14.5	19	205.2	205.2	10.8	15.8

fodder mixtures	9	11.7	11.7	0.4	0.8	12	16.8	16.8	0.5	x	—	—	—	—	—
fodder lupin	12	24.0	36.0	1.1	2.0	14	5.6	8.4	—	—	—	—	—	—	—
b. Succulent forages	x	x	272.4	8.9	15.7	x	x	357.0	10.9	21.1	—	—	675.5	35.5	52.1
mangolds	200	160.0	16.0	0.5	3.1	300	240.0	24.0	0.8	1.5	—	—	—	—	—
leaves of sugar beet	110	44.0	4.4	0.2	x	150	330.0	33.0	1.0	1.9	—	—	—	—	—
fodder potatoes	120	1008.0	252.0	8.2	14.5	160	1200.0	300.0	9.1	17.7	180	2702.0	675.5	35.5	52.1
c) Rough forage	x	x	936.7	30.3	54.0	x	x	1062.0	32.5	62.8	x	x	415.9	21.9	32.1
vetch	24	136.8	54.7	1.7	3.1	32	153.6	61.4	1.8	3.6	—	—	—	—	—
clover	35	105.0	52.5	1.5	3.0	42	609.0	304.5	9.3	18.0	45	40.5	20.3	1.1	1.5
serradella	22	121.0	36.3	1.1	2.1	—	—	—	—	—	—	—	—	—	—
fodder lupin	450	4230.0	169.2	5.5	9.7	500	500.0	20.0	0.7	1.2	—	—	—	—	—
straw of winter cereals	26	1861.6	186.2	6.0	10.7	40	2028.0	202.8	6.2	12.1	38	634.6	63.5	3.4	4.9
straw of spring cereals	18	887.4	133.1	4.2	7.7	25	410.0	61.5	1.8	3.6	29	466.9	70.1	3.9	5.4
meadow hay[2]	15	1063.5	212.7	6.6	12.2	26	1136.2	340.8	10.5	20.1	8	1136.0	227.2	11.8	17.6
pastures, fallow, idle land	14	306.6	92.0	3.7	5.3	16	236.8	71.0	2.2	4.2	10	116.0	34.8	1.7	2.7
III. Industrial plants	x	x	67.9	2.2	100.0	x	x	262.6	8.0	100.0	x	x	93.0	4.9	100.0
sugar beet	190	76.0	19.0	x	28.0	280	616.0	154.0	4.7	58.6	—	—	—	—	—
flax	18	36.0	36.0	1.1	53.0	26	88.4	88.4	2.7	33.7	—	—	—	—	—
hemp	23	18.4	12.9	x	19.0	24	28.8	20.2	0.6	7.7	—	—	—	—	—
tobacco	—	—	—	—	—	—	—	—	—	—	15.5	46.5	93.0	4.9	100.0
Total	x	x	3093.1	100.0	x	x	x	3284.3	100.0	x	x	x	1900.0	100.0	x

Source: Yields — those of main crops average for 1957—1959 according to data of the County Planning Commission checked by interviews. Yields of vegetables, fruits, estimated on the base of interviews and field observations.

[1] Consumption of potatoes calculated on the basis of population number in particular villages multiplied by the consumption index (3q per 1 person).

[2] Applied index: 0.2 on account of low nutritional value of hay (sedges) in the Borysówka and Hruskie villages.

The poor yields of cultivated plants and the low productivity of meadows, i. e. 15 q per 1 ha result in the fact that the plant production calculated in comparative units is also very low — 9,8 grain units are scarcely gained per 1 ha of arable land. The low productivity per unit area of farmed land also reflects the fact that a considerable area of arable land is excluded from production as fallow land (22%), idle land (2,5%) and numerous furrows and balks (8%).

On the other hand, the yields in the Grodzisko village are fairly satisfactory. The four principal cereals yield there an average of 17,5 q per 1 ha, potatoes 160 q, sugar beet 280 q, clover hay 42 q. These yields are not so much the result of more favourable soil conditions as of more correct agronomics replacing the classic three field farming.

The productivity of the meadows of the post *„grond"* type and that of post *„łęg"* ones, 30—35 q per 1 ha, is also satisfactory. In consequence, the plant production per 1 ha of arable land is double that of Borysówka village.

As far as Hruskie village is concerned the relatively high yields of all cultivated plants in relation to the kind of soil, are gained as a result of intensive manuring, careful field cultivation and treatment.

The dominance of meadows with exceptionally low productivity (8 q per 1 ha) exerts a distinct influence on the gross plant production. In effect we are dealing here with a productivity as low as 9,1 grain units per 1 ha of farmed land.

In all three villages the various fodder plants account together for over 52% of the total plant production.

The prevalence of the rough forages appears with the sole exception of Hruskie village — in the production structure of fodder plants.

In the Borysówka and Grodzisko villages the fodder is mainly gained from field crops (Borysówka — lupin, serradella, Grodzisko — clover). In Hruskie village all the rough forage is gained from meadows and pastures.

The share of other sub-groups of fodder plants varies in the particular villages. Oats are the dominant component in the group of grain crops, from 14,5 — Grodzisko to 27,5% — Borysówka. In the succulent foods potatoes are dominant as their share varies from 84% in Grodzisko, to 100% in Hruskie, where potatoes cultivated for fodder dominate the whole production of fodder crops.

The great share of fodder plants in the plant production indicates that the agriculture of these villages is being actually managed much in order to cover the demands of livestock breeding.

Food plants are next in importance in the production of the villages

phot. W. Biegajło

Fig. 6. Hruskie — Tobacco plantations on the garden plots

(Borysówka and Grodzisko 40—42% and Hruskie 27%), while grains, both bread and groat grains make up the main share of the food plants.

Of the remaining food crops only potatoes have greater importance.

The industrial plants play only a small part in plant production. However in Grodzisko village besides the traditional cultivation of flax and hemp, sugar beet has been introduced in recent years. In Hruskie village only tobacco is cultivated, owing to the proximity of the tobacco processing plant in Augustów, and supplies almost 5% of the total plant production. Indeed tobacco cultivation brings a considerable income to the population of the village.

6. LIVESTOCK BREEDING AND ANIMAL PRODUCTION

Horses make up an exceptionally large share in livestock breeding, i. e. almost 30% of the total number of big animal units. The horse remains the chief and only draft power. The number of horses per 100 ha of arable land (Table 6): in Borysówka village — 19, in Grodzisko — 26,4 and in Hruskie village — 13,4 is too high in relation to the

Specification	Borysówka					Grodzisko					Hruskie				
	Heads	Big animal units	% of big animal units	Number per 100 ha agricult. land: heads	Number per 100 ha agricult. land: animal units	Heads	Big animal units	% of big animal units	Number per 100 ha agricult. land: heads	Number per 100 ha agricult. land: animal units	Heads	Big animal units	% of big animal units	Number per 100 ha agricult. land: heads	Number per 100 ha agricult. land: animal units
Horses	60	69.8	28.6	19.0	22.2	46	50.2	29.8	26.8	29.2	27	31.8	33.0	13.4	15.8
work horses	53	63.6				33	39.6				26	31.2			
young horses, 1—3 yrs	5	5.0				7	7.0				—	—			
foals — 1 yr	2	1.2				6	3.6				1	0.6			
Cattle	117	101.2	41.4	37.0	32.2	85	64.1	38.1	49.5	37.3	48	43.2	45.0	23.8	21.4
bulls	1	1.2				1	1.2				1	1.2			
cows	88	88.0		27.8		50	50.0		28.4		38	38.0		15.8	
heifers 1—3 yrs	14	9.8				8	5.6				4	2.8			
1/2 — 1 yr	2	0.8				15	6.0				2	0.8			
calves — 6 mths	12	1.4				11	1.3				3	0.4			
Pigs	222	45.3	18.5	70.1	14.4	189	38.6	22.9	110.0	22.5	93	15.8	16.5	46.2	7.8
sows	35	10.5				45	13.5				14	4.2			
cutters	107	26.8				58	14.5				25	6.2			
piglets	80	8.0				86	8.6				54	5.4			
Sheep	345	20.6	8.4	109.0	6.6	212	12.2	7.2	123.4	7.1	48	2.9	3.0	23.8	1.5
ewes and rams over 1 yr	166	11.6				96	6.7				24	1.7			
lambs to 1 yr	179	9.0				110	5.5				24	1.2			
Poultry	1568	7.7	3.1	495.0	2.4	792	3.4	2.0	461.2	2.0	502	2.4	2.5	249.2	1.3
therein															
hens	952	2.85				574	1.7				324	1.0			
geese	616	4.90				218	1.7				178	1.4			
Total	x	246.6	100.0	x	77.8	x	168.5	100.0	x	98.1	x	96.1	100.0	x	47.7

Source: Agrarian Census 1959.

actual needs of draft animal power for farming purposes. The maintenance of such a high number of horses is possible only because of the common grazing of pasture-land with no limitation of the number of grazing animals; it is also connected with the opportunities of earning money by timber transport in the winter time.

The breeding of cattle is more differentiated. The number of cattle in Borysówka and in Grodzisko village per 100 ha of arable land is higher than the average for the County (28,6) and the Voivodship (32,9) [8] but lower than the number for the whole country (44,5) [9]. Hruskie village in spite of a very high share of grassland area has the lowest head of cattle (due to the low productivity of meadows and the poor quality of hay).

The cattle belong on the whole to the lowland black-and-white breed of milch type and are distinguished — with the exception of Grodzisko village (1700 l) — by a low productivity of 1050—1200 l of milk per 1 cow. This is a result of insufficient care and poor feeding throughout the year because of overgrazed pastures and a shortage of fodder in winter time.

The fairly well developed breeding of pigs and sheep in the villages of Borysówka and Grodzisko should be stressed. The white hanging-eared breed of pigs of lard type and the prevailing English large white breed of pork type — are here most popular.

The very large numbers of sheep — over 100 heads per 100 ha of arable land — is a rare phenomenon both in the whole country and the voivodship of Białystok. It occurs only in the villages with three field farming, in which dry pastures, fallows, and stubble fields, are commonly utilized for sheep grazing. Sheep of the local *wrzosówka* breed, of sheepskin type, have a poor appearance and a low wool productivity which yields 1,3—2,0 kg. In spite of this, according to the opinion of the local peasants, they bring a high income in the field of animal breeding.

Every farm holding in addition keep several hens and geese. Numerically animal breeding with the exception of the Hruskie village is rather well developed. 98 big animal units with a prevalence of cattle to every 100 ha of arable land are found in Grodzisko village and 77,8 in Borysówka.

Data relating to animal production (Table 7) enables us to determine more precisely the productivity, and orietation of livestock breeding.

In all the villages meat-stock with a prevalence of pork maintains

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[8] Rocznik statystyczny woj. białostockiego 1961, Białystok 1961, p. 169.

[9] Rocznik statystyczny 1960, Warszawa 1960, GUS, p. 199.

Table 7

Animal Production

Specification	Borysówka					Grodzisko					Hruskie				
	Number of animals	Average output	Production	Production in grain units	% of animal production	Number of animals	Average output	Production	Production in grain units	% of animal production	Number of animals	Average output	Production	Production in grain units	% of animal production
Milk	88	1050 l	92400	693.0	25.8	50	1700	85000	637.5	26.8	38	1200 l	45600	342.0	29.2
Meat stock *	—	—	—	1605.4	59.5	—	—	—	1499.4	62.8	—	—	—	724.0	61.7
beef	11	380 kg	41.8	250.8	9.3	11	420kg	46.2	277.2	11.6	7	400 kg	28.0	168.0	14.3
veal	32	45 kg	14.4	86.4	3.2	28	52kg	14.6	87.6	3.6	21	50 kg	10.5	63.0	5.4
pork	160	110 kg	176.0	880.0	32.6	145	120kg	174.0	870.0	36.6	76	110 kg	83.6	418.0	35.6
mutton	152	30 kg	45.6	273.6	10.2	105	35kg	36.7	220.2	9.2	16	40 kg	6.4	38.4	3.2
hens	340	1.5 kg	5.1	30.6	1.1	170	1.5kg	2.1	12.6	0.5	105	1.5 kg	1.6	9.6	0.8
geese	400	3.5 kg	14.0	84.0	3.1	132	4.0kg	5.3	31.8	1.3	112	4.0 kg	4.5	27.0	2.4
Wool	345	1.3 kg	4.85	194.0	7.2	212	1.5kg	3.18	127.2	5.3	44	2.0 kg	0.9	36.0	3.0
Eggs	750	108 ps	8100	202.5	7.5	420	115ps	48300	120.7	5.1	260	110 ps	28600	71.5	6.1
Total	x	x	x	2694.9	100.0	x	x	x	2384.8	100.0	x	x	x	1173.5	100.0

* live weight.

the dominant position in animal production accounting for over 59%. Beef and veal stock supplies 12,4% in the village of Borysówka and 19,7% of the total animal production in Hruskie. In the village of Borysówka and Grodzisko mutton stock is also quite important.

Milk production account for over 25% of animal production which combined with beef and veal production (of over 13%) determines the relative priority of cattle breeding.

Eggs and wool in spite of their small contribution to the total production (10—15%) play rather an important role in the profitability of farm holdings for they are largely marketable products.

7. GROSS AGRICULTURAL PRODUCTION

The productivity of agriculture in the three investigated villages is strongly differentiated. The lowest productivity is found in the village of Hruskie, where in 1959 there was an average of about 15 grain units per 1 ha of farmed land of which over 62% was in plant production. The cause — as was already been stressed — is the predominance of extensively utilized grasslands. In all, the farming orientation of Hruskie village can be defined as a low productive, vegetable with animal, fodder, potato—meadow hay with dairy cattle breeding orientation — $2xV_3(f_2pt,mh) + A_1(cd)m$.

The highest productivity of farming is found in Grodzisko village. The gross agricultural production here per 1 ha of arable land amounted in the same year to 33 grain units of which the plant production made up 72%.

The analysis of the structure of the total production (Table 8) indicates that farming in the village of Grodzisko has a medium productive vegetable-animal, food-fodder-meat, rye-meadow hay-clover-dairy cattle and pork stock breeding orientation — $3xV_2(a_1rw + f_1mh, cv) + A_2(cd + pk)m_1$.

The example of the Grodzisko village indicates that the agriculture of a three field rotation system with a cultivated fallow can be fairly productive in more favourable natural conditions, even without very great changes.

The agriculture of Borysówka village with its classic three field farming and bare fallow is distinguished by its low productivity. In 1959, the total production per 1 ha of farmed land amounted scarcely to 18,7 grain units while the animal and crop production remained on a similar level. The farming orientation can be determined as low productive, vegetable-animal, food-fodder-meat, rye-meadow hay- lupine-

Table 8

Gross agricultural production

Specification	Borysówka			Grodzisko			Hruskie		
	Grain units	%		Grain units	%		Grain units	%	
		of gross production	of the given group		of gross production	of the given group		of gross production	of the given group
I. Plant production	3092	53.4	100.0	3285	57.8	100.0	1900	61.8	100.0
Food crops	1289	22.2	41.7	1331	23.2	40.2	510	16.7	26.9
wheat	120	2.1	3.9	312	5.6	9.5	70	2.3	3.7
rye	756	13.1	24.5	619	10.9	19.0	317	10.3	16.7
other cereals	28	0.5	0.9	38	0.7	1.1	11	0.4	0.6
leguminous vegetables	27	0.5	0.9	68	1.2	2.3	—	—	—
and fruits	178	3.0	3.7	114	2.0	3.5	31	1.1	1.7
potatoes	180	3.0	3.8	160	2.8	4.9	81	2.6	4.2
Fodder crops	1735	30.0	56.1	1691	30.0	51.8	1297	42.1	68.2
grains	526	9.1	17.0	272	4.8	8.3	206	6.7	10.8
succulent forage	272	4.7	8.9	357	6.3	11.0	675	22.0	35.6
roughage	937	16.2	30.2	1062	18.8	32.5	416	13.4	21.8
Industrial crops	68	1.2	2.2	263	4.6	8.0	93	3.0	4.9
II. Animal production	2694	46.6	100.0	2384	42.2	100.0	1174	38.2	100.0
milk	693	12.0	25.8	637	11.3	26.7	342	11.1	29.1
meat	1605	27.7	59.7	1499	26.5	62.8	724	23.5	61.6
beef	337	5.8	12.5	365	6.5	15.1	231	7.5	19.7
pork	880	15.2	32.8	870	15.4	36.5	418	13.6	35.7
mutton	274	4.7	10.2	220	3.9	9.2	38	1.2	3.1
poultry	114	2.0	4.2	44	0.7	1.8	37	1.2	3 1
Wool	194	3.4	7.2	127	2.2	5.3	36	1.2	3.1
Eggs	202	3.5	7.3	121	2.2	5.2	72	2.4	6.2
	5786	100.0	x	5669	100.0	x	3074	100.0	x
Gross production in grain units per 1 ha of farmed land	18.7			32.9			14.8		
plant production	9.8			19.0			9.1		
animal production	8.9			13.9			5.7		

dairy cattle-pork stock breeding orientation — $2xV_2(a_1ry + f_1mh, lp) + A_2(cd + pk)m_1$.

In spite of lower productivity the farming orientation in Borysówka village is similar to that in Grodzisko village. However after more thorough consideration (see Table 8) the farming of these villages reveals serious differences.

In Borysówka village, oats, cereal straw, hay and lupin prevail in the fodder group whilst rye is the most important food plant. Consequently the crops which are typical of extensive cereal farming have a dominant position in plant production. On the other hand, the agriculture of Grodzisko village has a considerably greater share of more valuable plants. In the group of food crops, apart from rye, wheat is important and in the group of fodder plants, clover and meadow hay are both equally important. Industrial plants particularly sugar beet and flax also play an important role in the total plant production.

Animal production does not differ in its general proportions in both the villages. In both cases pig and cattle products dominate though in Borysówka village a somewhat greater share is taken up by sheep and poultry breeding.

An analysis of land use and agriculture in the villages of Borysówka, Grodzisko and Hruskie in which the three field system of farming is practised enables us to draw the following conclusions of a more general character:

1. The three field system of farming with its fragmentation of land, and traditional division of the area in to three main open fields still shows many features of common farming. This is revealed in the common use of pastures in which sometimes a determined area is detached only for sheep, horses or cattle, in field compulsion — (Borysówka) in the customarily accepted crop sequence in the use of the particular main fields (Grodzisko), and in the limitation of orchards and gardens to the settlement area, etc.

2. The natural conditions are not sufficiently utilised largely because:

a) the maintenance of fallow as the method of restoring soil fertility or as a grazing area is not economically justified in the particular climatic and soll conditions of the Białystok voivodship. More than 1/3 of the arable land is every year excluded from production.

b) The common use of pastures leads to overgrazing and consequently to their degradation.

c) The maintenance of a definitely one-sided cereal orientation in the use of arable land connected with the three field system of farming — (Borysówka village) — involves backward agronomics (poor manuring, no structure forming plants, and no after-harvest subsoiling) thus

encouraging deterioration of the soil structure and increasing depletion of the soil.

3. Heavy fragmentation of lands connected with density of rural population and the prevalence of dwarf farm holdings makes the application of moderrn agricultural machinery to a certain extent unprofitable and sometimes even impossible.

Consequently in the villages with a high fragmentation of land all the field work is performed manually involving high expenditures of labour per 1 ha, and strongly incrassing production costs.

4. The high numbers of livestock per 100 ha of arable lands does not compare with their productivity. The low productivity of animals (Borysówka village) is a result to a large extent, of the lack of proportion between the number of animals bred and the actual fodder supply.

5. The dominance of plant production, and the low animal production in spite of the prevalence of grassland in the Hruskie village reflect the degree to which agriculture there is influenced by the unfavourable conditions of the natural environment.

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THE CARPATHIAN COMMUNE OF CERGOWA

Cergowa commune [1] is situated in the southern part of the county of Krosno, in the Rzeszów voivodship in the Lower Beskid, which constitutes the eastermost section of Western Carpathians. Its area occupies 1908.7 ha [2]. The commune includes three villages: Cergowa with an area of 545.1 ha, Jasionka with an area of 703.1 ha, Lipowica with an area of 162.6 ha, and in addition Cergowa State Farm with an area of 490.0 ha[3], and a state forest with an area of 308.9 ha.

In the social structure small-scale peasant farming is predominant taking 73.9% of the total area. The remaining area of 26.1% is owned by the State, namely by the Cergowa State Farm and the Dukla District Forest Administration. It has to be stressed that majority of the State owned area is occupied by forest and pastures and that arable land takes only 20.7% of the total land.

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[1] The commune of Cergowa has been surveyed and mapped in 1958 within the framework of Land Utilization Survey of Krosno county made by the Agricultural Geography Department of the Institute of Geography of the Polish Academy of Sciences by the research group under the direction of the present author.

[2] According to an agricultural census the geodetic area occupies 1897.7 ha but frequently an area of 2209 ha is given owing to inclusion into the total of Cergowa State Farm's land situated on the territory of the neighbouring communes.

[3] The area of Cergowa State Farm occupies an area of 490.9 ha of which only 189.0 ha is within the commune's boundaries. This situation arose in 1956 due to subdivision of the former Cergowa commune into two separate administrative units. However in 1960 they were put back together into one unit and so Cergowa State Farm is presently situated within the boundaries of the same commune.

1. NATURAL CONDITIONS

Cergowa commune is located in the Lower Beskid range built of a variety of flysh deposits (sandstones, shales, marls) and is situated in the Jasionka river valley, a tributary of the Jasiołka. It lies between Cergowa mountain (718 m a. s. l.) in the south and that of Pachanowa (512 m a. s. l.) in the north; hence the commune is situated in a basin surrounded from the south and north by forest covered mountains.

The soils in this area are chiefly brown and podzolized forest ones made up of sedimentary flysh rock. On the fields of Cergowa commune the following types of soils can be distinguisished:

a) Clayey and silt soils prevailing on the majority of the commune's land.

b) Light and medium alluvial mud soils occurring in the Jasionka and Jasiołka valleys.

c) Skeleton mountain soils occuring at the foot of Cergowa mountain in the southern part and that of Pachanowa in the northern part of the commune area.

Thus, the predominant soils there are the heavy mountain clayey and silt ones classified as soil productivity class III and IV, although, either, the very poor skeleton soils classified V and VI class are present also [5].

The climatic conditions are also not too favourable for agriculture in this region. The area is characterized by changing weather conditions, considerable cloudiness and frequent wind direction changes accounted for by influx of air masses from the south through the Dukla pass.

The length of vegetation season varies here from 180 to 190 days a year (beginning April 1th, ending about October 25th). The annual rainfall is between 800 and 900 mm, and the average number of days with light frost varies between 130 and 150 [6]. The light spring frosts which sometimes occur even until the second half of May often injure orchards and gardens. The phenomenon of temperature inversion and the formation of frost pockets has also been recorded happening in this area and this has been particularly harmful for orchards and gardens. The so adverse climatic conditions apply particularly to Jasionka, village which lies at the lowest altitude in the area.

As can be inferred from the above, the soil and climatic conditions

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[5] Data provided by the Presidium of Cergowa Commune Council.

[6] R. Gumiński — Meteorologia i klimatologia dla rolników. Warszawa 1951.

as well as the location of the area, are rather unfavourable for agriculture, hence rational farming calls for a sound knowledge of the geographical environment.

2. AGRARIAN STRUCTURE

The agrarian structure of Cergowa is not greatly diversified. Small holdings of up to 5 ha are prevalent constituting 95.2% of the total number of farm holdings which own 86.6% of agricultural land. The proportion of holdings of over 5 ha is, therefore, rather small (4,8% of the total number of farms and 13.4% of agricultural land).

Table 1

Size of individual farming

Size of farm holdings	Number	% of the total number	In ha	% of the total area
0.10 — 0.49	17	3.1	5.54	0.4
0.50 — 1.99	204	37.2	261.14	19.1
2.00 — 2.99	162	29.4	394.44	28.9
3.00 — 4.99	141	25.5	520.96	38.2
5.00 — 6.99	19	3.4	107.45	7.9
7.00 — 9.99	6	1.1	47.19	3.5
10.00 — 13.99	1	0.15	10.22	0.8
14.00 — 19.99	1	0.15	15.96	1.2

The only farm of a size of 15.96 ha that exists in entire Cergowa commune is a property of the Roman Catholic parish at Jasionka.

The origins of the villages of Cergowa commune date back to the 14th and 15th centuries when they were founded according to German Rights as forest villages (Waldhufendörfer). Originally the village was located at a valley bottom only along the stream, the farmland being consolidated and stretched back behind the farmstead to the village boundary.

The old field pattern has been best preserved in the village of Jasionka. The village was founded by the Przemyśl Bishopric towards the end of the 14th century on the site of cleared up forests and situated in a valley by a stream and where the fields run upwards on either side of the stream. This is, therefore, a typical mountain chain village with field strip pattern (Map 1).

As a result of the long lasting process of land subdivision a secondary fragmentation of fields pattern, has developed on within the framework of the fairly well preserved ancient field pattern. At present farmers'

fields are — on an average — in 7 different plots, although in some larger farms they reach up to and over 20 plots.

The old field strip pattern has not been preserved so well in the two other villages i. e. Cergowa and Lipowica. However, a fragmentation of lands has also developed there though it is slightly different form than that in Jasionka.

Fragmentation of anyway small holding into several separate plots, frequently placed far from each other, makes farming increasingly difficult and leads to waste of time lost in travelling between various fields. It also results in incomplete utilization of land taken by numerous

Map 1. Jasionka, Pattern of fields

boundary strips, balks, furrows, field roads etc. which in those regions occupy, on an average, about 10% of agricultural land.

The field pattern in the Cergowa State Farm is different. Although particular fields form large blocks, yet the land owned by the Farm does not constitute one single and compact area. On the contrary, particular plots are scattered all over the commune as well as the neighbouring communes.

Arable land alone is subdivided into 5 different size non-contiguous plots (plot I — 25.47 ha, plot II — 18.70 ha, plot III — 22. 85 ha, plot IV — 1.79 ha and plot V — 103.66 ha) and this, of course, presents an obstacle to rational farming and rational exploitation of the stock of agricultural machinery.

3. MANPOWER

In 1957 Cergowa commune had a population of 2213, in that number there were 1010 men and 1203 women [6]. The number of people in the productive age group was 1579 persons which, calculated per 100 ha, means a total of over 113 people per 100 ha. Since some people are employed outside agriculture, the actual numbers of the rural labour force are somewhat different.

Table 2

Labour force

Specification	Total population	In that number	
		men	women
Number of people employed in private holdings	1432	580	852
Number of people employed in the State Farm and in the State Forest Administration	31	27	4
Number of people employed outside agriculture	116	95	21
Non — employed	634	308	326
Total number of population	2213	1010	1203

As the table indicates some 1432 persons are employed in the commune private holdings which gives 110 persons per overy 100 ha of agricultural land. From the point of view of labour expenditure per surface unit, this is admittedly a very high proportion, granted even

[7] Data provided by the Cergowa Commune Council.

the high degree of farm fragmentation and intensive farming orientation. In this instance we face a phenomenon of rural over-population something that was typical of Southern Poland, prior to the World War I when it was a part of the Austrian Empire. Owing to the lack of any alternative employment for surplus labour outside agriculture, the peasant holdings for whole generations have been subdivided into smaller units owned by a continuously growing number of farmers.

Presented below is a tentative balance sheet of manpower indispensable for farm work in Cergowa commune taking into account their present day technical equipment.

Table 3

Size of farms in ha	Number of farms	Minimum labour per 1 farm	Total minimum in labour
0— 2	223	1.9	423.7
2— 5	303	2.1	666.6
5— 7	19	2.3	43.5
7—10	6	2.5	15.0
over 10	2	2.7	5.4
Total minimum labour	553	—	1154.2
Total number of people able to work	—	—	1432.0

Thus, theoretically speaking, the labour surplus in the commune amounted to about 300 persons. Granting, however, that this is a case of highly fragmented farming with high labour expenditure as well as seasonal employment of about 100 persons outside agriculture — a factor overlooked by the statistics — we may assume fairly correctly that in this region manpower surplus amounts to at least 100 persons. On the other hand the location of industry in the proximity could draw from agriculture without any difficulty some 400 or more commuters. 28 persons from Cergowa commune and 6 persons from other communes, a total of 34 persons, were employed in the State Farm. Of that number 4 persons worked in the Farm administration, while 9 persons attended to livestock raising, which leaves 21 persons employed directly in field work. As a result, this leaves hardly 4.3 persons per 100 ha of agricultural land, a number all too small despite the large scale mechanisation of field work. However, one should bear it in mind that the majority of the State Farm's agricultural land is now taken by pastures which do not call for expenditure of manpower, while arable land and meadows occupy between themselves an aggregate total of 200 ha. This makes some 10.5 persons per 100 ha. To this figure a certain number of

seasonal workers should be added (15 to 20 persons, depending on demand) who are hired in the summer field work peak. That leaves us with about 15 workers per 100 ha of arable land and meadows — a number quite sufficient to carry on with farm work where a considerable stock of technical farm aquipment is available.

4. LAND UTILIZATION

The total land area of the commune of Cergowa amounts to 1410.8 ha (Table 4). The overhelming majority of the land owned by individual farmers is agricultural land which constitutes over 90% of the total area, while arable land occupies from 77.9% in Cergowa to 83.8% of the total area in Jasionka. This makes a very high proportion pointing to the cultivation of whatever land is suitable for this purpose.

Permanent grasslands occupy from 6.9% in the village of Lipowica to 12.4% in Cergowa. The remaining, relatively small share ranging from 7.9% to 10.0% is occupied by private forests, built up sites and waste land.

Table 4

Land utilization

Geodetic area 1897.7 ha, Census area 1908.7, overall area with State Farm's land included 2209.6

Specification	Cergowa		Jasionka		Lipowica		State farm Cergowa		Cergowa forest administration	
	ha	%	ha	%	ha	%	ha	%	ha	%
1. Arable land	424.7	77.9	589.0	83.3	133.3	82.2	165.1	33.6	1.5	0.4
of which fallow	25.6	6.0	47.9	8.1	2.6	1.9	—	—	—	—
2. Orchards	4.7	0.8	—	—	1.5	0.9	1.0	0.2	0.8	0.2
3. Permanent grasslands	67.4	12.4	58.5	8.3	11.3	6.9	300.0	61.2	1.1	0.3
meadows	19.8	3.6	20.3	2.9	2.7	1.7	32.0	6.5	—	—
pastures	47.6	8.8	38.2	5.4	8.9	5.2	268.0	54.7	1.1	0.3
Total agricultural land	496.8	91.1	647.5	92.1	147.1	90.0	466.1	95.0	3.4	0.9
4. Forests	15.6	2.9	24.5	3.5	6.0	3.9	9.0	1.8	300.9	97.6
5. Built up areas	18.4	3.4	12.5	1.7	2.7	1.8	14.8	3.0	4.6	1.5
6. Waste lands [1]	14.3	2.6	19.0	2.7	6.8	4.3	1.0	0.2	—	—
Total	545.1	100.0	703.1	100.0	162.6	100.0	490.9[2]	100.0	308.9	100.0

[1] According to agricultural census of 1958 this column includes also: land built up, roads, water and other used lands.

[2] Cergowa State Farm covers 490.9 ha of which 189.0 ha are within the commune, the remainder being located within the boundaries of other communes.

There are rather insignificant differences between particular villages in as far as the share of arable land is concerned. In all of them arable land takes 80%, or a little over 80% of the total area. Major divergences are observed only in the permanent grasslands acreage which in Lipowica take 6.9% and in Cergowa 12.4% of the total area. Arable fields dominate in the agricultural land. Their cultivation is not mechanised. Horse ploughing prevails while harvesting is still done by means of scythe and sickle, and in case of potato crop - by hoe. Grain threshing is performed mostly with the use of a flail. There are, as a matter of fact, two engine driven threshing machines in the commune, but still their share in the threshing process is relatively insignificiant. Wider application of mechanised equipment is seriously hindered by the fragmentation of both farms and their land. Of the assortment of the basic farm tools and implements each farm is almost sure to possess a plough, a harrow, and a chaff-cutter. Of the other, more sophisticated implements, for some 560 farms there are only 4 disc harrows, 5 cultivators, 2 threshing machines, one hand operated grain selecting machine and three horse gears in whole commune.

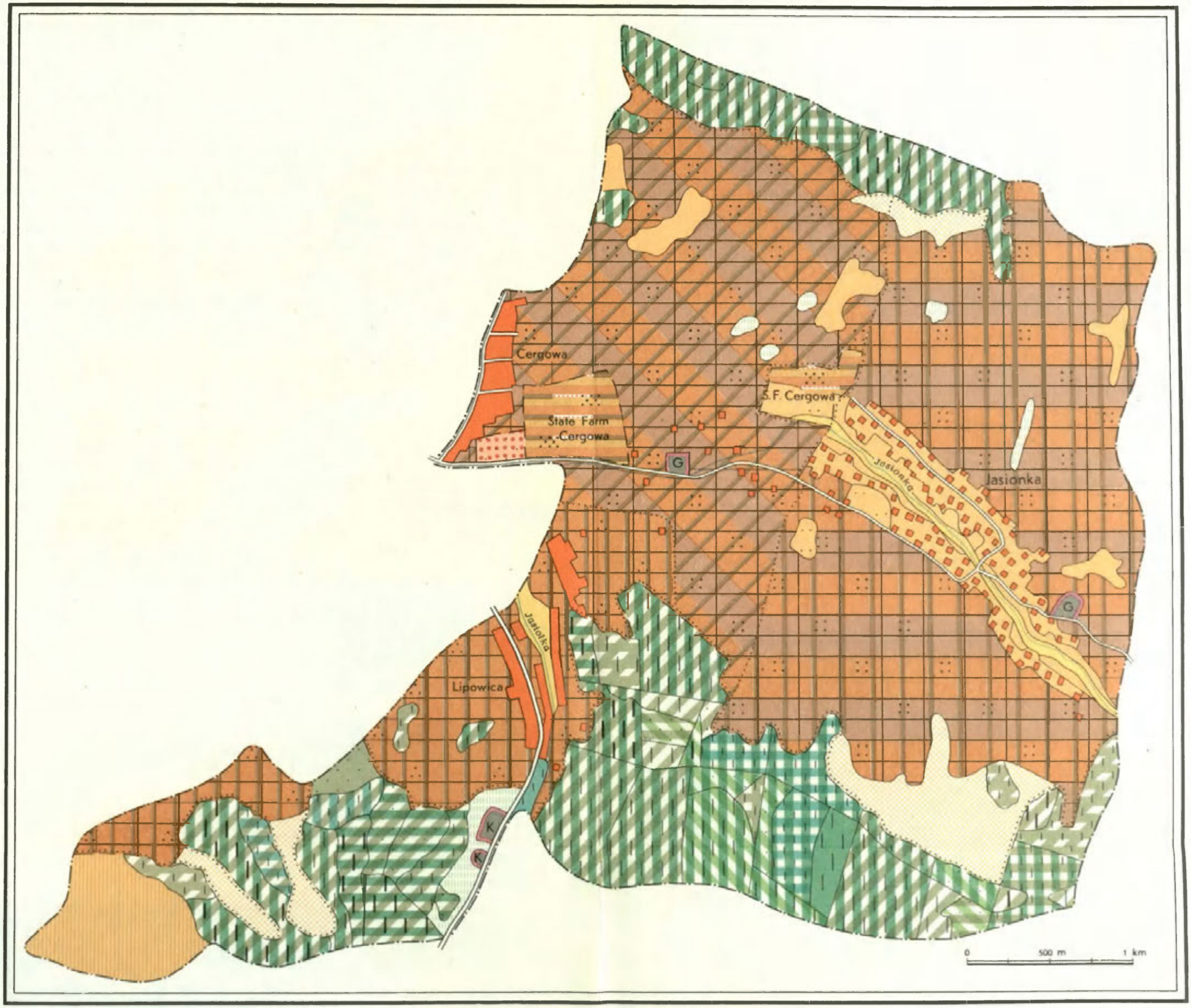
As for manuring, dung predominates and some 35 to 40 t of dung are used per one ha of root crops every 3 to 4 years. Artificial fertilizers are in use only in the major farms, their quantities being, nonetheless, rather small.

Neither fields nor meadows in the villages of Cergowa, Jasionka and Lipowica are improved while a good part of them, especially those in river valleys are in danger of annual inundations. Most of the arable land faces erosion. Diagonal subdivision of field strips into smaller plots as well as transverse ploughing of slopes were the only measures designed to safe-guard land against erosion. Erosion processes, on the other hand, are rendered easier owing to field roads, which represent former boundaries between field strips. Small gullies and alluvial cones formed out of eroded soil occur at places.

Manual sowing of cereals prevails in the commune and the quantities of grain involved are about 200 kg of wheat and rye, 180 kg of oats and 18 to 20 q of potatoes per 1 ha.

Land utilization proportions in the State Farm which has 490.9 ha of land, are totally different ones. Though in this instance, agricultural land occupies some 95% of the total area, yet arable land takes hardly 33.6% while permanent grassland takes as much as 61.2% of the agricultural land (meadows — 6.5%, pastures — 54.7%).

This pattern is a consequence, on the one hand, of the natural conditions i. e. pastures extending over mountain land with relatively poor soil and on the other hand, of the transformations which have taken place



Map 2. The commune of Cergowa. Land utilization map

in this region since the World War II. In most cases these lands represent former arable lands owned by Ukrainians who, either emigrated to USSR or under a programme of liquidation of Ukrainian Nationalistic bands, were transferred in 1947 to Western and Northern Poland. On these lands the State Farm of Cergowa has been organized. A part of the land is now cultivated while the other is utilized only as pastures or even lies almost unused.

Arable land cultivation in Cergowa State Farm is almost completely mechanised. The Farm has two tractors and a full set of agricultural machinery with combine harvester including. The arable fields of the State Farm extend over level terrain hence there are no obstacles offered to mechanisation of field works.

Apart from 30 to 35 t of dung used for root crop manuring the farm goes in for a wide application of artificial fertilizers which, calculated in their pure component, are used as follows: 10 to 20 kg of nitrate, 20 kg of phosphorous and 40 to 60 kg of potassic fertilizers. The fertilizers are used for almost all kinds of crops.

a. Arable Lands

In none of the Cergowa commune villages arable lands are utilized to the full. There is a certain area of fallow land ranging from 2.6% in Lipowica to 8.0% in Jasionka. These are one year bare fallows, covering areas with the poorest soil. Neither in Cergowa commune villages nor in the State Farm are after-crops used, or else their use is so insignificiant that they escaped the agricultural census.

One can single out three systems of crop rotation in the Cergowa commune villages, depending on farm size, namely:

a) in small farms of up to 1 ha, three year crop rotation prevails with a following sequence: 1) root crops^{++}, 2) fodder crops, 3) grain crops,

b) in bigger farms of 1 to 5 ha there prevail 3 and 4 year crop rotations, the latter predominating, with the following sequence, 1) root crops^{++}, 2) spring grain, 3) fodder crops, 4) winter grains.

c) in farms over 5 hectares in size the five year crop rotations predominate with a following sequence: 1) root crops^{++}, 2) spring crops (barley, oats, vegetables, spring wheat, flax etc., 3) and 4) fodder crops for two years (chiefly clover), 5) winter grains (wheat, rye).

The most common crop rotation is the four year one with the following sequence: 1) root crops^{++}, 2) spring crops (oats, barley, vegetables, spring wheat, mixed corn, flax etc. 3) fodder crops (clover for one year only), 4) winter grains (wheat, rye). This is the variety of the

Norfolk rotation system which has been adapted to the local conditions and farm size.

Any attempt at territorial delimitation of the rotation systems followed in particular villages is not feasible in conditions of great subdivision of land and great fragmentation of fields.

The predominating crops on the fields of Cergowa commune villages are exhaustive crops — mostly cereals (57.1% in Lipowica, 55.6% in Cergowa and 60.0% in Jasionka) among which wheat and rye growing is on a par (in Jasionka — wheat 29.4%, rye 28.7%, Cergowa — wheat 30.5%, rye 28.4%, or else there is a relative prevalence of wheat over rye (Lipowica — wheat 31.8%, rye 24.7%) which points to territorial differences depending on local conditions.

Among the exhaustive crops grown in Cergowa, Jasionka and Lipowica a considerable share of barley and oats is also noticeable and this is a heritage to some extent of the farming orientation which was practised here previously.

A comparison of statistical data for the years 1938—1958 reveals that throughout Krosno county, and for that matter throughout the entire Carpathians, there has been a marked decline in rye, barley and oats growing in favour of wheat, which is admittedly a positive feature reflecting intensification of agriculture. (Krosno county, wheat: 1938—24.0%, 1958 — 35.1%; rye: 1938 — 36.4%, 1958 — 32.4%; barley: 1938 — 13.8%, 1958 — 7.8% of the group of exhaustive crops. Among the intensifying crops which cover 20.0% in Jasionka, 22.0% in Cergowa and 24.5% in Lipowica potatoes are dominant and take over 80% of the total in the group. A fairly considerable share is also that of vegetables which cover about 10% of the area taken by this group. The other intensifying crops like flax, sugar beet and rapeseed play hardly any role. The structure-forming crops cover hardly 12.6% in Jasionka, 15.8% in Lipowica and 16.3% in Cergowa of the total arable land. Among them clover prevails covering almost 99% of the total area in the group. Of the other structure-forming crops which have no practical importance a mention must be made of serradella, lupine and field pea. Predominance of clover among structure-forming crops is indicative of yet another phenomenon, namely, it confirms that clover which during the last twenty years has been in constant expansion from the west onto the fields of the mountainous counties of the Polish Carpathians has already reached the region under examination and succeeded in eliminating the other fodder plants from the area.

An analysis of the proportions of the particular groups indicates that in this case there is a noted predomination of exhaustive crops among which either wheat prevails or else is on a par with rye; with, at the

Agricultural land utilization

Table 5

Specification	Cergowa				Jasionka				Lipowica				State farm Cergowa			
	ha	%			ha	%			ha	%			ha	%		
		Agricultural land	Arable land	Group		Agricultural land	Arable land	Group		Agricultural land	Arable land	Group		Agricultural land	Arable land	Group
I. Arable land	424.7				589.0				133.3				165.1			
A. Exhaustive crops	235.4	47.4	55.6	100.0	358.6	55.5	60.0	100.0	76.1	52.3	57.1	100.0	64.4	13.8	39.0	100.0
wheat	71.7	14.5	17.3	30.5	105.4	16.3	17.3	29.4	24.2	16.6	18.2	31.8	38.0	8.1	22.5	58.0
rye	66.8	13.4	15.9	28.4	102.7	16.0	17.0	28.7	18.8	12.9	14.2	24.7	8.4	1.7	5.0	12.0
barley	43.7	8.8	10.2	18.6	80.5	12.4	13.2	22.5	16.6	11.4	12.3	21.5	16.0	3.3	9.5	24.0
oats	52.9	10.6	11.6	22.4	67.9	10.5	11.3	18.9	16.0	11.0	12.0	21.0	4.0	0.7	2.0	6.0
mixed corn	0.3	0.1	0.1	—	1.7	0.2	0.3	—	—	—	—	—	—	—	—	—
buckwheat, millet	—	—	—	—	0.4	0.1	0.1	—	0.5	0.3	0.4	—	—	—	—	—
B. Intensifying crops	93.5	18.8	22.0	100.0	108.3	16.6	20.0	100.0	33.0	22.6	24.5	100.0	37.7	8.1	22.8	100.0
maize	—	—	—	—	—	—	—	—	—	—	—	—	2.0	0.4	1.2	5.2
sugar beet	0.6	0.15	0.1	—	0.6	0.1	0.1	—	0.2	0.1	0.1	—	—	—	—	—
rapeseed	0.3	0.1	0.05	—	0.4	0.1	0.1	—	0.3	0.2	0.2	—	16.2	3.5	9.9	42.6
other oleaginous	0.2	0.05	0.05	—	—	—	—	—	—	—	—	—	—	—	—	—
flax	0.2	0.05	0.05	—	3.2	0.4	0.6	—	1.2	0.8	0,9	—	—	—	—	—
fodder root crops	6.2	1.2	1.4	—	0.5	0.1	0.1	—	1.9	1.3	1.4	—	4.5	1.0	2.7	11.8
potatoes	76.1	15.3	18.0	81.8	93.2	14.3	17.3	86.3	25.4	17.4	19.1	77.0	13.0	2.8	7.8	34.2
vegetables	9.7	1.9	2.2	10.5	10.4	1.5	1.8	9.3	3.6	2.5	2.6	10.7	2.0	0.4	1.2	5.2
root crop plantings	0.2	0.05	0.05	—	—	—	—	—	0.4	0.3	0.3	—	—	—	—	—
C. Structure building crops	70.2	14.1	16.3	100.0	74.2	11.5	12.3	100.0	21.6	14.2	15.8	100.0	63.0	13.5	38.2	100.0
field pea, vetch	0.5	0.1	0.1	—	0.1	—	—	—	0.2	0.1	0.2	—	4.0	0.8	2.4	6.4
lupine	—	—	—	—	—	—	—	—	0.2	0.1	0.2	—	4.0	0.8	2.4	6.4
clover	69.8	14.0	16.4	99.3	73.4	11.4	12.2	99.3	21.2	14.0	15.4	98.0	35.0	7.6	21.3	55.5
serradella	—	—	—	—	0.7	0.1	0.1	—	—	—	—	—	20.0	4.3	12.1	31.7
Total	399.1	x	93.9	x	541.1	x	92.0	x	130.7	x	97.4	x	165.1	x	100.0	x
D. Uncultivated land (bare fallow)	25.6	5.2	6.1	x	47.9	7.4	8.0	x	2.6	1.7	2.6	x	—	—	x	x
II. Perennial crops	4.7	0.9	x	x	—		x	x	1.5	1.1	x	x	1.0	0.2	x	x
III. Permanent grasslands	67.4	13.6	x	100.0	58.5	9.0	x	100.0	11.3	7.9	x	100.0	300.0	64.4	x	100.0
meadows	19.8	4.0	x	29.5	20.3	3.1	x	35.0	2.7	1.8	x	24.5	32.0	6.9	x	10.7
pastures	47.6	9.6	x	70.5	38.2	5.9	x	65.0	8.9	6.1	x	75.5	268.0	57.7	x	89.3
Grand total of agricultural land	496.8	100.0	x	x	647.5	100.0		x	147.1	100.0	100.0	x	466.1	100.0	x	x

same time, a considerable share of intensifying crops among which potatoes are absolutely prevalent. Finally, a small proportion of structure-forming crops with predominance of clover is also noticeable.

Thus, the arable land utilization orientations in the particular villages are as follows:

a) Lipowica, wheat with potatoes ($E_3\,wh + I_1\,pt$)

b) Cergowa, wheat — rye with potatoes ($E_3wh, ry + I_1pt$)

c) Jasionka, wheat — rye with potatoes ($E_4\,wh, ry + I_1\,pt$)

The orientation in arable land utilization adopted, in the State Farm has a different character than that in individual farms in the three villages. A negative aspect of the sort of farming followed in Cergowa State Farm was the absence of a fixed and practiced crop rotation. It was only in 1956 that an 8 course rotation was established and efforts are currently being made to put it into operation through the introduction of transitional crop rotation sequence. However, it is hard to say what the final outcome will be.

The share of the exhaustive crops is much lower, for it covers only 39.0% and in this group wheat is absolutely predominating. Then there is a relatively large proportion of barley growing, while the part played by the remaining plants i.e. rye and oats is a minor one.

Among the intensifying crops which occupy 22.8% of the area, industrial crops, namely rapeseed, is relatively prevailing, with 42.6% of the group. Rapeseed is then followed by potatoes occupying 34,2%, fodder root crops taking 11.8% and maize taking 5.2%. On the other hand, the share of structure-forming crops is much higher than in individual farms amounting to 38.2% of the total. In this group clover predominates taking 55.5%, but serradella growing is also considerable (31,7%). The other fodder crops such as vetch, lupine etc. do not play major role.

Summing up, the orientation in utilization of arable land in the State Farm is as follows: wheat — clover — rapeseed ($E_2wh + I_1rp + S_2cv$).

It results from the above that 3 different orientations in utilization of arable land are practiced in Cergowa commune farming 1) state farming, 2) villages of Cergowa and Jasionka and 3) the village of Lipowica (Table 5).

b. Perennial Crops

In the villages of Cergowa commune perennial crops occupy but small areas and their role in farming is a minor one. In this class primarily belong small home-yard orchards covering 4.7 ha (0.8%) in Cergowa, 1.5 ha (0.9%) in Lipowica. In those orchards apple trees predominate (two thirds of all fruit trees) and they are followed by

plum, pear and cherry trees of different age, each on relatively small plots. The fruit grown in the individual orchards is meant to meet the needs of their owners.

Statistical data does not provide information on orchards in Jasionka. There are practically but single fruit trees and orchards are replaced by paddock-pastures. This is a reflection of the adverse climatic conditions, chiefly of temperature inversion and the formation of pools of stagnant cold air which caused freezing of the fruit trees particularly during the blooming season.

In 1958 there was one market orchard in the State Farm covering an area of 1 ha (0.2%) but it was set up only recently and is still non-productive. Species of apple trees adapted to the local climatic conditions predominated. In the next few years, however, the orchard greatly expanded and in 1960 it occupied an area of 5 ha.

c. Permanent Grasslands

Despite the fact that the area under survey includes mountainous regions, permanent grasslands cover relatively small surfaces (Lipowica 6.9%, Jasionka 8.3% and Cergowa 12.4%). This is a direct result of all tillable land being taken into cultivation by the agricultural population rapidly increasing over the past century. Among the permanent grasslands there is a noted prevalence of pastures over meadows (Cergowa — meadows 3.6%, pastures 8.8%, Lipowica — meadows 1.7%, pastures 5.2%. As for meadows they are primarily tiny bits scattered amidst fields, along streams and around farm buildings (Jasionka). They are chiefly the „poplawy" kind of postgrond meadows, inundated mountain meadows as well as a spring fed variety of bog meadows. Agrotechnical intervention on those meadows is limited to sporadic manuring and only small bits see extra grass sowing. They are mown twice yearly and their output ranges from 30 to 35 q of hay per ha.

The pastures generally yield small amounts of fodder. They are situated above the level of arable fields and below the line of forests, on the steeper slopes. Their vegetation is scanty as it is impoverished by excessive grazing. Tiny strips of pastures occur also right in Jasionka, along the stream, as well as on gravel and stone deposits laid down by the stream in Lipowica. The boundary strips and field roads are also utilized for grazing.

Cergowa State Farm, on the other hand, has large areas of grassland which covers 61.2% of the total land. The rough pasture land is situated mostly outside the common and, as a rule, it is former arable land situated higher up on the relatively poor soils. Only a part of

these pastures are utilized, a good deal being left neither mown nor grazed, partly overgrown with self sown scarce young growth of forest trees. Adequately managed they could provide an extensive basis for livestock breeding. Most of the meadows belong to the „*popława*" variety of post grond type. They are not particularly productive, their hay yield reaching about 30 q per hectare.

d. Forests

Forests, mostly State owned, cover 18.1% of the total area in the villages of Cergowa commune. Private forest holdings cover rather small areas in the villages (Cergowa — 2.9%, Jasionka — 3.5%, Lipowica — 3.9%). They form either tiny strips adjoining State forests or else forest-overgrown gorges. They are greatly differentiated as regards their age and the species of trees. Fir and beech are predominant although there also appear: pine, sycamore maple and grey alder, the latter mostly slongside rivers.

The bulk of the forests are State owned located in the south of the commune in one large and compact area round Cergowa and Hyrowa mountains.

From the typological point of view they can be classified as submontane mixed forests (submontane *lasobor*) and the fir-beech lower — mountain forests (lower *regel*).

Quantities of the particular kinds of trees are different in the particular sections, depending in each case, on the altitude. Lower down, the forest is much more varied, for instance section 46 a (pine 20%, spruce 20%, beech 10%, oak 10%, sycamore maple 20% and single hornbeams, ash-trees and larches). Higher up the species composition changes considerably. For instance section 61 a (beech — 70%, sycamore maple — 20%, fir — 10%, and single spruces).

The forests placed highest up, at the very peak of Cergowa mountain at an altitude of some 650—700 metres, display still different proportions, for instance section 58 (beech — 70%, fir — 30%, and single specimens of sycamore maples and ashes).

Fully productive forests prevail in this area and the age structure of the tree cover is illustrated below.

Class V (old stand) — about 5%

Class III and IV (fellable and nearly fellable stand) — 62%

Class I and II (young growth and immature stand) — 33%.

Planned forest management has been introduced throughout the entire area. Full clear cuttings are located only lower down whereas

higher np group cutting with simultaneous renewal of forests is a common practice.

Certain sections of arable land overgrown with wildings are being forested. Certain grounds, especially those on steep slopes (section 51) have been included into protective forests. The mountain Cergowa forest is of particular interest owing to the existence there of a natural reserve of yew trees, a species which is disappearing in Poland (section 63a).

A part of the tree cover, especially the old one, was badly ravaged during the hostilities of the 2nd World War.

5. PLANT PRODUCTION

Yields harvested in Cergowa commune villages (Table 6) are relatively high ones. They do not differ largely between the particular villages in the commune. Crops harvested at Cergowa State Farm are also similar in scope, the only difference being that in potatoe yields.

Crop production per hectare of agricultural land varies between 18 and 19 grain units (Cergowa 18.1, Jasionka 18.6, Lipowica 18.7). More than half of the crops harvested in the three villages is represented by food crops, the next biggest group being that of fodder crops which take about 50% of the total plant crop.

Industrial plants do not play practically any role in this region (from 0.5 to 1.4% of the total crop production, Table 6).

In the case of Cergowa and Lipowica villages potatoe production slightly exceeds that of grains with wheat prevailing. The co-relation of the particular groups is somewhat different in Jasionka where grain crops, with a balance struck between wheat and rye, pravail slightly over potatoes. A relatively high proportion of fodder crops, with clover predominating, is a characteristic in all three villages.

In all villages, this is a case of farming orientation of small scale peasant holdings in which grain and potato crops constitute the main basis of subsistence while fodder crops provide the basis for livestock breeding.

Crop production in the State Farm is strikingly different from that recorded in the three villages. Should the level of crop productivity be determined on the basis of the whole agricultural area it would hardly attain 9.5 grain units per 1 ha of agricultural land. Granting, however that the 268 ha of rough pastures owned by the State Farm are of little use — the crop productivity level has to be determined

Plant

Specification	Cergowa			%		Li	
	Yields in q per ha	Crop in q	Production in grain units	Plant production	Group production	Yields in q per ha	Crop in q
I. Food crops	x	x	4271	47.4	100.0	x	x
a) grains	x	x	2118	23.7	49.3	x	x
wheat	16.5	1183	1183	13.3	27.7	15.5	375
rye	14.0	935	935	10.4	21.6	14.0	263
buckwheat	x	x	x	x	x	6.0	3
b) roots and vegetables	x	x	1994	21.3	46.8	x	x
onions	65.0	97	29	0.3	0.7	65.0	39
cabbage	175.0	1135	170	1.9	3.9	175.0	438
beans	15.0	26	7	0.1	0.3	15.0	8
potatoes	115.0	7152	1788	19.6	41.9	110.0	2693
c) fruits	x	x	159	1.8	3.9	x	x
apples	80.0	272	136	1.6	3.3	80.0	88
others	35.0	46	23	0.2	0.6	35.0	14
II. Fodder crops	x	x	4669	52.1	100.0	x	x
a) grains	x	x	1570	17.4	33.6	x	x
barley	17.0	743	743	8.2	15.4	16.0	266
oats	16.5	823	823	9.1	17.1	16.0	256
mixed corn	12.0	4	4	0.05	0.1	—	—
b) succulent fodders	x	x	549	6.6	12.5	x	x
maize	—	—	—	—	—	—	—
mangolds	240.0	1480	149	1.6	3.5	240.0	450
potatoes	115.0	1600	400	4.7	9.0	110.0	400
c) roughage	x	x	2550	28.4	53.0	x	x
vetch	25.0	12	5	0.05	0.1	25.0	5
lupine	—	—	—	—	—	210.0	42
clover	45.0	3141	1256	14.1	26.5	45.0	954
serradella	—	—	—	—	—	—	—
meadows	35.0	693	208	2.3	4.9	30.0	81
pastures	23.0	1094	328	3.6	6.7	20.0	178
corn straw	32.0	7532	753	8.3	15.6	30.0	2283
III. Industrial crops	x	x	37	0.5	100.0	x	x
sugar beet	210	126	31	0.3	66.0	200.0	40
rapeseed	14.2	4	8	0.1	17.0	14.0	4
other oleaginous	8.5	2	4	0.05	8.5	—	—
flax	18.0	4	4	0.05	8.5	18.0	22
Total plant production	x	x	8987	100.0	x	x	x

Table 6

production

powica			Jasionka					State farm Cergowa				
Production in grain units	%		Yields in q per ha	Crop in q	Production in grain units	%		Yields in q per ha	Crop in q	Production in grain units	%	
	Plant production	Group production				Plant production	Group production				Plant production	Group production
1345	49.5	100.0	x	x	5925	49.2	100.0	x	x	931	21.1	100.0
641	23.6	47.1	x	x	3212	26.7	54.9	x	x	734	16.6	78.8
375	12.5	27.3	17.0	1772	1772	14.8	30.4	16.0	608	608	13.7	65.6
263	10.0	18.5	14.0	1438	1438	11.9	24.5	15.0	126	126	2.9	12.2
3	0.1	0.3	6.0	2	2	0.01	0.03	—	—	—	—	—
647	24.3	49.1	x	x	2533	22.5	45.1	x	x	196	4.5	21.2
12	0.4	0.8	65.0	117	35	0.28	0.5	60.0	30.0	9	0.2	0.8
66	2.4	4.6	175.0	1312	197	1.6	3.1	150.0	150.0	23	0.55	2.4
2	0.1	0.2	16.0	18	5	0.02	0.1	12.0	6	2	0.05	0.3
567	21.4	43.4	120.0	9189	2296	20.6	41.2	100.0	650	162	3.7	17.7
51	1.6	3.8	x	—	—	—	—	—	—	—	—	—
44	1.4	3.2	—	—	—	—	—	—	—	—	—	—
7	0.2	0.5	—	—	—	—	—	—	—	—	—	—
1369	49.1	100.0	x	x	6187	49.8	100.0	x	x	2920	65.8	100.0
522	19.1	37.4	x	x	2394	19.8	38.1	x	x	388	7.6	11.5
266	9.6	19.0	16.0	1288	1288	10.7	20.6	17.0	272	272	6.1	9.7
256	9.5	18.0	16.0	1086	1086	9.0	17.1	16.0	64	64	1.5	1.8
—	—	—	12.0	20	20	0.1	0.4	—	—	—	—	—
145	4.5	13.8	x	x	531	4.2	8.5	x	x	344	7.7	11.6
—	—	—	—	—	—	—	—	420.0	840	92	2.1	3.3
45	1.5	3.8	250.0	125	31	0.2	0.5	200.0	900	90	2.0	3.2
100	3.0	9.2	120.0	2000	500	4.0	8.0	100.0	650	162	3.6	5.1
702	25.5	49.8	x	x	3262	27.2	53.4	x	x	2237	50.5	76.9
2	0.1	0.2	30.0	3	1	—	—	40.0	160	64	1.5	2.2
13	0.4	1.0	—	—	—	—	—	300.0	1200	156	3.6	5.3
382	13.9	27.1	50.0	3670	1468	12.3	22.9	50.0	1750	700	16.0	27.0
—	—	—	30.0	21	8	0.1	0.1	35.0	750	300	6.9	9.8
24	0.8	2.0	40.0	812	244	1.8	4.3	30.0	960	288	5.6	9.3
53	1.9	4.1	25.0	955	286	2.4	5.0	10.0	2630	536	12.3	17.1
228	8.2	15.4	35.0	12551	1255	10.5	20.1	30.0	1932	193	4.4	6.9
40	1.4	100.0	x	x	106	0.9	100.0	x	x	582	13.1	100.0
10	0.35	25.0	200.0	120	30	0.3	28.3	—	—	—	—	—
8	0.25	20.0	14.0	6	12	0.1	11.3	18.0	291	582	13.1	100.0
—	—	—	—	—	—	—	—	—	—	—	—	—
22	0.8	55.0	20.0	64	64	0.5	60.4	—	—	—	—	—
2754	100.0	x	x	x	12038	100.0	x	x	x	4432	100.0	x

Animal

Specification	Cergowa					Li	
	Animal heads	Average productivity	Production	Production in grain units	% of animal production	Animal heads	Average productivity
Milk	264	1950 l	514.800	3.921	52.1	366	1900 l
Meat stock beef	44	350 kg	15.400	924	12.3	65	350 kg
veal	92	40 kg	3.680	221	2.9	151	40 kg
pork	175	110 kg	19.250	963	12.7	161	120 kg
mutton	15	40 kg	600	36	0.5	38	40 kg
poultry	2800	2 kg	5.600	336	4.5	3250	2 kg
Wool	44	2.5 kg	110	44	0.6	100	2.5 kg
Eggs	4530	95 ps	430.350	1.076	14.2	5212	90 ps
Total plant production	x	x	x	7.521	100.0	x	x

on the basis of the remaining area of agricultural land only (arable lands, meadows, orchards). Such a basis of reference would, of course, enhance enormously the crop productivity index which would rise up to 22.1 grain units per 1 ha. Food crops take hardly 24.7% of the total crops harvested in the State Farm, of that amount grain crops with a predomination of wheat take 67.1% while the potato crop only 29.8%. More than two thirds of the total crops is taken by fodder crops (62.2%) of which fodder crops earmarked for hay and green crop take 81.6% with a marked prevalence of clover. Even the elimination of pastures from crop productivity calculations is not likely to influence the orientation which remains a fodder orientation, anyway.

The proportions in crop production branches presented above confirm therefore, the outstanding differences between farming in the particular villages and in the State Farm, differences which come to the fore, also in orientations in the whole agricultural production.

6. LIVESTOCK BREEDING AND ANIMAL PRODUCTION

Grasslands as well as fodder crops grown on the arable land, provide the fodder base for livestock raising in this region. The livestock raising is pretty well developed in Cergowa commune, as illustrated in Table 8.

The number of draft animals represented here by horses only, is

Table 7

Production

powica			Jasionka					State farm Cergowa				
Production	Production in grain units	% of animal production	Animal heads	Average productivity	Production	Production in grain units	% of animal production	Animal heads	Average productivity	Production	Production in grain units	% of animal production
695.400	5216	54.0	101	1800 l	181.800	1364	53.5	57	2100 l	119.700	918	40.7
22.750	1365	14.0	18	350 kg	6.200	372	14.5	10	400 kg	4.000	240	10.6
6.040	362	3.5	15	40 kg	1.800	108	4.2	40	40 kg	1.600	96	4.4
19.320	966	10.0	40	120 kg	4.800	240	9.4	180	100 kg	18.000	900	40.0
1.520	91	0.8	3	40 kg	120	1	—	—	—	—	—	—
6.500	390	4.7	1000	2 kg	2.000	120	4.7	100	2 kg	200	12	0.5
250	100	1.0	9	2.5 kg	23	9	0.3	4	3 kg	12	5	0.2
469.085	1173	12.1	1520	90 ps	136.800	342	13.4	150	95 ps	14.250	34	1.5
x	9663	100.0	x	x	x	2556	100.0	x	x	x	2255	100.0

relatively low (9.7 to 11.8 horses per 100 ha of agricultural land) if compared to the average for Rzeszów voivodship where the ratio amounts to 17.5 horses per 100 ha of agricultural land.

As far as the age structure is concerned, there appear almost exclusively grown-up borses, over three years old, that means work-horses, whereas young horses are almost non-existent. Apart from field work horses are used in forests for seasonal timber transportation.

On the other hand, there is a very high density of cattle population per 100 ha of agricultural land. The actual figures vary between 61.8 (Cergowa) and 83.9 (Lipowica). This relatively high number of cattle both in this area and in other mountainous counties of Rzeszów and Kraków voiwodships is a feature with a long tradition, closely linked with subdivision of farms. Even the smallest farm has, on average, one cow.

Cows dominate in cattle breeding structure taking about 80% of the entire herd, the remainder being young animals. This indicates that a renewal of the cattle herd takes place every 5 to 6 years.

In Cergowa villages Polish Red cattle breed predominates although specimens of Lowland, Black-and White breed also occur there.

Mature cattle weights-on an average are about 350 to 400 kg which is obviously far from anything remarkable. Milk productivity ranges from 1800 to 2000 l. a year from one cow and the content of milk fat amounts to about 3.5%.

As far as pig herds are concerned the „Hanging Eared" breed of pork

Livestock

Specification	Cergowa					Ja	
	Animal heads	Big animal units	% in big animal units	Heads of animal per 100 ha agricultural land	Big animal units per 100 ha of agricultural land	Animal heads	Big animal units
Horses	48	57.6	14.8	9.7	11.7	69	82.3
over 3 years old	48	57.6				68	81.6
young ones	—					1	0.7
Cattle	304	280.6	71.8	61.8	56.9	458	411.2
cows	264	264.0				366	366.0
bulls	2	2.4				—	—
heifers	9	6.3				44	30.8
calves	29	7.7				48	14.4
Pigs	208	28.15	7.2	42.3	5.7	199	22.15
sows	33	9.9				12	3.6
cutters	45	11.75				46	11.5
piglets	130	6.50				141	7 05
Sheep	44	3.25	0.8	9.0	0.6	100	8.1
grown up	11	2.10				62	6.2
lambs	23	1.15				38	1.9
Poultry	5560	21.27	5.4	1130.0	4.3	6482	25.18
hens	4530	13.59				5212	15.64
geese	750	6.00				960	7.68
ducks	280	1.68				310	1.86
Total	x	390.67	100.0	x	79.2	x	548.93

Table 3

Breeding

sionka			Lipowica					State farm Cergowa				
% in big animal units	Heads of animals per 100 ha of agricult. land	Big animal units per 100 ha of agricult. land	Animal heads	Big animal units	% in big animal units	Heads of animals per 100 ha of agricult. land	Big animal units per 100 ha of agricult. land	Animal heads	Big animal units	% in big animals units	Heads of animals per 100 ha of agricult. land	Big animal units per 100 ha of agricult. land
15.0	**10.7**	**12.7**	17	20.4	**13.9**	**11.8**	**14.3**	28	29.6	**21.9**	**6.0**	**6.4**
			17	20.4				20	24.0			
			—					8	5.6			
74.9	**71.0**	**63.8**	120	111.5	**75.8**	**83.9**	**77.9**	59	58.9	**43.7**	**12.7**	**12.74**
			101	101.0				57	57.0			
			—	—				1	1.2			
			12	8.4				1	0.7			
			7	2.1				—	—			
4.0	**30.8**	**3.4**	50	5.90	**4.0**	**35.0**	**4.1**	249	45.65	**33.8**	**53.5**	**9.72**
			—	—				128	38.40			
			17	4.25				6	1.50			
			33	1.65				115	5.75			
1.5	**15.5**	**1.2**	9	0.7	**0.5**	**6.3**	**0.5**	4	0.2	**0.2**	**0.9**	**0.04**
			5	0.5				—	—			
			4	0.2				4	0.2			
4.6	**1005.0**	**4.0**	2040	8.52	**5.8**	**1426.0**	**5.9**	150	0.45	**0.3**	**32.2**	**0.1**
			1520	4.56				150	0.45			
			420	3.36				—	—			
			100	0.60				—	—			
100.0	x	85.1	x	147.02	100.0	x	102.7	x	134.8	100.0	x	29.0

-and-lard type predominates. An average weight of a fattened hog varies between 120 and 140 kg.

In spite of this being mountainous terrain, sheep raising is not too popular. The primary cause is scarcity of grazing land. The sheep that there are, however, belong to the cross breed of Mountain Cakla--and Merino sheep which weighs, on an average, about 40 kg and which yields about 2.5 kg of wool a year.

Poultry raising is rather popular and particularely of hens (from 1130 in Cergowa to 1426 in Lipowica per 100 ha of agricultural land). Mixed breeds prevail and their average weight is up to 2 kg while yields about 2.5 kg of wool a year.

Ducks and geese are also raised but in rather small numbers.

Generally speaking, the livestock population expressed in big animal units per 100 ha of arable land is high with their numbers ranging between 79 and 103. Such extensive livestock raising ensures adequate amouts of organic manure making intensive farming possible on the arable land.

On the whole, cattle raising is predominant in the villages of Cergowa commune, taking 70 to 80% of the total livestock expressed in big animal units. The next biggest group is that of horses which take from 14 to 15%, pigs from 4 to 6%, poultry about 5% and sheep about 1% of the total livestock population.

The livestock raising orientation that prevails in the State Farm is a totally different one. Owing to a high degree of mechanisation of field work, the number of horses amounts to only 6.0 heads per 100 ha of agricultural land (6.4 big animal units). A large proportion of them are young horses.

With mechanical traction available such a ratio of horses has been found much too excessive, notwithstanding the adverse conditions encountered by mechanisation of farming in a mountainous terrain.

The number of cattle per 100 ha of agricultural land is only 12.7 animal heads (12.74 big animal units) which is rather a low figure in view of the considerable fodder base. The lowland, White-and-Black breed prevails in the herd. (99%). Average weight of one cow is around 450 kg and milk productivity tops 2100 litres a year from one cow.

The pig herd is the most intensive section of livestock raising at the Farm which boasts 53.5 animal heads per 100 ha of agricultural land (9.7 big animal units). There are two distinct orientations in pig raising i.e. one directed on piglets meant for sale, the other on fattened pigs meant for bacon and weighing up to 100 kg. Sheep and poultry raising is small and insignificiant.

All together there are 29 big animal units per 100 ha of agricultural land (cattle — 43.7%, pig herd — 33.8% and horses 21.9% of the total animal units). The ratio of livestock to 100 ha of agricultural land would be far more adventageous should the unproductive pasture-land be excluded, that is to say, should the ratio be calculated with regard to arable land and meadows only. Were it so, the number of horses would grow up to 14, cattle up to 29.4 and the pig herd up to 124.5 heads of animals, per 100 ha (14.8, 29.4 and 22,8 big animal units per 100 ha). Altogether, the number of big animal units per 100 ha would as a result of such calculation, rise up to 76.4, or almost as many as in individual holdings.

Animal production orientations prevailing in the villages of Cergowa commune are nearly identical (Table 7). This means that there is practically one orientation only in individual farming. In general terms the orientation can be defined as a dairy one (milk production takes 52—54% of the total animal production) with a good share of meat (33% of the animal production) as accompanying orientation (beef and veal prevailing). There is also a considerable share of egg production in overall animal output (12.1 to 14.2%).

The orientation adopted by the State Farm is a different one It can be described as mixed meat and dairy orientation, with pork stock prevailing.

7. GROSS AGRICULTURAL PRODUCTION

Gross agricultural production as expressed in grain units per 1 ha of agricultural land is relatively high in the three villages where it amounts to 33.2 in Cergowa, 33.3 in Jasionka and 36.1 in Lipowica. With the proportion between the particular sections of farming as the basis the agricultural production orientation for all of the villages has been determined as follows (Table 9).

Cergowa and Jasionka — medium productive, Lipowica fairly productive.

a) Cergowa — $3 \, x \, V_2(a_1pt + f_1cv) + A_2(c_1d) \, l$

b) Jasionka — $3 \, x \, V_2(a_1pt + f_1cv) + A_2(c_1d) \, l$

c) Lipowica — $4 \, x \, V_2(a_1pt + f_1cv) + A_2(c_1d) \, l$

Agricultural productivity expressed in grain units as well as orientation in agricultural production adopted in Cergowa State Farm are different. Here, the agricultural productivity scores hardly 14.3 grain units per 1 ha of agricultural land, which, indeed, is not much. Gross-production calculated per arable land and meadows only with the exclusion of pastures increases to a total of 30.7 grain units per 1 ha

Table 9

Gross agricultural production

Specification	Cergowa			Jasionka			Lipowica			Cergowa state farm		
	Production in grain units	% of crops or animal production	% of the total production	Production in grain units	% of crops or animal production	% of total production	Production in grain units	% of crops or animal production	% of total production	Production in grain units	% of crops or animal production	% of the total production
Food crops	4.271	47.4	25.4	5.925	49.2	27.3	1.345	49.5	25.9	931	21.1	13.9
grains	2.118	23.7		3.212	26.7		641	23.6		734	16.6	
potatoes and vegetables	1.994	21.9		2.533	22.5		647	24.3		196	4.5	
fruits	159	1.8		—	—		51	0.4		—	—	
Fodder crops	4.669	52.1	28.7	6.187	49.8	27.4	1.369	49.1	25.9	2.920	65.8	43 6
grains	1.570	17.4		2.394	19.8		522	19.1		338	7.6	
succulent forage	549	6.6		531	4.2		145	4.9		344	7.7	
rough forage	2.550	28.4		3.262	27.2		702	25.5		2.237	50.5	
Industrial crops	37	0.5	0.3	106	0.9	0.5	40	1.4	0.6	582	13.1	8.7
Total crops	8.987	100.0	54.4	12.033	100.0	55.2	2.754	100.0	52.4	4.432	100.0	66.2
Milk	**3.921**	**52.1**	**23.7**	**5.216**	**54.2**	**24.1**	**1 364**	**53.5**	**25.5**	**918**	**40.7**	**13.7**
Meat	**2.486**	**32.9**	**15.1**	**3.174**	**33.0**	**14.7**	**841**	**32.8**	**15.7**	**1.298**	**57.4**	**19.5**
beef and veal	1.145	15.2		1.727	17.5		480	18.7		336	14.7	
pork	**963**	12.7		966	10.0		240	9.4		950	42.2	
mutton and poultry	372	5.0		481	5.5		121	4.7		12	0.5	
Eggs	**1.076**	**14.2**	**6.5**	**1.173**	**12.1**	**5.5**	**342**	**13.4**	**6.3**	**34**	**1.5**	**0.5**
Wool	**44**	**0.6**	**0.3**	**100**	**1.0**	**0.5**	**9**	**0.3**	**0.1**	**2**	**0.2**	**0.1**
Total animal production	7.521	100.0	45.6	9.663	100.0	44.8	2.556	100.0	47.6	2.255	100.0	33.7
Grand total	16.508	x	100.0	21.701	x	100.0	5.310	x	100.0	6.687	x	100.0
Per 1 ha of agricultural land		33.2			33.3			36.1			14.3/30.7	
plant production		18.1			18.6			18.7			9.5/22.1	
animal production		15.1			14.7			17.4			4.8/ 9.6	

of agricultural land, a productivity index similar to that scored in individual holdings. There appear, however, to be major differences between individual and state farming in so far as agricultural production is concerned.

The orientation prevalent in the State Farm is a medium productive, vegetable, fodder, clover-dairy cattle one:

$3xV_3(f_2cv) + A_1(cd)m$

Despite their considerable share, of the industrial crops with rapeseed predominant, as well as milk production do not reach the level to be included into the groups which determine the orientation of agricultural production.

Thus, the farming orientation presented above of the different agricultural units of the Cergowa commune first and foremost point to the existence of considerable differences between individual and state farming. They also emphasize the existence of differences in farming orientations in individual farming, depending, on natural conditions, size of farm, structure of land uses etc.

GEOGRAPHIA POLONICA 5, 1965

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THE COMMUNE OF CZERSK IN THE WARSAW SUBURBAN ZONE

Using the examples of 8 villages of an area of about 1750 ha an attempt is made to present in this report an analysis of land utilization and farming in the southern part of the Warsaw suburban zone [1].

The villages under study comprise the eastern part of the commune of Czersk which itself is situated in the southern section of Piaseczno county, just by the administrative boundary of the county of Grójec, some 35 km south of Warsaw and 20 km from Piaseczno. The eastern boundary of the area under examination runs along the bed of Vistula river while the western one runs along its entire length almost parallel to the highway from Warsaw to Warka and farther south.

1. NATURAL CONDITIONS

The villages comprising the eastern section of the area concerned (such as Kępa Radwankowska, Borki, Brzumin, Ostrówik) are situated on the flood plain of the valley of the Vistula river, at an altitude of 90 to 100 m above sea level, where as those in the north-western section are situated on an morainic upland dominating the area and rising up to 125 m above sea level (Castle Hill in Czersk).

The climatic conditions prevailing in these two sections differ slightly from each other.

Despite only small difference of elevation, the average minimum monthly temperature on the upland is slightly higher than that at the bottom of the valley which is a result of inversion of temperature and

[1] The field land use studies in the Piaseczno county were carried out in 1962 under the direction of the author. The commune of Czersk was mapped by T. Lankamer.

of formation of cold air layers in the large Vistula Valley. The temperature divergence disappears almost totally when referred to average maximum monthly temperatures. This case is illustrated below, on the basis of 1959 record [2]:

Table 1

Average minimum monthly temperature in centigrade in 1959

Area	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Vistula Valley	-3,8	-5,0	-0,3	2,2	6,5	9,8	15,1	13,0	6,0	1,5	-0,5	-4,4
Upland	-1,7		0,4	3,2	7,4	11,2	16,1	13,6	6,1	1,8	-0,5	-3,7

Table 2

Average maximum monthly temperatures in centigrade in 1959

Area	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Vistula Valley	1,1	0,6	9,2	13,9	18,8	22,9	26,4	24,4	18,0	13,4	4,9	-0,3
Upland	1,1	0,3	9,6	14,1	19,0	22,5	26,9	24,4	18,0	13,5	4 0	0,7

Operation of two opposite factors accounts here for the disappearance of the difference of temperatures. At the bottom of the valley of the Vistula there are milder winds blowing and this, of course, enhances higher temperature of the air on ground level. On the other hand, because of a heightened thermal capacity, the higher moisture content of the bottom of the Vistula Valley, sets itself against growth of the temperature of air, compensating for the smaller wind velocity.

The villages under survey are characterised by a relatively long vegetation season, and particularly by late setting in of the Autumn. The vegetation season in this region continues from March till the end of October [3].

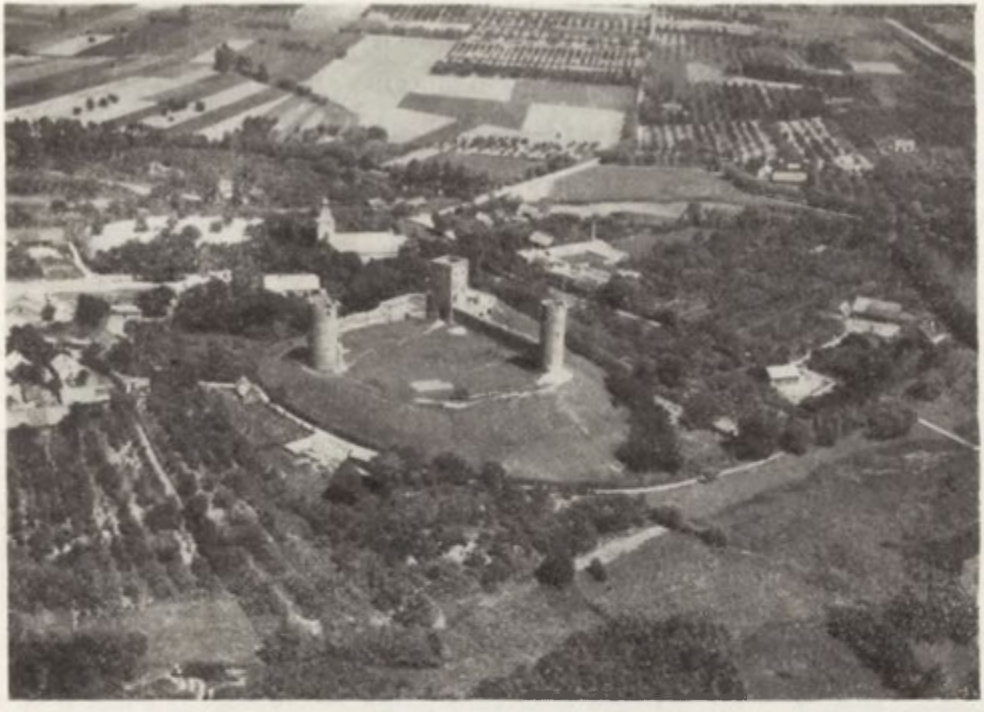
Table 3

Lenght of vegetation season [3]

Localities	Beginning of Spring	Beginning of Autumn	Length of vegetation season
Królewski Las	29. III	27. X	212 days
Warsaw Astronomic Observatory	23. III	10. X	201 days

[2] W. Parczewski. O klimacie lokalnym pradoliny Wisły w rejonie Warszawy. Zeszyty Naukowe SGGW 1961, z. 3, s.35—43. (On local climate of the old valley of river Vistula in the area of Warsaw).

[3] M. Molga. Próba ustalenia czasu trwania okresu wegetacyjnego w woj. warszawskim na podstawie obserwacji fitofenologicznych z okresu 1948—1950. Wiadomości Służby Hydrologicznej i Meteorologicznej, tom II, 1951. s. 156—160 (Tentative determination of the length of vegetative period in Warsaw voiwodship on the basis of phytophenological observations covering period 1948—1950.



phot. E. Kupiecki

Fig. 1. Overall view on the Czersk commune

The annual rainfall for the bottom of the Vistula Valley reached 386 mm in 1959, that is to say a rainfall close to the absolute annual minimum for Warsaw which is 401 mm (for a forty year period from 1891 to 1930) [4]. Slightly higher rainfall has been recorded in the upland which testifies to the appearance of a rainfall deficit in the ancient Vistula Valley, particularly acute in the warmer season of the year.

Table 4

Average monthly and annual rainfall total in 1959

Area	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Vistula Valley (Obory)	20,2	12,2	23,2	25,7	22,2	139,8	49,2	17,1	10,0	7,6	12,1	46,7
Upland (Wolica)	12,5	3,1	13,5	32,1	20,9	140,4	79,3	17,3	15,5	8,6	17,9	53,6
Warsaw Observatory	35	26	32	40	48	60	84	72	44	37	38	38

[4] W. Parczewski — Op. cit.

Annual total: Obory — 386, Wolica — 414,7, Observatory — 554,0. It is presumed that in the total water balance sheet for the valley the smaller rainfall is compensated by profuse dew.

The fertile, medium and heavy alluvial meadow soils (*mada*) are the predominant types of soils in the Vistula Valley. Sandy muds and river sands of but poor agricultural quality occur also in the Vistula Valley, chiefly on the lands of Kępa Radwankowska and in the neighbourhood. In the centre of the area under survey, on the boundary between the villages of Czersk and Coniew there appears a stretch of meadow bog soils used chiefly for permanent grasslands and brushwood.

The upland part of the area under study has different types of soils. It was covered by boulder clay or sandy fluvioglacial sediments on which podsolized clayey or sandy-clayey soils have developed.

Apart from the Vistula the greatest influence upon the hydrographic situation in the area under survey is exerted by its tributary stream Czarna, cutting across the area in a parallel direction. Because the stream is not controlled it floods the adjoining meadows and fields in seasons when the volume of water increases. Moreover, in the springtime or following prolonged rainfalls, pools of stagnant water are observed on the agricultural land which, of course, cannot but have an adverse bearing upon field crops and the root system of fruit trees.

2. AGRARIAN STRUCTURE

The area under survey occupies 1733 ha. All the land is owned by the small scale peasant farmers. It can be observed from Table 5 that with the sole exception of the village of Borki there is a considerable

The size of individual

Village	Total land owned in ha	Total number of farms	Average size of farms	0—2	
				% of farms	% of land
Borki	55.32	11	5.00	9.1	3.4
Brzumin	66.73	17	3.92	29.4	6.9
Coniew	260.56	66	3.94	30.2	10.0
Czersk	597.63	145	4.12	28.3	8.1
Kępa Radwankowska	31.48	9	3.50	22.2	12.0
Królewski Las	155.58	35	4.44	20.0	4.2
Ostrówik	171.87	34	5.05	17.7	4.5
Podgóra	135.61	34	4.00	14.7	5.5

subdivision of land in the region in question. Out of the total of 351 farms, larger farms (over 10 ha in size) appear only in 5 villages occupying an aggregate 13% of agricultural land (4,2% of the total number of farms). Farms of under 5 ha constitute about 70% of the total, owning about 45% of the area of agricultural land. Of this a little over 20% is taken by the dwarf farms (of under 2 ha) while within the limits of Greater Warsaw this category of farms takes as much as 33% [5]. In some villages located in the northern part of the county of Piaseczno this group of farms represents even over 40% of the total [6]. It is only in three villages (Brzumin, Czersk, Coniew) representing about 65% of the area under survey that farms of under 2 hectares constitute about 30%. In the village of Podgóra which owns relatively infertile land the small farms represent under 15% of the total number of farms occupying hardly 5,5% of the total area of land.

Over a majority of the area are farms of 2 to 7 ha in size, which own from 55 to 65% of the land are predominant. Larger farms, from 5 to 10 ha, are most frequent (58%) only in the village of Ostrówik while in the village of Kępa Radwankowska farms of 2 to 5 ha predominate (55%).

Subdivision of land is closely followed by fragmentation of fields. From this point of view the area embraced by this survey can be divided into two parts. The northern part with but moderate fragmen-

[5] W. Sokołowski. Gospodarka rolna w granicach Wielkiej Warszawy. (Farming within Greater Warsaw). Miasto 1954, vol. 3.

[6] W. Stola. Gospodarka rolna w strefie podmiejskiej na przykładzie wsi Bielawa. (Rural economy in a suburban area on the example of Bielawa village). Przegl. geogr., v. 34, 1962 No 1.

Table 5

farms in 1960

2—5		5—7		7—10		10—14		> 14	
% of farms	% of land	% of farms	% of land	% of farms	% of land	% of farms	% of land	% of farms	% of land
18.2	11.0	63.6	72.8	9.1	12.8	—	—	—	—
41.2	37.3	17.6	25.7	5.9	12.2	5.9	17.9	—	—
42.4	37.5	12.1	18.1	12.1	24.7	3.2	9.7	—	—
40.0	33.4	17.9	25.5	8.3	15.6	3.4	9.2	2 1	8.2
55.4	55.5	22.2	32.5	—	—	—	—	—	—
48.6	40.3	11.4	16.0	11.4	20.4	5.7	7.8	2.9	11.3
35.5	23.8	23.2	27.2	17.8	31.3	5.8	13.2	—	—
58.9	47.0	17.6	27.5	8.8	20.0	—	—	—	—

tation, not exceeding 5 plots per one farm (mostly 2 to 3 plots) and the southern part comprising the villages of Coniew, Królewski Las and Podgóra where fields are more fragmented and where there are from 5 to 10 plots per one farmstead.

The relatively low degree of field fragmentation in the northern part is a result of consolidation of farms carried through in this area (for instance at Czersk) in the inter-war period, as well as parcelling out of the former landed estate in Brzumin owing to which the newly created farms hold their land generally in one or two plots. An outcome of the above mentioned parcelling of the landed estate carried through in the inter-war period on the proprietor's own accord, is the setting up of the village of Ostrówik. As regards the southern part, there were attempts made, both during the German occupation and after the liberation, at consolidation of farms, the plans were not, however, carried through fully.

Field pattern is closely linked with land fragmentation. On the lands which have been integrated and parcelled the field pattern is of a block type whereas in the regions with heavy fragmentation there has been preserved in a modified form a three-field (*n i w a*) pattern with checkerboard like field fragmentation. Scattering of field plots of particular farms in different parts of village and frequently on the premises of the neighbouring villages as well presents added difficulties to farming.

In 1961, the population of the villages embraced by the survey reached the 1293 people of which 616 were men and 677 women. The number of people representing actual manpower, hence the popu-

Manpower

Village	Borki			Brzumin			Coniew			Czersk		
Size of farm >ha<	Number	Persons per 1 farm	Total number of persons 1 farm	Number	Persons per 1 farm	Total number of persons 1 farm	Number	Persons per 1 farm	Total number of persons 1 farm	Number	Persons per 1 farm	Total number of persons 1 farm
0 — 2	1	1.9	1.9	5	1.9	9.5	20	1.9	38.0	41	1.9	77.9
2 — 5	2	2.1	4.2	7	2.1	14.7	28	2.1	58.8	58	2.1	121.8
5 — 7	7	2.3	16.1	3	2.3	6.9	8	2.3	18 4	26	2.3	59.8
7 — 10	1	2.5	2.5	1	2.5	2.5	8	2.5	20.0	12	2.5	30.0
> 10	—	—	—	1	2.7	2.7	2	2.7	5.4	8	2.7	21.6
Total	11	x	24.7	17	x	36.3	66	x	140.6	145	x	311.1

lation in the productive age group, numbered some 700 persons [7] of which about 100 people according to estimated data were employed outside agriculture.

Granting that about 60% of the population in post productive age (about 100 persons) is still employed in agriculture it has been calculated that about 700 people, as a total, are employed in agriculture which gives 43 persons per 100 ha of agricultural land (total — 1605,8 ha).

As far as the percentage of the population employed in agriculture is concerned the commune of Czersk ranks first in Piaseczno county. While an average % throughout the county is only about 25 — it is much higher in Czersk commune where it strikes 84.4 figure. Field studies have confirmed that in some villages this % is, in fact, still higher. This is a consequence, on the one hand, of absence of industrial plants in or near the villages concerned, in addition to being a greater distance from Warsaw and, on the other hand, of the favourable natural conditions and primarily of the soil subjected to intensive farming.

A balance sheet of manpower [8] (Table 6) reveals manpower shortage in agriculture of the villages examined which is connected with the

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[7] Population in the productive age group (16 to 59 years) constitutes 53.9% of the total, that is 697 persons. The population in post-productive age (over 60 years) constitutes about 14.0% of the total or 181 persons.

[8] Method worked out by the Chair of Economic Geography, the University of Warsaw, under the direction of J. Kostrowicki (1954).

Manpower Table 6

Kępa Radwankowska			Królewski Las			Ostrówik			Podgóra			Total		
Number	Persons per 1 farm	Total number of persons 1 farm	Number	Persons per 1 farm	Total number of persons 1 farm	Number	Persons per 1 farm	Total number of persons 1 farm	Number	Persons per 1 farm	Total number of persons 1 farm	Number	Persons per 1 farm	Total number of persons 1 farm
2	1.9	3.8	7	1.9	13.3	6	1.9	11.4	5	1.9	9.5	87	1.9	165.3
5	2.1	10.5	17	2.1	25.2	12	2.1	25.2	20	2.1	42,0	149	2.1	312.9
2	2.3	4.6	4	2.3	9.2	8	2.3	18.4	6	2.3	13.8	64	2.3	147.2
—	—	—	4	2.5	10.0	6	2.5	15.0	3	2.5	7.5	35	2.5	87.5
—	—	—	2	2.7	5.4	2	2.7	5.4	—	—	—	15	2.7	40.5
9	x	18.9	34	x	73.6	34	x	75.4	34	x	72.8	350	x	753.4

heavy subdivision of village land. The shortage is all the more conspicuous if the specific character of farming in this area is taken into account, an area which because of its location is orientated towards direct supplies of farm products to Warsaw. As reported by L. Kosiński [9] the employment rate per 1 ha in the market gardening is 4 to 6 times higher than that prevailing in grain farming. Although vegetable growing fails to play any major role in this region, which will be demonstrated later on in this paper, its place is taken by orchards which call for the employment of greater manpower than farming with a cereal orientation. With this point in mind it has to be admitted that in the villages embraced by this survey there is a considerable manpower shortage in agriculture which is a direct consequence of the outflow of rural population to work in trades outside agriculture.

3. LAND UTILIZATION

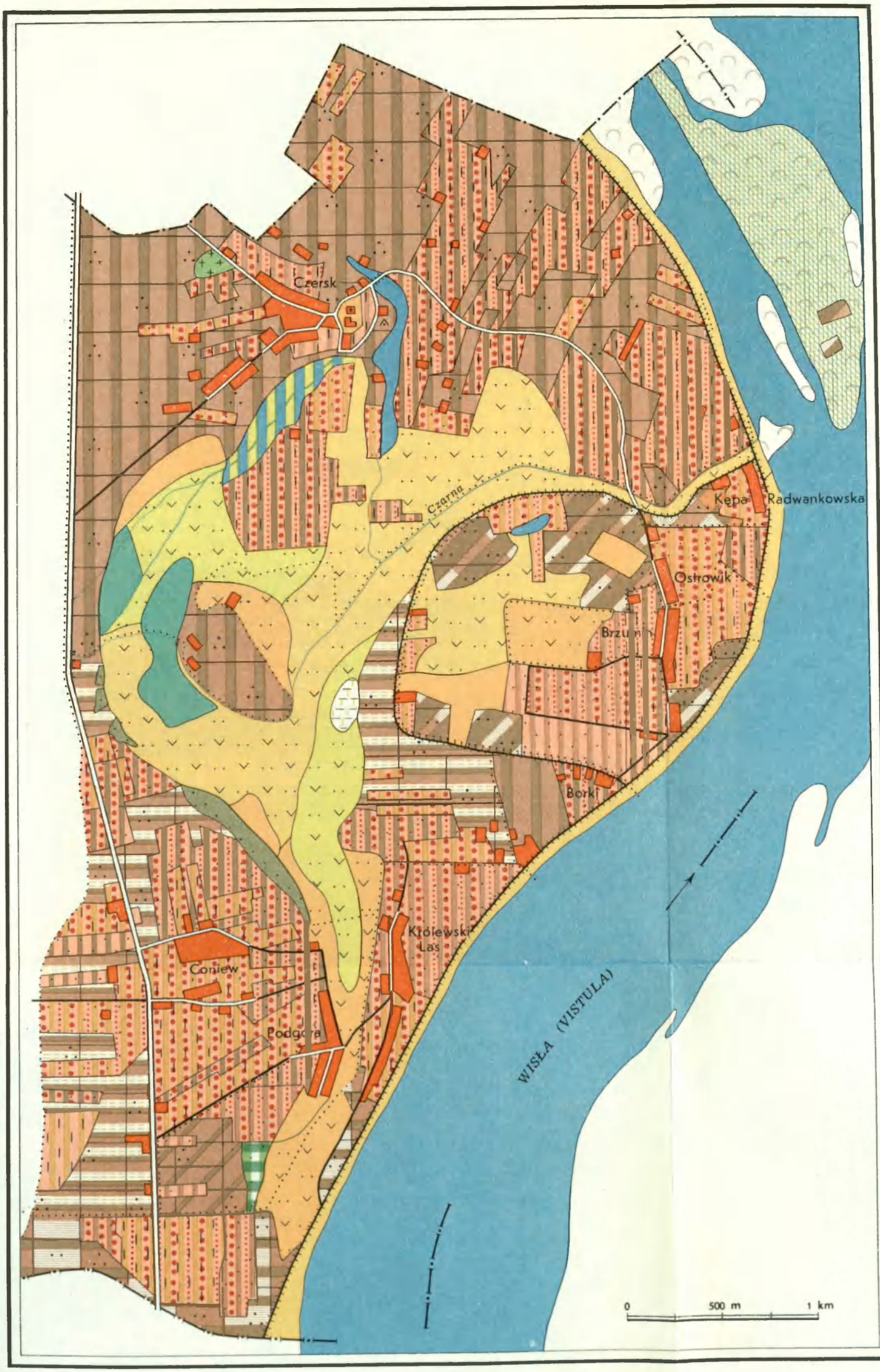
Table 7 illustrating land utilization in the region under survey points to maximum exploitation of land by agriculture reaching 92.5% while the average proportion in Piaseczno county is close to the national average reaching only 62.6% of the total land.

Table 7

Land utilization

Village	Total area of land		Arable land		Orchards in %		Grasslands in %		Forests %	Built up land %	Unproductive land %
	ha	%	%	In that idle and fallow %	Inter-cultivated	Not intercul-tivated	Meadows	Pastures			
Borki	52.68	100	55.0	—	6.4	0.7	21.4	8.4	—	3.3	4.8
Brzumin	75.42	100	0.7	—	75.2	—	14.5	5.2	—	2.5	1.9
Coniew	373.53	100	31.6	0.7	30.8	—	21.8	0.6	9.4	2.5	3.3
Czersk	700.31	100	46.5	—	25.7	0.7	16.7	5.0	0.5	4.0	0.9
Kępa Radwankowska	35.74	100	41.9	—	28.0	6.1	8.6	9.2	—	5.9	0.3
Królewski Las	172.80	100	36.7	—	35.0	—	17.3	5.5	—	3.3	2.2
Ostrówik	181.29	100	14.3	—	49.8	2.4	19.9	10.0	—	3.4	0.2
Podgóra	140.86	100	60.7	0.5	13.7	—	13.9	4.5	—	4.6	2.6
Total	1.733.23	100	38.2	0.2	30.9	0.7	17.9	4.3	2.2	3.5	1.8

[9] L. Kosiński, Funkcje rolnicze strefy podmiejskiej. (The agricultural role of the suburban zone). Przegl. geogr. V. 4. 1954.



Map 1. The contours of Czersk, land utilization map

Among agricultural land arable fields (38.2%) which are sown almost in their entirety (fallows take hardly 0.2%) and perennial crops which occupy only a little smaller area than arable fields (31.6%) predominate. This high portion of land taken by orchards accounts for the region in question and Grójec county to the south of it (8.9%) being the top fruit producing areas for Warsaw. According to M. Rzewuska [10], the orchard orientation in farming in the area under survey has been adopted mainly owing to the favourable economic factors and particularly due to the big urban market of Warsaw.

In the region concerned grasslands take 22.7% of which 18% of the total land is occupied by meadows. Only a very small area not exceeding 2.2% of the total, is occupied by forests which appear in the villages of Coniew and Czersk only.

a. Arable Land

The most frequently followed crop rotation system in the area in question are a intensive two-year rotation and a three-year rotation without fallow land. The two-year crop rotation system is predominant in the villages where fertile soils prevail (Borki, Brzumin, Kępa Radwankowska, Ostrówik) and the following crop sequence is characteristic there: 1) root crops +, 2) winter or spring grains which is sometimes followed by after-crops. The three-year crop rotation occurs in two different variants, i. e. grain and mixed one: 1) root crops +. 2) spring grain, 3) rye or: 1) root crops+, 2) spring grain, 3) fodder *papilionaceous* plants.

After crops, are frequently sown after harvesting grain or an early potato crop. Serradella and lupine are most common on the poorer soils cultivated partly for fodder and partly for green manure. On the fertile soils, however, vetch, field peas and various mixtures of fodder leguminous plants are prevalent.

Fields are generally fully manured in preparation for potato and fodder root crops. Dung is used almost exclusively for root crops, in varying quantities, for instance for potatoes, from 25 to 30 t. per ha. Artificial fertilizers are made use of, frequently for grain crops and the quantities involved are as follows: phosphorous — about 80 to 100 kg per ha, nitrate — on an average — 100 to 120 kg per 1 ha, potassic from 130 to 150 per 1 ha. On acid soils lime is sown occasionally at a rate of 10 q/ha.

About 60% of grain is sown by sowing machines, and 40% by hand.

[10] M. Rzewuska, Rozwój sadownictwa i warzywnictwa w Polsce w latach 1947—1954. Master thesis (typewritten copy) University of Warsaw.

The drilling requires about 150 kg of wheat and oats per one ha. This quantity is about 25% higher in case of manual sowing. Potato seed is set mainly by hand and it takes about 12 q to plant one ha. Corn harvesting is even less mechanised for only 20% of the total operation is performed by harvesters. On the other hand, corn threshing is performed almost exclusively by means of broad threshers driven by electric motor or, occasionally, by Diesel engine. Hiring agricultural machinery from the farmers who own it is generally practised and the pay for 1 working hour varies from 70 to 100 zloty depending on the kind of propulsion of the machinery. Some farmers continue to stick to horsegear threshers. Until quite recently potato digging was made mainly by hoe, at present, however, horse driven potato diggers are being increasingly introduced.

The fragmentation of land accounts for the low level of mechanisation of field works. The other reason is scarcity of farm machinery which is not profitable if owned separately by each small farmer. This explains why in the recent years one meets often a joint ownership of agricultural machinery by two or three farmers. Apart from this, in the region under survey there are three agricultural circles (peasant associations) which embrace 5 villages (Borki, Brzumin, Czersk, Coniew and Ostrówik). They have not as yet been provided with complete sets of agricultural machinery. Nevertheless, the agricultural circles create conditions which are favourable for the solution of the issue of mechanisation of agriculture.

The structure of crops [11] (Table 8) indicates a prevalence of exhaustive crops which take — on an average — some 50.7% of the total sown land in this area. Among them rye sowing prevails everywhere taking 44,6% of the area sown with exhaustive plants; then rye is followed by oats (24,2%). The structure of this group is different in particular villages. It is only in the villages of Borki, Czersk and Podgóra that exhaustive crops with a prevalence of rye take over 50% whereas in Brzumin and Kępa Radwankowska, the villages situated directly along the Vistula, wheat, mostly winter wheat, is on a par with rye. The share of exhaustive plants in the villages of Królewski Las and Ostrówik drops down to under 40%. Also, while rye dominates in Coniew it is oats which are more important in the villages of Ostrówik and Królewski Las.

The intensifying crops share — on an average — some 33.4% of the

[11] Agricultural census statistics quote crops cultivated on arable land and intercultivated in orchards jointly, hence the orientation in arable land utilization discussed below include also the annual plants grown in orchards.

Table 8

Agricultural Land utilization

Specification	Borki				Brzumin			
	ha	%			ha	%		
		Sown area	Group	Agricult. acreage		Sown area	Group	Agricult. acreage
I. Arable lands	28.93	x	x	59.9	0.56	x	x	0.8
A. Exhaustive crops	16.89	52.9	100.0	35.0	26.76	46.5	100.0	37.1
winter wheat	2.35	7.4	14.0	5.0	8.68	15.2	32.4	12.0
spring wheat	—	—	—	—	0.28	0.5	1.0	0.4
rye	7.85	24.4	46.4	15.9	9.32	16.4	35.0	13.0
spring barley	1.88	6.1	11.1	3.9	1.19	2.2	4.4	1.6
oats	4.71	14.6	27.8	9.8	7.29	12.2	27.2	10.1
fodder mixtures	0.10	0.4	0.7	0.4	—	—	—	—
buckwheat, millet	—	—	—	—	—	—	—	—
B. Intensifying crops	10.21	31.7	100.0	21.2	23.55	41.2	100.0	32.7
potatoes	6.76	21.0	66.2	14.0	13.92	24.4	59.1	19.3
vegetables	0.35	1.0	3.1	0.8	0.56	1.0	2.5	0.8
root crop seedlings and other *	1.17	3.6	11.9	2.4	5.84	10.2	24.8	8.1
fodder roots	1.65	5.2	16.1	3.4	3.23	5.6	13.6	4.5
winter rape	—	—	—	—	—	—	—	—
hemp	—	—	—	—	—	—	—	—
maize	0.28	0.9	2.7	0.6	—	—	—	—
C. Structure forming crops	5.13	15.4	100.0	10.7	6.93	12.3	100.0	9.6
edible leguminous	0.30	0.9	5.9	0.7	0.91	1.6	13.1	1.1
field pea	0.20	0.6	3.9	0.5	0.50	0.9	7.2	0.8
vetch	0.05	0.2	1.0	0.0	2.22	4.0	32.0	3.1
leguminous mixtures	3.09	9.5	60.2	6.4	—	—	—	—
bitter lupin	0.12	0.3	2.0	0.2	—	—	—	—
fodder lupine	0.45	1.2	8.6	0.9	—	—	—	—
clover	0.39	1.1	7.7	0.8	3.30	5.8	47.7	4.6
lucerne	0.28	0.8	5.8	0.6	—	—	—	—
serradella	0.25	0.8	4.9	0.6	—	—	—	—
Total sown land	32.23	100.0	x	66.9	57.24	100.0	x	79.4
D. Fallow	—	x	x	—	—	x	x	—
II. Perennial crops	3.75	x	x	7.7	56.68	x	x	78.6
orchards	0.45	x	x	0.8	—	x	x	—
orchards with intercultivation	3.30	x	x	6.9	56.68	x	x	78.6
III. Permanent grasslands	15.75	x	x	32.4	14.84	x	x	20.6
meadows	11.30	x	x	23.3	10.52	x	x	15.2
pastures	4.45	x	x	9.1	3.92	x	x	5.4
Total agricultural land	48.43	x	x	100.0	72.08	x	x	100.0

* mainly vegetables, rhubarb and other ridged up crops.

Table 8a

Land utilization

Specification	Coniew				Czersk			
	ha	%			ha	%		
		Sown area	Group	Agricult. acreage		Sown area	Group	Agricult. acreage
I. Arable lands	117.91	x	x	37.2	325.65	x	x	49.0
A. Exhaustive crops	89.83	39.0	100.0	28.3	299.43	59.2	100.0	45.2
winter wheat	4.81	2.1	5.3	1.5	46.91	9.2	15.6	7.1
spring wheat	3.46	1.5	3.8	1.1	1.00	0.2	0.4	0.1
rye	46.54	20.2	51.9	14.7	134.45	26.4	44.9	20.3
spring barley	4.67	2.0	5.2	1.4	48.03	9.6	16.0	7.3
oats	19.28	8.4	21.4	6.1	67.64	13.5	22.6	10.2
fodder mixtures	10.87	4.7	12.1	3.4	1.40	0.3	0.5	0.2
buckwheat. millet	0.20	0.1	0.3	0.1	—	—	—	—
B. Intensifying crops	65.91	28.7	100.0	20.9	169.91	33.7	100.0	25.6
potatoes	48.20	20.9	73.1	15.3	124.55	24.6	73.1	18.0
vegetables	0.90	0.4	1.3	0.3	1.70	0.4	1.2	0.2
root crop seedlings and other *	8.44	3.7	12.8	2.7	17.47	3.5	10.3	2.6
fodder roots	7.37	3.2	11.3	2.3	25.89	5.2	15.2	3.9
winter rape	—	—	—	—	—	—	—	—
hemp	—	—	—	—	0.20	0.0	0.1	0.0
maize	1.00	0.5	1.5	0.3	0.10	0.0	0.1	0.0
C. Structure forming crops	74.37	32.3	100.0	23.5	36.11	7.1	100.0	5.4
edible leguminous	—	—	—	—	0.10	0.0	0.3	0.0
field pea	0.70	0.3	0.9	0.2	0.20	0.0	0.6	0.0
vetch	15.84	6.9	21.4	5.0	—	—	—	—
leguminous mixtures	10.82	4.7	14.6	3.4	24.20	4.7	66.8	3.6
bitter lupine	25.72	11.2	34.5	8.1	1.45	0.3	4.2	0.2
fodder lupine	2.19	0.9	2.9	0.7	1.35	0.3	3.95	1.1
clover	1.93	0.8	2.6	0.6	6.71	1.4	18.6	1.1
lucerne	0.20	0.1	0.3	0.1	—	—	—	—
serradella	16.97	7.4	22.8	5.4	2.10	0.4	5.8	0.3
Total sown land	230.11	100.0	x	72.7	505.45	100.0	x	76.2
D. Fallow	2.75	x	x	0.8	—	x	x	—
II. Perennial crops	114.95	x	x	36.3	165.04	x	x	20.0
orchards	—	x	x		5.20	x	x	0.8
orchards with inter-cultivation	114.95	x	x	36.3	179.84	x	x	27.2
III. Permanent grasslands	83.60	x	x	26.5	152.27	x	x	23.0
meadows	81.51	x	x	25.8	117.08	x	x	17.7
pastures	2.09	x	x	0.7	35.19	x	x	5.3
Total agricultural lands	316.46	x	x	100.0	662.96	x	x	100.0

Table 8b

Agricultural Land utilization

Specification	Kępa Radwankowska				Królewski Las			
	ha	% Sown area	% Group	% Agricult. acreage	ha	% Sown area	% Group	% Agricult. acreage
I. Arable lands	14.96	x	x	44.6	63.39	x	x	38.8
A. Exhaustive crops	14.62	58.6	100.0	43.5	61.87	50.0	100.0	37.9
winter wheat	5.29	21.2	36.3	15.9	12.72	10.3	20.5	7.8
spring wheat	—	—	—		0.65	0.5	1.0	0.4
rye	5.37	21.5	36.5	15.9	23.40	18.9	37.8	14.3
spring barley	—	—	—	—	0.20	0.2	0.4	0.1
oats	—	—	—	—	24.90	20.1	40.3	15.3
fodder mixtures	3.96	15.9	27.2	11.8	—	—	—	—
buckwheat, millet	—	—	—	—	—	—	—	—
B. Intensifying crops	10.32	41.4	100.0	30.8	43.10	34.8	100.0	26.4
potatoes	4.50	18.1	43.9	13.4	28.53	23.0	66.1	17.5
vegetables	—	—	—	—	1.20	1.1	2.9	0.8
root crop seedlings and other *	2.20	8.8	21.4	6.6	5.57	4.5	13.0	3.4
fodder roots	3.62	14.5	34.7	10.8	7.15	5.8	16.6	4.3
winter rape	—	—	—	—	0.30	0.2	0.7	0.2
hemp	—	—	—	—	—	—	—	—
maize	—	—	—	—	0.35	0.2	0.7	0.2
C. Structure forming crops	—	—	—	—	18.87	15.2	100.0	11.5
edible leguminous	—	—	—	—	0.20	0.2	1.0	0.1
field pea	—	—	—	—	—	—	—	—
vetch	—	—	—	—	0.30	0.2	1.5	0.2
leguminous mixtures	—	—	—	—	15.67	12.6	83.0	9.6
bitter lupine	—	—	—	—	—	—	—	—
fodder lupine	—	—	—	—	—	—	—	—
clover	—	—	—	—	2.10	1.7	11.1	1.3
lucerne	—	—	—	—	0.10	0.1	0.5	0.0
serradella	—	—	—	—	0.50	0.4	2.9	0.3
Total sown land	24.94	100.0	x	74.3	123.84	100.0	x	75.8
D. Fallow	—	x	x	—	—	x	x	—
II. Perennial crops	12.18	x	x	36.3	60.45	x	x	37.0
orchards	2.20	x	x	6.6	—	x	x	—
orchards with inter-cultivation	9.98	x	x	29.7	60.45	x	x	37.0
III. Permanent grasslands	6.38	x	x	19.1	39.51	x	x	24.2
meadows	3.08	x	x	9.1	29.96	x	x	18.4
pastures	3.30	x	x	10.0	9.55	x	x	5.8
Total agricultural land	33.52	x	x	100.0	163.35	x	x	100.0

Table 8c

Agricultural Land utilization

Specification	Ostrówik				Podgóra			
	ha	% Sown area	% Group	% Agricult. acreage	ha	% Sown area	% Group	% Agricult. acreage
I. Arable lands	26.0	x	x	14.9	85.51	x	x	65.4
A. Exhaustive crops	46.05	39.3	100.0	26.4	59.42	57.0	100.0	45.5
winter wheat	9.15	7.9	19.8	5.2	7.00	6.7	11.8	5.4
spring wheat	—	—	—	—	—	—	—	—
rye	11.53	9.9	25.0	6.6	29.99	28.8	50.5	23.0
spring barley	7.46	6.1	16.3	4.3	2.26	2.2	3.9	1.7
oats	13.46	11.6	29.3	7.7	15.22	14.6	25.6	11.6
fodder mixtures	4.45	3.8	9.6	2.6	4.95	4.7	8.3	3.8
buckwheat, millet	—	—	—	—	—	—	—	—
B. Intensifying crops	50.06	43.1	100.0	28.8	24.81	23.8	100.0	19.0
potatoes	22.18	19.0	45.0	12.8	20.73	19.9	83.6	16.0
vegetables	—	—	—	—	—	—	—	—
root crop seedlings and other *	16.93	14.6	34.3	9.7	4.08	3.9	16.2	3.0
fodder roots	10.95	9.5	20.7	6.3	—	—	—	—
winter rape	—	—	—	—	—	—	—	—
hemp	—	—	—	—	—	—	—	—
maize	—	—	—	—	—	—	—	—
C. Structure forming crops	20.28	17.6	100.0	11.7	19.78	19.2	—	15.0
edible leguminous	0.30	0.3	1.5	0.2	—	—	—	—
field pea	2.31	2.0	11.3	1.3	—	—	—	—
vetch	4.67	4.0	23.0	2.7	—	—	—	—
leguminous mixtures	3.0	2.6	14.8	1.7	9.68	9.5	49.0	7.4
bitter lupine	—	—	—	—	1.40	1.3	7.1	1.1
fodder lupine	0.30	0.3	1.5	0.2	—	—	—	—
clover	9.70	8.4	47.9	5.6	0.40	0.4	2.0	0.3
lucerne	—	—	—	—	—	—	—	—
serradella	—	—	—	—	8.30	8.0	41.9	6.2
Total sown land	116.39	100.0	x	66.9	104.01	100.0	x	79.5
D. Fallow	—	x	x	—	0.70	x	x	0.6
II. Perennial crops	94.61	x	x	54.0	19.20	x	x	14.7
orchards	4.20	x	x	2.0	—	x	x	—
orchards with inter-cultivation	90.41	x	x	52.0	19.20	x	x	14.7
III. Permanent grasslands	54.32	x	x	31.1	25.88	x	x	19.9
meadows	36.20	x	x	20.7	19.60	x	x	15.0
pastures	18.12	x	x	10.4	6.28	x	x	4.9
Total agricultural land	174.93	x	x	100.0	130.59	x	x	100.0

area sown. This share ranges from 24.1% in Podgóra to 42.9% in Ostrówik. In this group there is noted throughout the area a pronounced prevalence of potato cultivation (on an average 67.4%) with the sole exception of Kępa Radwankowska, where apart from potato, emphasis is laid on fodder root crops. On an average, there is an even share of root crop seedlings (15.6%) and fodder root crops (15.0%) in the region examined. Taking into account the fact that the villages concerned are situated in the Warsaw suburban zone, the area of land taken for vegetable growing is strikingly low. According to the data provided by agricultural census the vegetables are grown on hardly 0.5% of the total area under cultivation.

Although farming in this region is not at all oriented towards vegetable growing, still, the share of vegetables in the structure of sowing is assumed to be higher than is revealed by the statistical data. Closer investigations have revealed that the area of land on which vegetables are grown is reported by farmers much smaller than is actually the case for tax reasons. It can be fairly correctly assumed that the statistics column of „root and other crops" embraces also potatoes and rhubarb occasionally intercultivated in orchards.

The structure forming crops embrace, on an average, less than 16.0% of the cultivated area. No plant in this group manifests itself in clear cut prevalence over the other. The relatively largest share falls to papilionaceous-cereal mixtures which occupy slightly over one third of the group. In Coniew which has a considerable proportion of light soils bitter lupine predominates among structure forming crops, and it is destined for ploughing in. Kępa Radwankowska is also remarkable for structure forming plants are not grown there at all while the largest proportion, relatively speaking, is that of fodder root crops.

Six orientations of arable land utilization can be singled out in the region embraced by this survey. The most intensive orientation potato--oats-rye one *($E_2ot,ry\ I_3pt$)* is observed in the village of Ostrówik; fairly intensive, rye-wheat-potato-fodder-root one *($E_3ry,wh\ I_3pt$)* is typical of the villages of the Vistula Valley (Brzumin and Kępa Radwankowska). In Borki, Czersk and Podgóra villages there appears what is very popular in Middle Poland, the rye with potato orientation *($E_3ry\ I_2pt$)* while an oats-rye-potato *($E_3ot,ry\ I_2pt$)* one prevails in Królewski Las. Finally, in the village of Coniew there occurs the least intensive rye-lupine with potatoes *($E_2ry\ I_1pt\ S_2lp$)* orientation.

b. Perennial Crops

The most characteristic feature of the region under study, unprecedented elsewhere in Poland, is the high percentage of perennial crops,

chiefly orchards, but also different small fruit groves, as well as strawberries plantations. In Brzumin perennial crops occupy over three quarters of agricultural land, more than half in Ostrówik and over one third in the villages of Coniew, Kępa Radwankowska and Królewski Las. Only in Borki this proportion falls down to under 10%.

Of the total number of orchards 57% are commercial orchards of over 1 ha of land occupying 83.2% of the total orchard area of (455 ha). Commercial orchards extend over considerable areas forming large contiguous complex on the map in which it is difficult to distinguish the separate units. All in all, there are 350 orchards (as many as farmsteads), of this number some 15% are owned by farmers from other villages.

The most striking concentration of orchards takes place in the eastern part, on the Vistula Valley, despite the fact that climatic and hydrographic conditions are far from favourable for orchard growing. Apart from the factors mentioned earlier on (page 95) the developed orchard growing of this region may be explained to a considerable extent by the following facts. First, this region (mainly the villages of Borki, and Brzumin) has been known until recently, for its extensive fruit tree nurseries which, without a doubt, exerted its influence upon the growth of the orchard area. In the last few years, however, all the nurseries were liquidated as a result mainly of administrative authorities' orders. The authorities came to a conclusion that the fruit trees

Fruit trees

Village	Total number of trees	In that					
		Apple trees			Pear trees		
		Total number	Fruit bearing trees in %	% of the total no of trees	Total number	Fruit bearing trees in %	% of the total no of trees
Borki	651	161	77.0	24.7	89	35.9	13.7
Brzumin	5978	2055	73.1	34.4	829	62.1	13.9
Coniew	19653	12532	45.9	63.7	1605	36.3	8.2
Czersk	37764	17070	60.1	95.2	2012	72.7	5.3
Kępa Radwanowska	2720	1050	17.9	38.6	150	38.0	5.5
Królewski Las	9690	5170	30.9	53.4	430	25.8	4.4
Ostrówik	42274	11805	21.4	27.9	6427	16.4	15.2
Podgóra	3295	858	52.4	26.0	249	40.2	7.6

grown there in the nurseries were of substandard quality on account of defective (underdeveloped) root systems resulting from a too high ground water level. Another argument in their plea for the liquidation of nurseries was the mass invasion of the trees by woolly apple aphid (*Eriosoma lanigerum* Hausm.) which ruined plantations.

The most frequent species of fruit trees (Table 9) are apple-trees which constitute 41.5% of the total number, and cherry-trees constituting 32.8%. The relatively high proportion of cherry trees which, owing to small rainfall in the summer, yield high quality fruit finds its explanation in the proximity of the vast Warsaw market. Apple tree growing, with a prevalence of winter species, favours a more even use of the manpower throughout the year. The remaining 25.7% of the number of fruit trees includes mainly plums (with the prevalence of a variety prunes) and pear trees (with the prevalence of the „klaps" variety); these are supplied to the market as they ripen, in late summer (pears) and in autumn (plums).

In the particular villages there is a clear cut differentiation of orchards as regards the proportion of the different species of fruit trees. Cherry-trees pronouncedly dominate in the village of Brzumin while in the villages of Borki and Ostrówik they are on a par with apple trees. In Czersk apple-trees dominate over cherry trees while in the villages of Coniew and Królewski Las apple trees are absolutely predominant. It is only in the villages of Kępa Radwankowska and Podgóra that three different species are co-dominant: apple, cherry and plum-trees.

in orchards

Table 9

Plum trees			In that								
			Sour cherry trees			Cherry trees			Other fruit trees		
Total number	Fruit bearing trees in %	% of the total no of trees	Total number	Fruit bearing trees in %	% of the total no of trees	Total number	Fruit bearing trees in %	% of the total no of trees	Total number	Fruit bearing trees in %	% of the total no of trees
137	36.5	21.1	11	100.0	1.7	215	37.2	33.0	38	2.8	5.8
360	98.1	6.0	15	100.0	0.3	2663	86.8	44.5	56	53.6	0.9
1684	53.1	8.6	53	20.7	0.3	3750	46.3	19.1	34	61.8	0.1
2974	74.9	7.9	165	87.9	0.4	15060	68.1	39.9	483	64.8	1 3
660	15.1	24.3	—	—	—	860	36.7	31.6	—	—	—
1340	41.6	13.8	—	—	—	2750	53.7	28.4	—	—	—
8435	26.1	19.9	291	48.4	0.7	13595	23.2	32.2	1721	0.0	4.1
730	50.1	22.1	79	32.9	2.4	1224	93.1	37.1	158	26.6	4.8

Alongside the considerable proportion of fruit trees of a fruit bearing age a relatively large number of young trees are encountered in some of the villages as, for instance, Kępa Radwankowska and Ostrówik, which is indicative of yet new orchards being planted in the area in recent years.

Almost all orchards (about 98%) are intercultivated with various herbaceous plants. These are chiefly structure-forming plants and especially mixtures of different annual papilionaceous plants meant for fodder, as well as root crops, aspecially potatoes or even cereals. To a much lesser degree there are some vegetables, grown mostly near the farm buildings, and these are meant to meet primarily the farmer's own needs.

As it has already been mentioned in the area in question there occur also small plantations of small fruit bearing bushes, mainly red and black currants, as well as strawberries. More frequently than currants gooseberies and strawberries are intercultivated in orchards where they occupy either the space between rows of fruit trees or, more often, are planted in the same rows as the trees. In the latter case land between the rows of trees is utilized for annual crops.

Greenhouses are found solely in Czersk where one of the farmers grows early vegetables and some flowers.

On account of insects pests an ever greater pressure is brought to bear upon farmers to take proper care of the fruit trees and fight the vermin. Apart from mechanical intervention chemical insecticides are used in almost all major orchards and sprayers lent out to farmers by Agricultural Circles are very useful for this purpose.

About 40% of the fruit crop is destined for direct retail sale, the remainder is supplied to purchase depots of the Gardening Cooperative from Czersk and Góra Kalwaria. Large farms which have lorries of their own supply the fruits directly to the Warsaw market.

c. Permanent Grasslands

Grasslands which occupy 382.55 ha (22.7% of the total area of agricultural land) form one compact area in the centre of the region under survey. They extend over a depression of the former meander mortlake of the Vistula across which the Czarna stream flows. They have good quality soils, mainly alluvial meadow and peaty soils utilized in 80% as meadows. Because there is no water control they yield medium or poor crops not exceeding 25 to 30 q/ha of poor hay.

Man's intervention in the form of manuring with artificial fertilizers or sowing high grade of grass seed is often useless because of frequent

inundations of the Czarna stream. Most of those grasslands can be included into the post „*łęg*" type, whereas grasslands in the west-central section of the area examined are of transitory post-*łęg*-peat bog type. Only in spots close to fields, particularly in the southern section, one comes across post-„*grond*" type grasslands generally utilized as pastures. A separate complex apart is formed by the pastures belonging to Kępa Radwankowska, which are placed on a Vistula island known under the same name as the village. They are unproductive pastures subject to annual inundations by the Vistula water, overgrown at places with osier and alder shrubs.

In order to increase meadow productivity control projects have been planned for Czarna stream which envisage turning this stream into a new bed. The project is to be carried out by 1965. With that object in view a Water Project Cooperative has been founded at Czersk with a membership embracing 60% of the commune's farmers.

In the inter-war period common pastures still existed in the area. For instance, in the village of Borki pastures constituted common property which, however, of the farmer's own accord, have been divided up and turned into orchards and arable land. The legal aspect of the issue is only in the course of being settled [12].

d. Forests

In the area under investigation forests are represented in two villages only: Coniew, where they occupy 9.4% of the area and Czersk where they constitute only 0.5% of the area. The forests constitute, in the main, the private property of the villagers. They are situated by the grasslands on the Czarna stream. The tree cover is of different age and heavily thinned in places.

e. Settlement

The settlement of the area consists of 8 villages among which Czersk is of some prominence having certain features of an urban settlement. One of the oldest settlements in Mazowsze, situated on a high ridge of the Vistula Valley, Czersk for a long time was the seat of the Mazovian princes. The moving away of the Vistula bed from Czersk in the 14th century reduced the defensive and commercial importance of the

[12] Land of the former common pasture was divided between farmers in such a way that half of it was divided in proportion to land owned by each of them and the other half was shared in proportion to the number of farms.

town. Towards the end of the 14th century Czersk was granted Chełmno Rights and numerous other privileges which were designed to step up the importance of the falling town. Later on, the fast development of the neighbouring Warsaw, as well as the burning out of the Czersk castle by Swedes (17th century) contributed largely to the final decline of the town.

The past of the town is clearly reflected in its layout. The centre is occupied by a large rectangular market place along which, however, there are a few buildings remotely reminding one of a town. A nearby hill is crowned with ruins of a magnificent castle of the 13th century. In 1960, Czersk had a population of 520, for most of whom the main source of subsistence was farming. As the seat of the commune's Council Czersk is the administrative centre for the villages embraced by this survey.

Out of the remaining 7 villages three represent typical nucleated settlements with loose lay-out of buildings stretched out along the village street (Coniew, Królewski Las and Podgóra). In the remaining 4 neighbouring villages where the farms have been consolidated there are a great many buildings apart from the ancient village cores which are of street type too.

The prevalent building material in old houses is generally wood while in the newer ones mainly bricks. The buildings are roofed with tile mostly although there occur buildings with tarboard or sheet metal roofs. Some old buildings are thatched.

Water supplies for the farms are ensured by private wells. It is only in Czersk where on account of its location on an elevated area, there are difficulties in digging down to water table. For that reason some of the working wells supply water to a larger number of farms.

Despite the proximity of Warsaw, electrification has not yet made great strides here. No farm has electric power in the four villages of the Vistula Valley (Borki, Brzumin, Kępa Radwankowska and Ostrówik) while in the other villages about 80% of farms have electricity.

4. PLANT PRODUCTION

We can see, therefore, that yields in the area under study are, generally speaking, higher than in the adjoining regions and this is accounted for, among others, by the villages having within their area very fertile soils which has a strong bearing on the crop output.

As far as plant production goes, about 50 to 70% of the crops, calculated in grain units, is taken up by food crops. Of primary importance in this group are fruits which constitute more than half of the group in

Table 10

Yields of more important crops

Crop	Area surveyed [1]	Average [2] Czersk commune	Average [3] Piaseczno county
	in q/ha	in q/ha	in q/ha
rye	18.0 — 22.0	15.2	16.5
wheat	19.0 — 23.0	16.8	16.8
barley	18.0 — 21.0	16.6	16.0
oats	19.0 — 21.0	19.0	18.8
potatoes	180.0 — 220.0	158.0	145.0

[1] The yields for the villages embraced by the survey have been checked through interviews and field observations.
[2] According to the data of the County Council.
[3] According to the Warsaw Voivodship Statistical Yearbook for 1961.

the villages of Brzumin, Coniew and Ostrówik, and form one third to a half in the villages of Czersk, Kępa Radwankowska and Królewski Las. The share of fruits drops to under 30% of the group only in the villages of Podgóra and Borki.

Like a fruit-trees stand fruit production is far from being homogeneous. Only in a few of the villages (for instance Coniew) one species clearly predominates. In the other villages fruit production structure is different. As a rule, apples are most important everywhere with the exception of Kępa Radwankowska and Podgóra where strawberries predominate. Then, second in importance often is the strawberry crop (at the villages of Borki, Coniew, Królewski Las) or apples should they not be in the first place.

In Czersk where the strawberry crop is only of minor importance (8% of the total fruit output) the second place after apple crop falls to currants (apples 36.5%, currants 21.8% of the total). The next item in fruit production is cherries and their position is typical of all the villages.

Strawberry growing concentrates in places where light soils prevail, placed relatively higher up, secure from inundations and stagnant waters [13].

[13] Using the same method as for other groups the orientation in fruit growing could be determined here. In most villages apple orientation is prevailing or dominant, with or without a secondary one. Coniew and Podgóra — apple orientation (ap_3 and ap_2 respectively); Borki — apple-strawberry one (ap_1sb); Brzumin — apple-cherry-strawberry ($ap_1ch_1sb_1$); Królewski Las — apple with strawberries and cherries orientation ($ap_2sb_1ch_1$); Czersk — apple with currants (ap_3cr_2). The only exception is Kępa Radwankowska where strawberries prevail over apple production (sb_2ap_1).

Apart from fruit and berry growing an important role in the group of food plants is played by cereals and potatoes. In Brzumin, Królewski Las and Ostrówik cereals and potato crops are equally important while in the other villages, grains predominate over potato crop. In Podgóra and Borki the crop of grains outdistances even that of fruits.

The next important plant group is that of fodder crops which share 30 to 50% of the total plant production. Their share in the particular villages is inversely proportionate to that of the food crops group. Among the fodder crops a relatively large proportion is shared by potatoes (26 to 40%) and by permanent grasslands (18.4%). Fodder root crop plays an important role in Kępa Radwanowska. The remaining intems of fodder crops making up various fragments of plant production vary in the particular villages. Industrial plants nowhere exceed 1% of the total plant production and in the majority of the villages industrial plants are not grown at all.

Livestock

Village	Borki					Brzu		
Specification	Heads	Big animals units	% big animal units	Big animal per 100 ha agricult. land	Heads per 100 ha agricult. land	Heads	Big animals units	% big animal units
Total	x	39.178	100.0	80.8	x	x	41.362	100.0
Draft horses	10	12.0	34.2	27.6	24.77	9	10.8	31.1
Young horses	2	1.4				3	2.1	
Bulls	—	—	44.7	36.2	49.5	—	—	45.5
Cows	16	16.0				16	16.0	
Heifers	1	0.7				3	2.1	
Calves	7	0.84				6	0.72	
Sows, boars	6	1.8	18.4	14.8	88.8	13	3.9	18.9
Cutters	11	2.75				5	1.25	
Piglets	26	2.6				26	2.6	
Sheep, rams	3	0.3	0.7	0.6	6.19	7	0.7	2.0
Lambs	—	—				3	0.15	
Goats	—	—	—	—	—	—	—	—
Hens	111	0.444	2.0	1.6	589.5	200	0.8	2.5
Chickens	172	0.344				121	0.242	

5. LIVESTOCK BREEDING AND ANIMAL PRODUCTION

The main tractional force in the services of the agriculture in the area under survey is represented by draft horses. Heavy soils and the bad state of village roads in the villages on the Vistula account for the fact that the number of horses per 100 ha of agricultural land is relatively high (18.8) indeed much in excess of the county index (15.2) and that of the Warsaw subregion (14.0) It is only in the village of Coniew where light soils predominate and which is located by the main road that the number of horses is lower, reaching only 14 heads per 100 ha of agricultural land. Mixed breed medium height type horses dominate in horse breeding.

The number of cattle per 100 ha of agricultural land in the villages in question is higher, with the exception of Coniew, than the average number prevailing in the Piaseczno county (32.3) or, for that matter, in the Warsaw voivodship (37.8) (Table 11).

Table 11

Breeding

min		Coniew					Czersk				
Big animal per 100 ha agricult. land	Heads per 100 ha agricult. land	Heads	Big animals units	% big animal units	Big animal per 100 ha agricult. land	Heads per 100 ha agricult. land	Heads	Big animals units	% big animal units	Big animal per 100 ha agricult. land	Heads per 100 ha agricult. land
57.3	x	x	157.122	100.0	49.6	x	x	549.572	100.0	82.8	x
17.9	16.6	36 8	43.2 5.6	31.1	15.4	13.90	122 20	146.4 14.0	29.2	24.2	21.4
		1	1.4				4	5.6			
26.1	34.7	68 6	68.0 4.2	47.9	23.7	27.8	130 99	130.0 69.3	38.9	32.3	46.8
		13	1.44				77	9.24			
		25	7.5				158	47.4			
10.7	61.0	41	10.25	17.7	8.8	53.1	103	25.75	27.6	22.2	151.3
		102	10.2				744	74.4			
1.2	13.9	5 2	0.5 0.1	0.4	0.2	2.2	34 21	3.4 1.05	0.4	0.8	8.3
—	—	—	—	—	—	—	14	1.12			
1.4	445.8	1129 108	4.516 0.216	3.0	1.5	391.4	2464 6028	9.856 12.056	3.9	3.3	1280.8

Livestock

Village	Kępa Radwankowska					Królewski		
Specification	Heads	Big animals units	% big animal units	Big animal per 100 ha agricult. land	Heads per 100 ha agricult. land	Heads	Big animals units	% big animal units
Total	x	22.168	100.0	66.1	x	x	96.072	100.0
Draft horses	4	4.8	28.0	18.5	17.9	25	30.0	34.1
Young horses	2	1.4				4	2.8	
Bulls	—	—	42.9	28.1	44.7	—	—	44.7
Cows	8	8.0				36	36.0	
Heifers	1	0.7				6	4.2	
Calves	6	0.72				23	2.76	
Sows, boars	2	0.6	19.3	13.0	95.5	23	6.9	17.7
Cutters	5	1.25				7	1.75	
Piglets	25	2.5				82	8.2	
Sheep. rams	9	0.9	4.2	2.8	29.8	11	1.1	1.3
Lambs	1	0.05				4	0.2	
Goats	—	—	5.6	3.7	1244.8	—	—	2.2
Hens	207	0.828				329	1.316	
Chickens	210	0.42				423	0.846	

In spite of the fact that dairying is not the principal orientation in farming in the villages under study for, as was mentioned above, fruit specialisation prevails there, still, the area and entire Piaseczno county are ones of high marketability in as far as dairying is concerned. A relatively extensive area of grasslands encourages the cattle raising here.

The predominating breed of cattle is Lowland Black-and-White Milch Cattle. Cows constitute about 70% of the cattle herd. Annual milking capacity per cow ranges from 2200 to 2500 l while in leading farms it strikes the 2800 l mark, with the average fat content varying from 3.3% to 3.5%. The milk is supplied to the local collecting centres in Coniew, Czersk and Brzumin which, in turn, pass it on to the Regional Dairying Cooperative in the nearby Góra Kalwaria.

Supply of milk directly to consumers, so typical of farming in Warsaw suburban zone, does not play any significant role, in this area.

Table 11a

Breeding

Las		Ostrówik					Podgóra				
Big animal per 100 ha agricult. land	Heads per 100 ha agricult. land	Heads	Big animals units	% big animal units	Big animal per 100 ha agricult. land	Heads per 100 ha agricult. land	Heads	Big animals units	% big animal units	Big animal per 100 ha agricult. land	Heads per 100 ha agricult. land
57.5	x	x	117.584	100.0	67.2	x	x	83.108	100.0	63.6	x
19.6	17.4	29	14.8	32.0	21.5	18.9	19	22.8	33.3	21.2	18.9
		4	2.8				7	4.9			
		—	—				1	1.4			
25.7	38.9	42	42.0	40.6	27.3	34.9	33	33.0	48.2	30.7	43.6
		6	4.2				5	3.5			
		13	1.56				18	2.16			
		55	16.5				18	5.4			
10.1	64.7	24	6.0	25.3	17.0	86.9	6	1.5	15.2	9.6	61.3
		173	7.3				56	5.6			
		5	0.5				9	0.9			
0.8	9.0	5	0.25	0.7	0.5	5.7	8	0.4	1.5	1.0	13.0
		—	—				—	—	—	—	—
1.3	450.8	211	0.844	1.4	0.9	357.7	213	0.852	1.8	1.1	429.5
		415	0.830				348	0.696			

Pig breeding is also fairly well developed in the area examined. The number of pig heads per 100 ha of agricultural land ranges from 53.1 in Coniew to 151.3 in Czersk. The average number of pigs per 100 ha of agricultural land tops 83.1 which exceeds the county average (57.7) by about 25 heads. Considerable amounts of potatoes, mixed corn and corn-papilionaceous mixtures are grown here with a view to ensuring an adequate fodder base.

The most common pig breed in the area is-the Gołąb (Puławy) breed, with the Large White breed coming second, of the meat and the meat--and-lard type with an average live weight from 120 to 150 kg.

Sheep raising is relatively uncommon (11 heads per 100 ha) and the predominant orientation is that of wool. A relatively high sheep head index occurs only in Kępa Radwankowska (almost 30 heads) where there are considerable areas of low quality pastures.

An important aspect of livestock raising in the area surveyed is

poultry, especially fowl breeding, which is widespread in all farms side by side with other livestock. In some villages as, for instance, Czersk, Kępa Radwankowska etc., there are about 1300 hens per 100 ha. This proportion is much smaller in other villages where it ranges from 400 to 500 hens. Apart from hens, considerable quantities of geese and ducks are raised, particularly in farms situated on water reservoirs and strems. Unfortunately, the agricultural census does not provide any data regarding their numbers and therefore no quantitative analysis is feasible.

Considering farm livestock in big animal units per 100 ha of agricultural land one, can notice considerable differences as to the degree of intensity of stock breading. In some villages as, for instance, Borki and Czersk there is a relatively high density of livestock (exceeding 80 heads). At the same time Coniew and Królewski Las have a strikingly low number (under 60 heads). Incidentally, these are the villages which, as it will be noted later on, are notorious for the lowest productivity of agriculture in the area under this study. The proportion of livestock is also very low in Brzumin where the predominant orientation is on fruit culture (orchards take 75.2% of the village's area). Everywhere in the livestock breeding of the villages examined, cattle raising plays a primary role. The stock breeding orientations prevailing in the area under study are determined by the data on animal products as illustrated on Table 12.

Milk and pork-stock are the basic elements of the animal production in the area. The two elements share from 30 to 48% of the total animal product, with the exception of the village of Czersk, where meat production is prevalent, especially pork. In the remaining villages there is either a slight prevalence of meat production (Borki, Kępa Radwankowska, Królewski Las, Ostrówik) or milk production (Brzumin, Coniew, Podgóra). Everywhere, however, with the exception of Kępa Radwankowska and Ostrówik, pork-meat production is below that of milk production.

The livestock raising orientation in the area under examination can generally be described as meat-milch or milch-meat with prevalence of dairy cattle and pork-stock or pork-stock and dairy cattle. In Czersk only, there appears a meat orientation with the prevalence of pig breeding, and with milch cattle raising as a secondary orientation.

This fact can be explained to some extent by the urban character of this settlement where, apart from farms, there exist small plots whose owners earn their living from trades other than agriculture and who raise 1 to 2 pigs to meet their own needs.

6. GROSS AGRICULTURAL PRODUCTION

The size of gross output and orientations prevailing in agriculture of the area under examination were arrived at as a result of calculations made on the basis of statistical data supplemented with some estimations. Not all aspects of agricultural production have been taken into account (for instance, production of after-crops, etc.) still it seems that the data collected point to the characteristic features of agricultural production in the area embraced by the survey.

Gross agricultural production equals 47.0 grain units per 1 ha of agricultural land, a figure indicative of high productivity of the agriculture.

The villages embraced by this survey can be divided into two groups according to the above productivity index:

1) villages with outstanding productivity (over 48 grain units per 1 ha) to which belong Brzumin, Czersk and Ostrówik, and

2) villages with smaller but also quite high productivity (under 48 grain units per 1 ha) to which belong all the remaining villages.

These divergences result from the fact that the villages in group (2), with the exception of Borki, own relatively poor soil which, beyond doubt, takes heavy toll on the crop, and that they raise relatively small numbers of livestock. As for the village of Borki, this has the least developed fruit culture which in the area under examination is responsible for such a high productivity.

Three quarters of the gross production is taken up by plant production while the remaining one quarter is in animal production.

The share of plant production in the particular villages ranges from 65% in Borki to 81% in Ostrówik and Brzumin. Outside of Borki a lower than average proportion of plant production is recorded in Czersk, Kępa Radwankowska and Podgóra.

The orientations of farming in the villages surveyed can be determined on the basis of Table 12. In each of the villages the plant production prevails over animal production, in Brzumin and Ostrówik being significantly dominant. In all villages, with the exception of Borki and Podgóra, the orientation of farming is more or less determined by fruit crops, among which apple production dominate in Coniew, Czersk, Królewski Las and Ostrówik. In animal production the orientation is either a pork-stock one (Czersk, Kępa Radwankowska), or pork-dairy (Borki, Królewski Las) or dairy-pork-stock orientation (Coniew, Podgóra).

In conclusion the following farming orientations may be determined on the area under study:

Specification	Borki						Brzumin					
	Yield	Production	Production in grain units	Gross production %	Branch production %	Group production %	Yield	Production	Production in grain units	Gross production %	Branch production %	Group production
Gross production	x	x	1777.7	100.0			x	x	3861.7	100.0		
I. Plant production (in q)	x	3745.0	1153.9	64.9	100.0		x	9035.4	3114.3	80.5	100.0	
A. Food crops	x	1434.7	571.4	32.2	49.6	100.0	x	4735.2	2142.3	55.7	69.1	100.0
a) Grains	x	258.1	261.2	14.7	22.6	45.6	x	391.2	393.0	10.3	12.6	18.3
winter wheat	22.0	51.7	51.7	3.0	4.5	9.0	21.0	182.3	182.3	4.7	5.9	8.5
spring wheat	—	—	—	—	—	—	21.0	5.9	5.9	0.3	0.2	0.3
rye	20.0	157.0	157.0	8.5	13.6	27.4	19.0	170.1	170.1	4.4	5.5	7.9
spring barley	18.0	33.8	33.8	2.0	2.9	6.0	20.0	23.8	23.8	0.6	0.7	1.1
buckwheat, millet	—	—	—	—	—	—	—	—	—	—	—	—
leguminous	12.0	15.6	18.7	1.2	1.6	3.2	10.0	9.1	10.9	0.3	0.3	0.5
b) Roots and vegetables	x	988.4	209.1	11.5	18.0	36.6	x	1846.4	430.1	11.3	13.9	20.1
potatoes	180.0	608.4	152.1	8.4	13.1	26.6	220.0	1531.2	382.8	10.0	12.4	17.9
vegetables	250.0	87.5	13.1	0.7	1.1	2.3	250.0	140.0	21.0	0.5	0.7	1.0
root crop seedlings and other	250.0	292.5	43.9	2.4	3.8	7.7	300.0	175.2	26.3	0.8	0.8	1.2
c) Fruits	x	188.2	101.1	6.0	8.8	17.8	x	2497.6	1319.2	34.1	42.6	61.6
apples	0.6	74.4	37.2	2.2	3.2	6.5	0.6	901.8	450.9	11.7	14.5	21.0
pears	0.5	16.0	8.0	0.5	0.7	1.4	0.5	257.5	128.8	3.3	4.1	6.0
plums	0.4	20.0	10.8	0.6	0.9	1.8	0.4	142.0	71.0	1.8	2.3	3.3
sour cherries	—	—	—	—	—	—	0.25	3.7	1.9	0.0	0.1	0.1
sweet cherries	0.3	24.0	12.0	0.7	1.1	2.1	0.3	693.9	346.9	9.0	11.2	1.6
other fruits	0.5	0.5	1.0	0.1	0.1	0.1	0.5	15.0	30.0	0.8	1.0	1.4
gooseberries	—	—	—	—	—	—	0.21	10.5	5.2	0.1	0.2	2.4
currants	0.04	2.1	1.0	0.1	0.1	0.2	0.05	6.0	3.0	0.1	0.1	0.1
raspberries	80.0	8.0	6.0	0.3	0.6	1.2	80.0	8.0	6.0	0.2	0.2	2.4
strawberries	80.0	43.2	25.9	1.5	2.4	4.5	80.0	459.2	275.5	7.1	8.9	12.8

B. Fodder crops	x	2310.3	582.5	32.7	50.4	100.0	x	4300.2	972.0	24.8	30.9	100.0
a) Grains	x	96.2	94.5	5.3	8.2	16.2	x	138.5	138.5	3.5	4.5	14.5
oats	20.0	94.2	94.2	5.3	8.2	16.2	19.0	138.5	138.5	3.5	4.5	14.5
mixed corn	20.0	2.0	0.3	0.0	0.0	0.0	—	—	—	—	—	—
maize	60.0	16.8	1.8	0.1	0.2	0.3	—	—	—	—	—	—
C. Rough forage	x	1176.4	292.8	16.4	25.3	50.3	x	1544.8	342.1	8.7	10.5	34.1
clover	40.0	15.6	7.8	0.4	0.6	1.3	45.0	148.5	74.2	2.0	2.4	7.7
lucerne	35.0	9.8	4.9	0.2	0.4	0.8	—	—	—	—	—	—
serradella	35.0	8.7	3.5	0.2	0.3	0.6	—	—	—	—	—	—
field pea	40.0	8.0	3.2	0.2	0.3	0.6	40.0	20.0	8.0	0.2	0.3	0.8
vetch	40.0	2.0	0.8	0.0	0.1	0.2	40.0	8.8	3.5	0.1	0.1	0.3
fodder lupine	40.0	18.0	7.2	0.4	0.6	1.2	—	—	—	—	—	—
leguminous mixtures	40.0	123.6	49.5	2.8	4.3	8.5	—	—	—	—	—	—
meadow hay	27.0	305.1	122.0	6.9	10.6	20.9	20.8	305.8	122.3	3.1	3.4	11.2
pastures	18.0	80.1	24.0	1.4	2.1	4.1	20.0	78.4	23.5	0.5	0.7	2.5
straw of winter cereals	41.0	418.2	41.8	2.3	3.6	7.1	41.0	738.0	73.8	1.9	2.4	7.7
rape	—	—	—	—	—	—	—	—	—	—	—	—
II. Animal production	x	x	623.8	35.1	100.0		x	x	747.4	19.5	100.0	
a) milk (in l)	2300	36800.0	276.0	15.5	44.2		2500.0	40000.0	300.0	7.8	40.2	
b) meat-stock (in kg of live-weight)	x	6088.2	318.4	17.9	51.1			6459.5	340.1	8.8	45.6	
beef	380	1140.0	68.4	3.8	11.0		380.0	1140.0	86.4	1.7	9.1	
veal	50	250.0	12.5	0.7	2.0		50.0	300.0	15.0	0.4	2 0	
pork	120	4440.0	222.0	12.5	35.6		1.2	4440.0	222.0	5.9	29.7	
piglets	—	—	—	—	—		—	—	—	—	—	
mutton	45	45.0	2.7	0.2	0.5		45	90.0	5.4	0.1	0.7	
lamb	—	—	—	—	—		—	—	—	—	—	
poultry	x	213.2	12.8	0.7	2.0		x	489.5	29.3	0.8	3.9	
therein: hens	1.75	96.2	5.8	0.3	0.9		1.75	325.5	19.5	0.5	2.6	
chickens	1.0	117.0	7.0	0.4	1.1		1.0	164.0	9.8	0.3	1.3	
c) Eggs	108	10800.0	27.0	1.5	4.3		120.0	40680.0	101.7	2.8	13.6	
d) Honey	—	—	—	—	—		—	—	—	—	—	
e) Wool	3	6.0	2.4	0.2	0.4		2.0	14.0	5.6	0.1	0.8	

Specification	Coniew						Czersk					
	Yield	Production	Production in grain units	Gross production %	Branch production %	Group production %	Yield	Production	Production in grain units	Gross production %	Branch production %	Group production %
Gross production	x	x	12179.9	100.0			x	x	35532.6	100.0		
I. Plant production (in q)	x	28771.5	9207.0	75.6	100.0		x	76689.2	25772.8	72.5	100.0	
A. Food crops	x	14068.9	5394.5	44.3	58.6	100.0	x	38464.5	17131.5	48.2	66.5	100.0
a) Grains	x	1080.2	1080.3	8.9	11.8	20.0	x	4800.9	4797.2	13.5	18.6	28.0
winter wheat	19.0	91.4	91.4	0.8	1.0	1.7	23.0	1078.9	1078.9	3.0	4.2	5.9
spring wheat	19.0	65.8	65.8	0.5	0.8	1.2	23.0	23.0	23.0	0.1	0.1	0.5
rye	18.0	837.7	837.7	6.9	9.1	15.5	20.0	2689.0	2685.0	7.5	10.5	15.7
spring barley	20.0	82.1	82.2	0.7	0.9	1.5	21.0	1008.6	1008.6	2.9	3.8	5.9
buckwheat, millet	16.0	3.2	3.2	0.0	0.0	0.1	—	—	—	—	—	—
leguminous	—	—	—	—	—	—	14.0	1.4	1.7	0.0	0.0	0.0
b) Roots and vegetables	x	7565.0	1516.7	12.5	16.5	28.1	x	17630.9	3890.1	10.9	15.2	22.7
potatoes	200.0	4820.0	1205.0	10.0	13.1	22.3	200.0	12455.0	3113.8	8.7	12.1	18.2
vegetables	250.0	225.0	33.7	0.2	0.4	0.7	270.0	459.0	68.8	0.2	0.3	0.4
root crop seedlings and other	300.0	2520.0	278.0	2.3	3.0	5.1	270.0	4716.9	707.5	2.0	2.8	4.1
c) Fruits	x	5423.7	2797.5	22.9	30.3	51.8	x	16032.7	8444.2	23.8	32.7	49.3
apples	0.6	3451.8	1725.9	14.2	18.7	32.0	0.6	6157.8	3078.9	8.7	11.9	18.0
pears	0.5	291.0	145.5	1.2	1.6	2.7	0.5	731.0	365.5	1.0	1.4	2.1
plums	0.4	358.0	179.0	1.6	1.9	3.3	0.4	890.8	495.4	1.4	1.9	2.9
sour cherries	0.25	2.7	1.4	0.0	0.0	0.0	0.25	36.2	18.1	0.0	0.1	0.1
sweet cherries	0.30	520.5	260.2	2.1	2.9	4.8	0.3	3075.0	1537.5	4.3	5.8	9.0
other fruits	0.5	10.5	21.0	0.1	0.2	0.4	0.5	156.5	313.0	0.9	1.2	1.8
gooseberries	—	—	—	—	—	—	0.2	21.4	10.7	0.0	0.1	0.1
currants	0.05	90.0	45.0	0.2	0.5	0.8	0.6	3664.8	1832.4	5.2	7.3	10.7
raspberries	—	—	—	—	—	—	30.0	88.0	66.0	0.2	0.2	0.4
strawberries	80.0	699.2	419.5	3.5	4.5	7.8	80.0	1211.2	726.7	2.1	2.8	4.2
B. Fodder crops	x	14702.6	3812.5	31.3	41.4	100.0	x	32218.7	8637.1	24.3	33.5	100.0
a) Grains	x	603.0	413.9	3.3	4.5	10.9	x	1382.2	1356.6	3.8	5.2	15.7
oats	20.0	385.6	385.6	3.1	4.2	10.1	20.0	1352.8	1352.8	3.8	5.2	15.7
mixed corn	20.0	217.4	28.3	0.2	0.3	0.8	21.0	29.4	3.8	0.0	0.0	0.0

b) Succulent forage	x	7091.0	1432.7	11.8	15.6	37.6	x	20745.8	3942.9	11.1	15.3	45.7
maize	60.0	60.0	6.6	0.0	0.1	0.2	60.0	6.0	0.7	0.0	0.0	0.0
fodder roots	300.0	2211.0	221.1	1.8	2.4	5.8	320.0	8284.8	828.5	2.4	3.2	9.6
potatoes	200.0	4820.0	1205.0	10.0	13.1	31.6	200.0	12455.0	3113.7	8.7	12.1	36.1
c) Rough forage	x	7008.6	1965.0	16.2	21.3	51.5	x	16090.7	3337.6	9.4	13.0	38.6
clover	45	86.8	43.4	0.4	0.5	1.1	50.0	335.5	167.8	0.5	0.6	1.9
lucerne	35	7.0	3.5	0.0	0.0	0.1	—	—	—	—	—	—
serradella	35	572.9	229.2	1.9	2.5	6.0	30.0	63.0	25.2	0.1	0.1	0.3
field pea	40	28.0	11.2	0.1	0.3	0.3	40.0	8.0	3.2	0.0	0.0	0.0
vetch	40	633.6	253.4	2.1	2.7	6.7	—	—	—	—	—	—
fodder lupine	40	87.6	35.0	0.3	0.4	0.9	40.0	54.0	21.6	0.1	0.1	0.3
leguminous mixtures	40	432.8	173.1	1.4	1.9	4.5	40.0	968.8	387.5	1.1	1.5	4.5
meadow hay	26.0	2119.3	847.7	7.0	9.2	22.3	27.0	3161.1	1264.5	3.5	4.9	14.7
pastures	18.0	37.6	11.3	0.1	0.1	0.3	20.0	703.8	211.1	0.6	0.8	2.4
straw of spring cereals	30.0	1154.4	173.2	1.4	1.9	4.5	30.0	3542.1	531.3	1.5	2.1	6.1
straw of winter cereals	36.0	1848.6	184.9	1.5	2.0	4.8	40.0	7254.4	725.4	2.0	2.9	8.4
C. Industrial crops	—	—	—	—	—	—	x	6.0	4.2	0.0	0.0	0.0
hemp	—	—	—	—	—	—	30.0	6.0	4.2	0.0	0.0	—
rape	—	—	—	—	—	—	—	—	—	—	—	
II. Animal production	x	x	2972.9	24.4	100.0		x	x	9759.8	27.5	100.0	
a) Milk (in liters)	2600	176.8	1326.0	10.8	44.6		2500.0	311500.0	2336.2	6.6	23.9	
b) Meat stock (in kg of live weight)	x	24953.7	1296.2	10.8	43.6		x	129604.5	6643.5	18.7	68.1	
beef	380	800.0	228.0	1.9	7.7		380.0	8360.0	501.6	1.4	5.2	
veal	50	1500.0	75.0	0.7	2.5		50.0	3000.0	150.0	0.5	1.5	
pork	120	18600.0	930.0	7.7	31.3		120.0	110280.0	5514.0	15.5	56.5	
piglets	—	—	—	—	—		—	—	—	—	—	—
mutton	45	45.0	2.7	0.0	0.1		45.0	675.0	40.5	0.1	0.4	
lamb	10	20.0	1.2	0.0	0.1		—	—	—	—	—	
poultry	x	988.7	59.3	0.5	2.0		x	7289.5	437.4	1.2	4.5	
therein: hens	1.75	988.7	59.3	0.5	2.0		1.75	2943.5	176.6	0.5	1.8	
chickens	—	—	—	—	—		1.0	4346.0	260.8	0.7	2.7	
c) Eggs	120.0	132840.0	332.1	2.7	11.2		130.0	294450.0	736.1	2.1	7.5	
d) Honey	2.5	75.0	15.0	0.1	0.5		3.0	84.0	16.8	0.0	0.2	
e) Wool	1.8	9.6	3.6	0.0	0.1		2.0	68.0	27.2	0.1	0.3	

Specification	Kępa Radwankowska						Królewski Las					
	Yield	Production	Production in grain units	Gross production %	Branch production %	Group production %	Yield	Production	Production in grain units	Gross production %	Branch production %	Group production %
Gross production	x	x	1438.4	100.0			x	x	6635.2	100.0		
I. Plant production (in q)	x	3993.4	1002.0	69.6	100.0		x	116836.9	5184.6	78.1	100.0	
A. Food crops	x	1636.6	659.8	45.9	65.8	100.0	x	7227.5	2740.6	41.3	52.9	100.0
a) Grains	x	229.2	229.2	15.9	22.9	34.8	x	707.9	708.4	10.6	13.7	25.8
winter wheat	22.0	116.4	116.4	8.1	11.6	17.7	21.0	267.1	267.1	4.0	5.1	9.7
spring wheat	—	—	—	—	—	—	21.0	13.6	13.6	0.2	0.3	0.5
rye	21.0	112.8	112.8	7.8	11.2	17.1	18.0	421.2	421.2	6.4	8.1	15.4
spring barley	—	—	—	—	—	—	18.0	3.6	3.6	0.0	0.1	0.1
buckwheat, millet	—	—	—	—	—	—	—	—	—	—	—	—
leguminous	—	—	—	—	—	—	12.0	2.4	2.9	0.0	0.1	0.1
b) Roots and vegetables	x	942.5	180.6	11.6	18.0	27.4	x	4402.8	931.5	14.1	17.9	34.0
potatoes	170.0	392.5	98.1	6.8	9.8	14.9	190.0	2710.3	677.6	10.2	13.0	24.7
vegetables	—	—	—	—	—	—	250.0	300.0	45.0	0.7	0.9	1.7
root crop seedlings and other	250.0	550.0	82.5	4.8	8.2	12.5	250.0	1392.5	208.9	3.2	4.0	7.6
c) Fruits	x	464.9	250.0	17.4	24.9	37.8	x	2116.8	1100.7	16.6	21.2	40.2
apples	0.6	112.8	56.4	3.9	5.6	8.5	0.6	960.0	480.0	7.2	9.3	17.5
pears	0.3	28.5	14.2	1.0	1.4	2.2	0.5	55.5	27.7	0.4	0.5	1.0
plums	0.4	40.0	20.0	1.5	2.0	3.0	0.4	222.8	111.4	1.7	2.1	4.1
sour cherries	—	—	—	—	—	—	—	—	—	—	—	—
sweet cherries	0.3	94.8	47.4	3.3	4.8	7.1	0.3	443.4	221.7	3.4	4.3	8.1
other fruits	—	—	—	—	—	—	—	—	—	—	—	—
gooseberries	—	—	—	—	—	—	0.20	8.0	4.0	0.1	0.1	0.2
currants	0.04	12.8	6.4	0.4	0.6	1.0	0.05	9.5	4.7	0.1	0.1	0.2
raspberries	—	—	—	—	—	—	80.0	4.0	3.0	0.0	0.1	0.1
strawberries	80.0	176.0	105.6	7.3	10.5	16.0	80.0	413.6	248.2	3.7	4.8	9.0
B. Fodder crops	x	2356.8	342.2	23.7	34.2	100.0	x	9606.4	2441.9	36.8	47.1	100.0
a) Grains	x	83.2	10[illegible]	0.8	1.1	3.0	x	549.1	549.1	8.3	10.6	22.6
oats	—	—	—	—	—	—	19.0	549.1	549.1	8.3	10.6	22.6

mixed corn	21.0	83.2	10.8	0.8	1.1	3.1	—	—	—	—	—	—
b) Succulent forage	x	1550.9	213.9	14.8	21.3	62.4	x	5090.8	914.8	13.8	17.6	37.5
maize	—	—	—	—	—	—	60.0	21.0	1.3	0.0	0.0	0.0
fodder roots	320.0	1158.4	115.8	8.1	11.5	33.8	330.0	2359.5	235.9	3.6	4.6	9.7
potatoes	170.0	392.5	98.1	6.7	9.8	28.6	190.0	2710.3	677.6	10.2	13.0	27.8
c) Rough forage	x	722.7	117.5	8.1	11.6	34.5	x	3966.5	978.0	14.7	18.9	39.9
clover	—	—	—	—	—	—	40.0	84.0	42.0	0.6	0.8	1.7
lucerne	—	—	—	—	—	—	35.0	3.5	1.7	0.0	0.0	0.1
serradella	—	—	—	—	—	—	35.0	17.5	7.0	0.1	0.1	0.2
field pea	—	—	—	—	—	—	—	—	—	—	—	—
vetch	—	—	—	—	—	—	40.0	12.0	4.8	0.1	0.1	0.2
fodder lupine	—	—	—	—	—	—	—	—	—	—	—	—
leguminous mixtures	—	—	—	—	—	—	40.0	626.8	250.7	3.8	4.9	10.3
meadow hay	28.0	86.2	34.5	2.4	3.4	10.2	28.0	838.9	335.6	5.2	6.5	13.7
pastures	20.0	66.0	19.8	1.4	2.0	5.8	20.0	191.0	57.3	0.7	1.1	2.3
straw of spring cereals	31.0	122.8	18.4	1.3	1.8	5.4	30.0	892.5	148.9	2.2	2.9	6.1
straw of winter cereals	42.0	447.7	44.8	3.0	4.4	13.1	36.0	1300.3	130.0	2.0	2.5	5.3
C. Industrial crops	—	—	—	—	—	—	x	3.0	2.1	0.0	0.0	0.0
hemp	—	—	—	—	—	—	—	—	—	—	—	—
rape	—	—	—	—	—	—	10.0	3.0	2.1	0.0	0.0	0.0
II. Animal production	x	x	436.4	30.4	100.0		x	x	1450.6	21.9	100.0	—
a) Milk (in liters)	2300.0	18400.0	138.0	9.6	31.7		2500.0	90000.0	675.0	10.2	46.6	—
b) Meat-stock (in kg of live weight)	x	4665.7	241.7	16.8	55.4		x	14686.7	757.5	11.5	52.3	
beef	380.0	380.0	22.8	1.6	5.2		380.0	1900.0	114.0	1.7	7.8	
veal	50.0	100.0	5.0	0.3	1.1		50.0	700.0	35.0	0.6	2.4	
pork	120.0	3720.0	186.0	13.0	42.6		120.0	11400.0	570.0	8.6	39.4	
piglets	—	—	—	—	—	—	—	—	—	—	—	—
mutton	45.0	135.0	0.1	0.6	2.5		45.0	90.0	5.4	0.1	0.4	
lamb	10.0	40.0	2.4	0.1			10.0	50.0	0.3	0.0		
poultry	x	290.7	17.4	1.2	4.0		x	546.7	32.8	0.5	2.3	
therein: hens	1.75	183.7	11.0	0.8	4.0		1.75	288.7	17.3	0.3	2.3	
chickens	1.0	107.0	6.4	0.4			1.0	258.0	15.5	0.2		
c) Eggs	100.0	19800.0	49.5	3.4	11.3		120.0	3720.0	9.3	0.1	0.6	
d) Honey	—	—	—	—	—		—	—	—	—	—	—
e) Wool	2.0	18.0	7.2	0.6	1.6		2.0	22.0	8.8	0.1	0.5	

Table 12c

Specification	Ostrówik						Podgóra					
	Yield	Production	Production in grain units	Gross production %	Branch production %	Group production %	Yield	Production	Production in grain units	Gross production %	Branch production %	Group production %
Gross production	x	x	9295.4	100.0			x	x	4793.8	100.0	x	
I. Plant production (in q)	x	22877.6	7513.7	80.0	100.0		x	10377.2	3497.3	72.9	100.0	
A. Food crops	x	12628.4	5222.5	56.2	69.5	100.0	x	4634.5	1930.2	40.3	55.2	100.0
a) Grains	x	584.2	585.0	6.3	7.8	11.2	x	750.5	750.5	15.8	21.5	38.9
winter wheat	21.0	192.1	192.2	2.1	2.5	3.7	20.0	140.0	140.0	3.0	4.0	7.2
spring wheat	—	—	—	—	—	—	—	—	—	—	—	—
rye	20.0	230.6	230.6	2.5	2.8	4.4	19.0	569.8	569.8	11.9	16.3	29.5
spring barley	21.0	157.9	157.9	1.7	2.4	3.0	18.0	40.7	40.7	0.9	1.2	2.2
buckwheat, millet	—	—	—	—	—	—	—	—	—	—	—	—
leguminous	12.0	3.6	4.3	0.0	0.1	0.1	—	—	—	—	—	—
b) Roots and vegetables	x	6672.3	1244.8	13.4	16.6	23.8	x	2907.7	633.1	13.2	18.1	32.8
potatoes	220.0	2439.8	609.9	6.6	8.1	11.7	19.0	1969.3	492.3	10.2	14.1	25.5
vegetables	—	—	—	—	—	—	—	—	—	—	—	—
root crop sedlings and other	250.0	4232.5	634.9	6.8	8.5	12.1	230	938.4	140.8	3.0	4.0	7.3
c) Fruits	x	5431.9	3392.7	36.5	45.1	65.0	x	976.3	546.6	11.3	15.6	28.3
apples	0.6	1518.0	759.0	8.2	10.1	14.6	0.6	270.0	135.0	2.8	3.9	7.0
pears	0.5	527.5	263.7	2.8	3.5	5.0	0.5	50.0	25.0	0.5	0.7	1.3
plums	0.4	880.0	440.0	4.7	5.9	8.4	0.4	148.0	74.0	1.6	2.1	3.8
sour cherries	0.25	35.2	17.6	0.2	0.2	0.3	0.25	6.5	3.2	0.0	0.1	0.2
sweet cherries	0.3	946.2	473.1	5.2	6.3	9.2	0.3	185.7	92.9	1.9	2.6	4 8
other fruits	0.5	391.5	783.0	8.4	10.5	15.0	0.5	21.0	42.0	0.9	1.2	2.2
gooseberries	—	—	—	—	—	—	—	—	—	—	—	—
currants	0.05	261.5	130.7	1.4	1.7	2.5	0.05	25.5	12.7	0.2	0.4	0.6
raspberries	80.0	16.0	12.0	0.1	0.1	0.2	—	—	—	—	—	—
strawberries	80.0	856.0	513.6	5.5	6.8	9.8	80.0	269.6	161.8	3.4	4.6	8.4
B. Fodder crops	x	10189.2	2291.2	24.6	30.5	100.0	x	5742.7	1567.1	32.6	44.8	100.0
a) Grains	x	381.0	295.8	3.2	3.9	12.6	x	418.68	332.5	6.9	9.5	21.2
oats	21.0	283.1	283.1	3.1	3.8	12.3	21.0	319.6	319.6	6.7	9.1	20.4

mixed corn	22.0	97.9	12.7	0.1	0.1	0.3	20.0	99.0	12.9	0.2	0.4	0.3
b) Succulent forage	x	6053.3	971.2	10.5	12.9	42.4	x	1969.3	492.3	10.2	14.1	31.5
maize	—	—	—	—	—	—	—	—	—	—	—	—
fodder roots	330.0	3613.5	361.3	3.9	4.8	15.8	—	—	—	—	—	—
potatoes	220.0	2439.8	609.9	6.6	8.1	26.6	190.0	1969.3	492.3	10.2	14.1	31.5
c) Rough forage	x	3754.9	1024.1	10.9	13.7	45.0	x	3354.9	742.3	15.5	31.2	47.3
clover	40.0	388.0	194.0	2.1	2.6	8.5	40.0	16.0	8.0	0.1	0.2	0.5
lucerne	—	—	—	—	—	—	—	—	—	—	—	—
serradella	—	—	—	—	—	—	35.0	290.5	116.2	2.4	3.3	7.4
field pea	40.0	92.4	37.0	0.4	0.5	1.6	—	—	—	—	—	—
vetch	40.0	186.8	74.7	0.8	1.0	3.3	—	—	—	—	—	—
fodder lupine	40.0	12.0	4.8	0.0	0.1	0.3	—	—	—	—	—	—
leguminous mixtures	40.0	120.0	48.0	0.6	0.6	2.1	40.0	347.2	138.9	2.9	4.0	8.9
meadow hay	27.0	977.4	391.0	4.2	5.2	17.2	26.0	509.6	203.8	4.2	5.8	13.0
pastures	20.0	364.0	109.2	1.2	1.5	4.8	18.0	113.0	33.9	0.7	1.0	2.2
straw of spring cereals	31.0	795.1	83.5	0.8	1.1	3.6	30.0	672.9	100.9	2.3	2.9	6.4
straw of winter cereals	40.0	819.2	81.9	0.8	1.1	3.6	38.0	1405.6	140.6	2.9	4.0	8.9
C. Industrial crops	—	—	—	—	—	—	—	—	—	—	—	—
hemp	—	—	—	—	—	—	—	—	—	—	—	—
rape	—	—	—	—	—	—	—	—	—	—	—	—
II. Animal production	x	x	1781.7	19.2	100.0		x	x	1296.5	27.1	100.0	
a) Milk (in liters)	2200	92400	693.0	7.4	38.9		2500	82500.0	618.8	12.9	47.7	
b) Meat-stock (in kg of live weight)	x	19823.7	1025.4	11.2	57.6		x	11707.5	608.7	12.8	47.6	
beef	380	2660.0	159.6	1.8	8.9		380	1900.0	114.0	2.5	8.8	
veal	50	1400.0	70.0	0.8	4.0		50	850.0	42.5	0.9	3.3	
pork	120	15000.0	750.0	8.1	42.2		120	8520.0	426.0	8.9	32.8	
piglets	—	—	—	—	—		—	—	—	—	—	—
mutton	45.0	270.0	16.2	0.2	0.9		—	—	—	—	—	—
lamb	—	—	—	—	—		10	10.0	0.6	0.0	0.1	
poultry	x	493.7	29.6	0.3	1.6		x	427.5	25.6	0.5	2.0	
therein: hens	1.75	183.7	11.0	0.1	1.6		1.75	185.5	11.1	0.2	2.0	
chickens	1.0	310.0	18.6	0.2			1.0	242.0	14.5	0.3		
c) Eggs	120.0	23880.0	59.7	0.6	3.3		120.0	24720.0	61.8	1.3	4.8	
d) Honey	—	—	—	—	—		—	—	—	—	—	
e) Wool	1.8	9.0	3.6	0.0	0.2		2.0	18.0	7.5	0.1	0.5	

1) highly productive, vegetable, food with fodder, apple with potato-meadow hay orientation — $5 \times V_4(a_2ap + f_1ptmh)$ — Ostrówik,

2) high productive, highly vegetable, food with fodder, apple with potato orientation — $5 \times V_4(a_2ap + f_1pt)$ — Brzumin,

3) highly productive, vegetable, food with fodder, apple with potato with pork stock breeding orientation — $5 \times V_3(a_2ap + f_1pt) + A_1(pk)m$ — Czersk,

4) fairly productive, vegetable, food with fodder — apple with potato — meadow hay with dairy cattle orientation — $4 \times V_3(a_2ap + f_1pt$,

Table 13

Agricultural production in grain units per 1 ha of agricultural land and 1 employed in agriculture

Specification	Borki		Brzumin		Coniew		Czersk	
	Grain units per 1 ha of agriculture land	Grain units per 1 employed in agriculture	Grain units per 1 ha of agriculture land	Grain units per 1 employed in agriculture	Grain units per 1 ha of agriculture land	Grain units per 1 employed in agriculture	Grain units per 1 ha of agriculture land	Grain units per 1 employed in agriculture
Plant production	23.8	52.6	43.0	73.8	29.1	55.1	38.9	79.2
Animal production	12.9	28.3	10.4	17.8	9.4	17.8	14.7	30.5
Gross production	36.7	80.9	53.4	91.6	38.5	72.9	53.6	109.7

Table 13a

Specification	Kępa Radwankowska		Królewski Las		Ostrówik		Podgóra	
	Grain units per 1 ha of agriculture land	Grain units per 1 employed in agriculture	Grain units per 1 ha of agriculture land	Grain units per 1 employed in agriculture	Grain units per 1 ha of agriculture land	Grain units per 1 employed in agriculture	Grain units per 1 ha of agriculture land	Grain units per 1 employed in agriculture
Plant production	29.9	59.0	31.0	51.8	42.9	100.2	26.8	44.3
Animal production	13.0	25.6	8.7	14.5	10.2	23.7	9.9	16.4
Gross production	42.9	84.6	39.8	66.3	53.1	123.9	36.7	60.7

$mh) + A_1 (cd)\, lm$ — Coniew or very similar — $4 \times V_3(a_2ap + f_1pt) + A_1(cd)\, lm$ in Królewski Las,

5) fairly productive, vegetable, food with fodder, strawberry-wheat -rye with potato and fodder roots with dairy cattle and pork stock orientation — $4 \times V_3(a_2sw,wh,ry + f_1pt,bf) + A_1(pk + cd)m$ — Kępa Radwankowska.

The last two villages are characteristic for their orientations are very common throughout the areas of Middle and Eastern Poland. The influence of the Warsaw market is reflected only in the higher than is normal, productivity of farming. These are: the village of Borki and Podgóra with fairly productive, vegetable food-fodder, rye-potato-meadow hay with dairy cattle orientation $4 \times V_3(a_1ry + f_1pt,mh) + A_1(cd)lm$.

In general it has to be stated that against the background of Polish agriculture the area under survey is characteristic with its exceptionally high productivity of agriculture attained through the high level of fruit culture specialization. This specialization has been developed in a section of the Warsaw suburban zone, while there are others specializing in market gardening, early potatoes growing, milch cows breeding etc. At the same time, even in the proximity of Warsaw, when farther away from access to main roads the orientation of farming does not differ much from that characterizing vast rural areas, of Middle Poland.

GEOGRAPHIA POLONICA 5, 1965

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THE COMMUNE OF KRUSZWICA ON THE CUIAVIAN PLAIN IN CENTRAL POLAND

The commune of Kruszwica lies in the center of the Cuiavian (Kujawy) Lowland forming the northeastern part of the Greater Poland (Wielkopolska) Lowland.

With regard to administration, the commune belongs to the County of Inowrocław, situated in the southern part of the Voivodship of Bydgoszcz. To the south, the county borders on the Voivodship of Poznań. The eastern boundary almost coincides with the former German-Russian boundary at the time of the Poland's partitions and constituted until the present time a sharply defined boundary of two different types of agricultural economy. To the west, an intensive diversified farming is predominant, which is highly productive and commercial one. whereas to the east it is less intensive, less productive and less marketable producing, more uniform, with grain and potatoes cultivation predominating.

The present study covers only a part of the Kruszwica commune, that is the villages of Sławsko and Rzepiszyn and the state farms in Kobylniki and Rożniaty making up a joint surface area of 1735.31 ha.

The units mentioned are adjacent one to the other and are situated in the northern part of the Kruszwica commune in the direct neighborhood of the town of Kruszwica, one of the ancient capitals of the Polish State [1].

[1] The land utilization survey of the area was made by the Department of Agricultural Geography of the Institute of Geography, Polish Academy of Sciences in 1957, under the direction of R. Szczęsny. The terrain of the Kruszwica commune was mapped by K. Borowicz. The data have been revised and brought up to date by the present author in 1963.

The immediate vicinity of the town of Kruszwica, and the convenient communication connections with centers of a higher order by a route which leads to Inowrocław and Bydgoszcz, as well as the railway line running through the center of the terrain discussed exert a favourable influence on the farming of the area studied.

Kruszwica is 18 km distant from the county seat. It takes 29 min by train from the stop at Różniaty to Inowrocław and 35 min by bus.

1. NATURAL CONDITIONS

The Cuiavian Lowland (sometimes called the Cuiavian Lakeland) is one of the most level areas of Poland.

Gradients on the area studied do not exceed 1—3 m. The only distinct slopes are found in the deep channels eroded at one time by the waters flowing from under the glacier, occupied at present by lakes (the so-called channel lakes).

Such a lake is first of all Gopło, forming the eastern boundary of the area under study [2]. The famous during early medieval times as „Mare Polonorum" the largest lake of Greater Poland (23.4 sq. km) was in the Middle ages almost twice as large as now. The area examined is mainly built of Quaternary glacier deposits (boulder clay) and more recent lake deposits covering with a rather thin layer the Pliocene Poznań silts.

The deeper substratum of the area studied is an elevation being a part of the long anticlinal ridge, running from the Holy Cross Mountains (Góry Świętokrzyskie) up the Island of Rugia (Rügen), called the Cuiavian — Pomeranian Ridge.

So far as climate is concerned the area discussed is characterized by all features of the transitional climate of the Polish lowlands [3]. The mean temperature of the coldest month (February) is — 1°, the mean temperature of the warmest month (July) is + 16,8°C. The vegetation season lasts about 220 days, the snow cover lasts from 30 to 50 days. The number of days having frosts does not exceed 100, with light frosts 50. The period of frosts and light frosts last from the beginning of November to the beginning of April. In spite of this, work in the field begins in the middle of March.

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[2] S. Majdanowski. Jeziora Polski. (The Lakes of Poland). Przegląd Geograficzny. Vol. 26, No. 2, 1954. pp. 7—50.

[3] E. Hohendorf, Klimat Kujaw i przyległych części pradoliny Wisły w świetle potrzeb rolnictwa. Postępy Wiedzy Rolniczej. No. 1, 1952.

The total yearly precipitation in the Cuiavian Plain does not exceed 500 mm and is the lowest in Poland. The days with precipitation barely reaches 140. Cuiavian lies in the central dry belt of the Polish lowlands, which begins east of the river Oder and crosses the Vistula, reaching more or less to the Wkra river. Similarly as in other areas of Poland, the maximum precipitation falls in June, July and August, hence during the period of very intensive field work.

The large fluctuations of temperatures during the spring season and the prevailing strong winds which dry out the soil, which is a result of the complete clearing of the forests and reclaiming of the marshes in this area — are unpropitious from the point of view of vegetation and agriculture. As a result the process, so often described, of what is called steppization of Cuiavia [4], manifested in the expansion of plant and animal species characteric of the steppes and connected with a decrease of the amount of precipitation, is apparent.

The soils of the Kruszwica commune can be reckoned among the best soils in Poland. They are mainly black earths called the Cuiavian ones. They were formed from large fens and marshes covering this area in the past. The initial form of the Cuiavian black earths were rich in lime lake sediments, which as a consequence of natural or artificial drainage were transformed into highly humous alkaline or neutral soils [6]. On the area of the black soils are also found small islands of light black earths formed from sand. The local farmers utilize them to sow serradella, rye, oats and other less requiring crops.

In general, owing to their high content of humus and capacity for storing humidity the black earths belong to the good or very good soils. Soils of class I—III occupy 97,5% [7] of the area of the Kruszwica commune. Under conditions where proper agrotechnical measures are taken and a proper soil structure is maintained with a low proportion of plants with a high transpiration index, such soils can give high yields of most requiring plants such as wheat, sugar beets and other industrial plants.

The depressions in the Notec river valley and around the Gopło lake are covered with meadow soils, formed from the low peat bogs. These

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[4] A. Wodziczko and others, Stepowienie Wielkopolski (The transformation of Great Poland into a Steppe Region) vol. 1, Poznań, 1947, pp. 141—152.

J. Lambor — Stepowienie środkowych obszarów Polski. Prace PIHM. No. 34. Warsaw 1954, 48 pp.

[6] M. Strzemski, Czarne ziemie jako wskaźnik odwodnienia kraju. (Humus as a sign of country drainage) Gospodarka Wodna No. 2, 1954. pp. 46—47.

[7] According to the data of the County Planning Commission in Inowrocław.

soils were degraded to a high degree as a consequence of faulty land reclaiming, which was limited to draining off excess water and which did not ensure that requirements for water could be met during the period of increased need for it. In consequence of these measures, the level of ground water was lowered, in many instances the active process of peat formation was checked, the peat soils became mouldered and hence loose their structure. This kind of land reclaiming resulted also in lowering the level of ground water on surrounding arable fields. As a consequence the top soil of the fertile black earths is blown off by the winds on to neighbouring terrains. To regulate again water relations in these areas is a difficult matter. The consequences of improper land reclaiming is reflected particularly unfavourably in the quality of grasslands, which require renewed systematic land reclaimation measures.

As a whole, in spite of a precipitation deficit, the natural conditions of the terrain under study can be considered as being favourable for agriculture, the condition of maintaining is this, however closely tied with a correct method of water control, which is here deficient.

2. SOCIAL AND OWNERSHIP RELATIONS

Cuiavia is an area which was settled very long ago, evidence of which is found in the many neolithic and more recent archeological sites in the network of prehistoric burghs, and later historical monuments. Even before the dynasty of Piasts appeared on the historical horizon, Kruszwica was a big burgh — the seat of the chief or prince. The legendary period of the history of the Polish nation is indissolubly bound with the town. During the early mediaeval period, the terrain discussed was relatively populated and politically organized. The fertility of the soil, the dense network of waterways (the route ran this way connecting the river Warta with the Vistula), its situation at the crossroads of important commercial routes assured Kruszwica and the neighbouring villages excellent conditions for development. During the region of the first Piasts, it was for a long time one of the leading towns of Poland. Wars between princes in the 11th and 12th centuries however led to the decay of the town of Kruszwica.

The principal cause of the downfall of the town was, however, the lowering of the water level of the lake Gopło in consequence of which the connection of Gopło with other principal waterways was changed.

In consequence of the second partition of Poland (1792), the area studied was incorporated into Prussia. In so far during the development

of capitalism, the role of a granary was allotted to the eastern provinces of the German Empire, favourable conditions were formed for the expansion of the agricultural economy. The high profitability of agriculture made its intensification possible. Land was reclaimed, proper crop rotation was introduced, artificial fertilizers were used, agricultural industry was expanded, especially the sugar industry which found there excellent conditions for the cultivation of sugar beets.

As a result of German state policy, great expanses of the land in Cuiavia passed into the hands of German estate owners or colonists. German ownership slightly diminished in the interwar period in consequence of parcelling of several landed estates and the efflux of some German colonists. In the area under study — the landed estate Kobylniki, belonging to baron Wilamowitz-Moellendorf was in German hands until 1945, whereas Sławsko Górne, mentioned for the first time in the documents of 1231 [8] belonged to the Polish landowner Antoni Posadzy in the period between wars. Likewise the estate Rożniaty, mentioned in a document at the beginning of the 14th century which was some time a royal domain, passed into private hands.

The present structure of land ownership on the terrain studied is to a certain extent similar to the prewar one. Not all landed estates were parcelled out by the Land Reform of 1945. State Farms were made of the former estates of Kobylniki and Rożniaty, which occupy a larger acreage on the area under study (994.00 ha) than do individual farms (735.47 ha).

Table 1

Size of Farms

Size groups of farms	Sławsko				Rzepiszyn			
	No of farms		Area occupied		No of farms		Area occupied	
	number	%	ha	%	number	%	ha	%
0— 2	87	56.8	57.28	8.4	6	46.1	3.81	4.8
2— 5	15	9.8	44.76	6.5	6	7.7	4.55	5.8
5—10	35	22.9	244.22	35.7	3	23.1	24.00	30.2
10—14	5	3.3	66.42	9.7	1	7.7	12.00	15.1
14—20	6	3.9	105.76	15.5	2	15.4	35.00	44.1
20	5	3.3	164.94	24.2	—	—	—	—
Total	153	100%	683.38	100%	13	100%	79.36	100%

Source — Agricultural Census, 1958.

[8] Słownik Geograficzny Królestwa Polskiego i innych krajów słowiańskich. Vol. X. p. 793, Warsaw 1880—1889.

In so far as the average size of a state farm in the county of Inowrocław amounts on the average to 300—500 ha, both State Farms, Kobylniki 421.28 hectares and Różniaty. 461.02 ha do not exceed this size. At the present level of mechanization, such sizes make it possible for them to be independently farmed and if the organization is efficient they are assured of developing highly commercial farming. The remaining units, the individual villages of Sławsko and Rzepiszyn greatly differ one from the other so far as area is concerned. The surface area of the former amounts to 683.4 ha, of the second to 79.4 ha.

As table 1 shows, so far as the number of farms are concerned in both villages, farms of 0—2 ha predominate. On the other hand, when as surface is taken into account farms of 5—10 ha prevail. Stress must be laid, however, on the fact that there is a large percentage in both villages of farms of more than 10 ha and there are 5 farmers in the village of Sławsko who have farms of a surface area over 20 ha.

As field investigations showed, holdings of a surface area of 2 ha are not farms in the full sense of the word. They were rather lots supplementing the incomes of the population employed outside of agriculture.

The most active economically group of farms in both villages is that over 10 ha. They are well equipped in implements and livestock, but often feel the shortage of manpower.

The fragmentation of farms, common in other parts of the country is not encountered on the area discussed. Individual farms consist usually of 1 to 3 lots which does not cause any great difficulties in farming. The pattern of the fields here is either the łan or the colony one depending on the type of the settlement. The łan pattern is the original layout of the fields in the village connected with the three-field system, whereas the „colony" pattern is a result from the new settlement processes, that is the parcelling of the landed estates into smaller holdings and the formation of dispersed settlement.

There was a total of 1407 persons living in 1960 in the area subject to this study, of which 935 that is 66.4% were maintained exclusively from farming.

The population being employed outside of farming were largely railroad workers and those working in the industrial plants in Kruszwica or Inowrocław. The village of Rzepiszyn which was settled by marked numbers of industrial or railroad workers who never had any farms is characterised by a particularly high percentage of non-farming population.

Table 2

Number and Structure of the Population

Specification	Village of Sławsko	Village of Rzepiszyn	Kobylniki State Farm	Rożniaty State farm	Total
Total population	729	254	178	246	1407
of which					
men	350	133	75	127	685
women	379	121	103	119	722
of which					
farmers	467	142	129	197	935
non-farming population	262	112	49	49	472

According to the data of the County Plannig Commission in Inowrocław.

3. LAND UTILIZATION

The fertility of the Cuiavian soils affected the degree and the character of land utilization of the units described. The District of Inowrocław is characterized by one of the highest proportions in Poland of agricultural land — 84.2% of the total surface.

Table 3

Land utilization in Individual and State Farming

Specification	Sławsko		Rzepiszyn		Kobylniki State Farm		Rożniaty State farm		Average for the County Of Inowrocław
	ha	%	ha	%	ha	%	ha	%	%
Arable lands	653.08	95.6	76.65	95.0	356.12	73.7	403.96	82.8	73.0
Orchards	3.00	0.5	1.76	2.2	15.77	3.3	x	x	1.0
Meadows	5.74	0.8	0.75	0.9	28.45	5.9	25.63	5.2	5.3
Pasture fields	1.00	0.1	x	x	30.94	6.4	31.43	6.4	4.9
Total agricultural land	662.82	97.0	79.16	98.1	431.28	89.3	461.02	94.4	84.2
Forest acreage	x	x	x	x	20.09	4.1	2.78	0.6	
Settlement terrain	17.86	2.6	1.46	1.81	31.72	6.6	23.50	4.8	15.8
Waste land	2.70	0.4	0.07	0.09	x	x	0.85	0.2	
Total	683.38	100%	80.69	100%	483.09	100%	488.15	100%	100%

Source: Agricultural Census, 1958 and The Statistical Annual of the Voivodship of Bydgoszcz 1960--1961.

As shown in Table 3, the index in all the farm units is even higher than average for the county.

Ninety-five percent of the agricultural acreage of both villages is constituted of arable land. The state farms are characterized by a lower percentage of arable lands and 11% of the surface area is there occupied by grasslands. The area investigated is almost entirely devoid of orchards and forests which occupy but a negligible percentage of the surface area.

a. Arable Lands

As seen in Table 5, 100% of the arable lands are sown. As indicated by field research, the crop rotation cycles applied here are longer than in other parts of the county.

Sławsko village is an example of farming where crop rotation depends on the size of the farm, the way of cultivation, fertilization and the orientation of farming.

The following crop rotations are most frequently encountered:

1. suggar beets ++	1. root crops ++	1. root crops ++
2. barley	2. spring crops (mainly barley)	2. spring crops
3. rye	3. papilionaceous plants	3. papilionaceous
4. oats	4. wheat	4. industrial crops
	5. rye	5. wheat

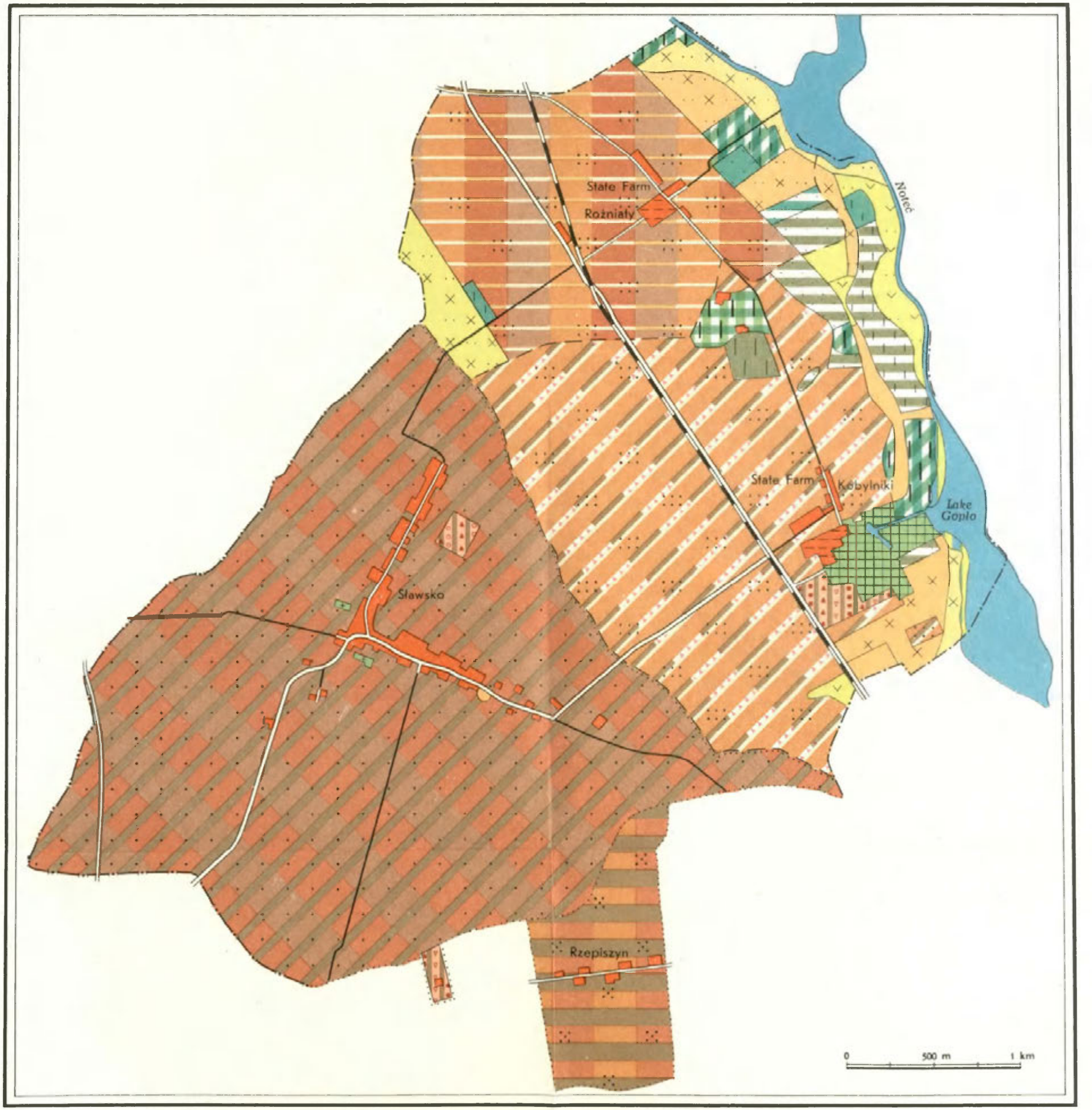
The most productive although less beneficial for the soil is the first crop rotation where grains occupy 3/4 of the total land, whereas only 1/2 of the land is given to grains in the third system of crop rotation. The second system of crop rotation is transitory in character.

The farmers of the village Rzepiszyn for the most part use a 5-course rotation with the following sequence:

1. root crops ++	4. wheat
2. spring crops	5. rye
3. papilionaceous plants	

hence corresponding to the second system used in Sławsko. Various systems of crop rotation are used on state farms: fodder, cereal-root or cereal ones in the following sequences:

1. fodder root crops	1. root crops ++	1. root crops ++
2. lucerne	2. barley	2. leguminous crops
3. silage crops	3. clover	3. rye
4. winter rape seed	4. wheat	4. clover
5. field pea	5. rye	5. root crop plantings
6. root crops ++	6. leguminous crops	6. wheat
	7. wheat	



Map 1. The commune of Kruszwica. Land utilization map

As far as the survey can prove the systems of crop rotations in the area studied are quite rational and adapted to local conditions.

Individual farms use stable manure every three years on an average, sometime every four years, depending on the livestock the farm has. The dung is used mainly under the root crops (sugar beets, potatoes) in an amount of about 30 tons per 1 ha, sometimes also it is used under wheat.

Mineral fertilization is also commonly practiced. The amount of fertilizers sown depend to a large extent on the finacial means of the individual farm. It amounts on an average to 100 kg per 1 ha of nitrogenous fertilizers.

The consumption of farm manure is lower on state farms and is generally used every four years.

On the other hand, State Farms use more mineral fertilizers, which are applied in the following amounts:

phosphorous fertilizers — 300 kg per 1 ha
potassium fertilizers — 300 kg per 1 ha
nitrogen fertilizers — 200 kg per 1 ha

The land both on individual farms and on state farms is well cultivated. Plowing is performed at the proper time, the crops are carefully tended, and after harvest skimming is also practiced.

The high agricultural standards and well-to-do of the farmers are reflected in the mechanization of the field work.

Table 4

Status of Agricultural Machinery in Individual Farms

	Drills	Mowing machines	Binders	Potato diggers	Thrashing machines	Electric engines	Tractors
Sławsko	23	8	9	17	13	10	3
Rzepiszyn	12	6	6	5	3	—	—

According to the data of the County Planning Commission in Inowrocław, 1957.

Sowing, harvesting and cultivation is for the most done by machinery. Plowing however, in the majority of the individual farms is done by horse traction.

As Table 5 shows, the highest percentage of arable lands (about 50%) is occupied everywhere by extractive crops. The percentage is slightly higher in individual farms and lower in state ones. A particularly high percentage of extractive crops occurs in the village of Sławsko. In Rzepiszyn, the ratios in this respect approach those of state farms. In

Agricultural Land Utilization — Table 5

Specification	Sławsko village				Rzepiszyn village				Kobylniki State Farm				Rożniaty State Farm			
	ha	% arable land	% agricultural acreage	% given group	ha	% arable land	% agricultural acreage	% given group	ha	% arable land	% agricultural acreage	% given group	ha	% arable land	% agricultural acreage	% given group
I. Arable land	653.08	100%	98.6	x	76.65	100%	96.8	x	356.12	100%	82.6	x	403.84	100%	87.6	x
A. Exhaustive crops	361.64	55.4	54.6	100	35.66	46.5	45.0	100 %	158.00	44.4	36.7	100 %	198.91	49.3	43.1	100 %
a. winter crops	198.51	30.4	30.0	54.9	19.90	26.0	25.1	55.8	81.00	22.7	18.8	51.2	105.00	26.0	22.9	52.8
wheat	84.87	13.0	12.8	23.5	11.27	14.7	14.2	31.6	47.00	13.2	10.9	29.7	53.00	13.1	11.6	26.6
rye	113.64	17.4	17.2	31.4	8.63	11.3	10.9	24.2	34.00	9.5	7.9	21.5	52.00	12.9	11.3	26.2
b. spring crops	163.13	25.0	24.6	45.1	15.76	20.5	19.9	44.2	77.00	21.7	17.9	48.8	93.91	20.3	20.2	47.2
wheat	6.88	1.0	1.0	1.9	—	—	—	—	17.00	4.8	3.9	10.8	10.00	2.5	2.2	5.0
barley	138.54	21.3	20.9	38.3	12.25	16.0	15.5	34.4	27.00	7.6	6.3	17.1	56.35	13.9	12.1	28.3
oats	17.71	2.7	2.7	4.9	3.51	4.5	4.4	9.8	33.00	9.3	7.7	20.9	20.00	5.0	4.3	10.1
mixed corn	—	—	—	—	—	—	—	—	—	—	—	—	7.56	1.9	1.6	3.8
B. Intensifying crops	200.91	30.7	30.3	100 %	31.76	41.4	40.1	100 %	91.00	25.5	21.1	100 %	73.58	18.2	16.0	100 %
fodder roots	1.66	0.25	0.25	0.8	—	—	—	—	14.00	3.9	3.2	15.4	10.00	2.5	2.2	13.6
maize	0.36	0.05	0.05	0.2	—	—	—	—	6.00	1.7	1.4	6.6	2.00	0.5	0.4	2.7
sugar beet	69.41	10.6	10.5	34.5	5.90	7.7	7.4	18.6	24.00	6.7	5.6	26.4	26.75	6.6	5.8	36.4
rape seed	—	—	—	—	—	—	—	—	10.00	2.8	2.3	11.0	15.33	3.8	3.3	20.4
poppy	2.25	0.3	0.3	1.1	1.00	1.3	1.3	3.1	—	—	—	—	—	—	—	—
flax	3.20	0.5	0.5	1.6	0.50	0.6	0.6	1.6	7.00	2.0	1.6	7.7	—	—	—	—
hemp	1.00	0.1	0.1	0.5	—	—	—	—	—	—	—	—	—	—	—	—
coriander	7.20	1.1	1.1	3.6	1.25	1.6	1.6	3.9	—	—	—	—	—	—	—	—
chicory	18.69	2.9	2.8	9.3	—	—	—	—	—	—	—	—	—	—	—	—
potatoes	90.53	13.9	13.7	45.1	20.29	26.5	25.6	63.9	27.00	7.6	6.3	29.7	13.50	3.3	2.93	18.3
cabbage	1.25				0.49				0.40				—	—	—	—
onions	0.92				0.65				0.60				—	—	—	—
carrots	1.17	1.0	1.0	3.3	0.38	3.7	3.6	8.9	0.70	0.8	0.7	3.2	—	—	—	—
beetroots	1.14				0.40				0.50				—	—	—	—
cucumbers	0.97				0.40				0.30				—	—	—	—

tomatoes	1.16				0.50				0.50				—	—	—	—
root crop seedlings	—	—	—	—	—	—	—	—	—	—	—	—	6.00	1.5	1.3	8.2
C. Structure forming crops	90.53	13.9	13.7	100%	9.23	12.1	11.7	100 %	91.00	25.5	21.1	100 %	112.35	27.8	24.4	100 %
peas, beans	0.20	0.03	0.03	0.2	0.25	0.3	0.3	2.7	9.00	2.5	2.9	9.9	9.00	2.2	2.0	8.0
field-pea	—	—	—	—	—	—	—	—	—	—	—	—	17.00	4.2	3.7	15.1
vetch	1.25	0.2	0.2	1.4	—	—	—	—	—	—	—	—	—	—	—	—
leguminous mixtures	30.19	4.7	4.6	33.3	7.87	10.3	9.9	85.3	19.00	5.3	4.4	20.9	—	—	—	—
fodder lupine	1.00	0.1	0.1	1.1	—	—	—	—	—	—	—	—	4.35	1.1	0.9	3.9
clover	15.10	2.3	2.27	16.7	0.86	1.2	1.2	9.3	14.00	3.9	3.2	15.4	30.00	7.1	6.5	26.7
lucerne	8.36	1.3	1.3	9.2	0.25	0.3	0.3	2.7	43.00	12.1	10.00	47.2	30.00	7.4	6.5	26.7
serradella	34.43	5.27	5.2	38.1	—	—	—	—	6.00	1.7	1.4	6.6	22.00	5.5	4.8	19.6
I. State farm workers' allotments																
A. Exhaustive crops																
oats	x	x	x	x	x	x	x	x	2.00	0.6	0.5	100%	2.00	0.5	0.4	100%
B. Intensifying crops	x	x	x	x	x	x	x	x	14.12	4.0	3.2	100%	17.00	4.2	3.7	100%
potatoes	x	x	x	x	x	x	x	x	11.00	3.1	2.5	77.8	14.00	3.5	3.1	82.3
vegetables	x	x	x	x	x	x	x	x	3.12	0.9	0.7	22.2	3.00	0.7	0.6	17.7
Total	653.08	100 %	x	x	76.65	100 %	x	x	356.12	100 %	x	x	403.84	100 %	x	x
II. Perennial crops with intercultivation	2.74	x	0.4	x	1.33	x	1.7	x	—	—	—	—	—	—	—	—
without intercultivation	0.26	x	0.04	x	0.43	x	0.5	x	15.77	x	3.6	x	—	—	—	—
III. Permanent grassland																
meadows	5.74	x	0.86	x	0.75	x	1.0	x	28.45	x	6.6	x	25.63	x	5.6	x
pastures	1.00	x	0.1	x	—	—	—	—	30.94	x	7.2	x	31.43	x	6.8	x
Total agricultural land	662.82	x	100 %	x	79.16	x	100 %	x	431.28	x	100%	x	461.02	x	100%	x

Source: Agricultural Census 1958 and 1960.

individual farming, barley predominates in the extractive group in Sławsko, with a large share taken by rye and a smaller one by wheat, whereas in Rzepiszyn, there is a larger share occupied by wheat and a smaller one by rye. Furthermore, both villages cultivate small amounts of oats chiefly for horse feeding.

Cultivation of wheat predominates with a marked share of rye and oats in the state farms of Kobylniki and Rożniaty, whereas the share of barley and rye is smaller. Winter wheat is mainly cultivated everywhere, whereas the barley is exclusively a spring crop.

The percentage of arable lands cultivated by intensifying crops is more differentiated. As a rule it is higher in individual farms than it is in state farms. In Rzepiszyn where less commercial farming is done, it does not exceed 40% of which almost 2/3 falls to potatoes and 1/6 to sugar beets. In Sławsko where the percentage amounts to over 30%, 1/3 falls to sugar beets and about 10% to chicory supplied to the factories of Włocławek, producing coffee substitutes.

Coriander, poppy seed, flax and hemp are cultivated in both villages. Vegetables constitute a small percentage of crops in this group in Sławsko and a higher one in Rzepiszyn. As for the intensifying group in the state farms, the cultivation of potatoes and sugar beets predo-

phot. W. Tyszkiewicz

Fig. 1 State Farm Rożniaty — Sugar beets

minate in Kobylniki, sugar beets are predominant in Rzepiszyn, the potato being third in order there after rape.

Some flax, maize and vegetables are grown in Kobylniki, only root crop seedlings and maize in Rożniaty. The percentage of structure-forming plants is low (12—14%) in individual farms, being twice as high in the state farms (25—28%). Of this plants group serradella and leguominous mixtures are most cultivated in Sławsko, with less clover and lucerne and small amounts of vetch and fodder lupine. Serradella is versatile in use — it is harvested for hay and seeds, and utilized as a pasture, compensating a deficit of permanent grasslands. This is also of great importance in farming when the cattle must be fed in the cow house. Leguominous mixtures are decidedly predominant in Rzepiszyn, in addition to which some clover, lucerne and edible peas are cultivated.

The largest area in the State Farm at Kobylniki is sown over by lucerne. Clover, leguminous crop mixtures and a little serradella are also cultivated. Over one-fourth of the structure-forming crops surface area in Rożniaty falls to lucerne and clover. Serradella and field peas are additionally cultivated. Edible peas are cultivated in both state farms

As seen from the above, there is a highly mixed utilization of agricultural arable acreage both in the peasant farms as in the State Farms. None of the three groups discussed, however, have a decided preponderance. The following orientations of utilization of arable lands can be defined: in Sławsko: — barley — rye — potato ($E_3bl,ry + I_2pt$), in Rzepiszyn: — barley — wheat — potato ($E_3bl,wh + I_3pt$), in Kobylniki — wheat with potatoes, sugar beets and lucerne ($E_3wh + l_1pt,bs + S_1lc$), in Rożniaty wheat — barley — rye with clover and lucerne orientation ($E_3wh,bl,ry + S_1cv,lc$).

b. Workers' Allotments

The State Farm of Kobylniki and Rożniaty has garden lots and separate plots in the fields for the workers, in which potatoes, a few vegetables and oats for their own house consumption are mainly cultivated. There is a lot of a surface area of about 0,5 ha per one worker. These lots are highly manured by dung which is supplied by the livestock of the workers.

c. Perennial Crops

The intensive character of farming on the terrain discussed finds no reflection in the development of fruit culture. An analysis of the map of land utilization and Table 5 show that there are only three small

commercial orchards in individual farming, the rest are home-yard orchards consisting of several apple and cherry trees. The intercultivation of various annual plants is practiced on 85% of the orchards surface.

The largest commercial orchard of an area of 15.77 ha belongs to the state farm of Kobylniki. The orchard produces table fruit (mainly pears and apples) intended for the Inowrocław market.

Such a weak status of fruit growing is a surprise if one takes into consideration not only the excellent natural conditions but also the fact that there is a fruit wine factory in Kruszwica which has been established for a long time, and which has recently been expanded to produce other fruit products (canned fruit, jams, fruit beverages etc.).

d. Permanent Grasslands

The area investigated is characterized by a very low share of grasslands (Table 5), the percentage of grasslands fluctuating between 1.0% in Sławsko and Rzepiszyn to 13% in state farms. Meadows dominate among grasslands in individual farms whereas pastures have a slight preponderance in state farms. There are small strips of grasslands in the village of Sławsko and Rzepiszyn mainly adjacent to farm buildings

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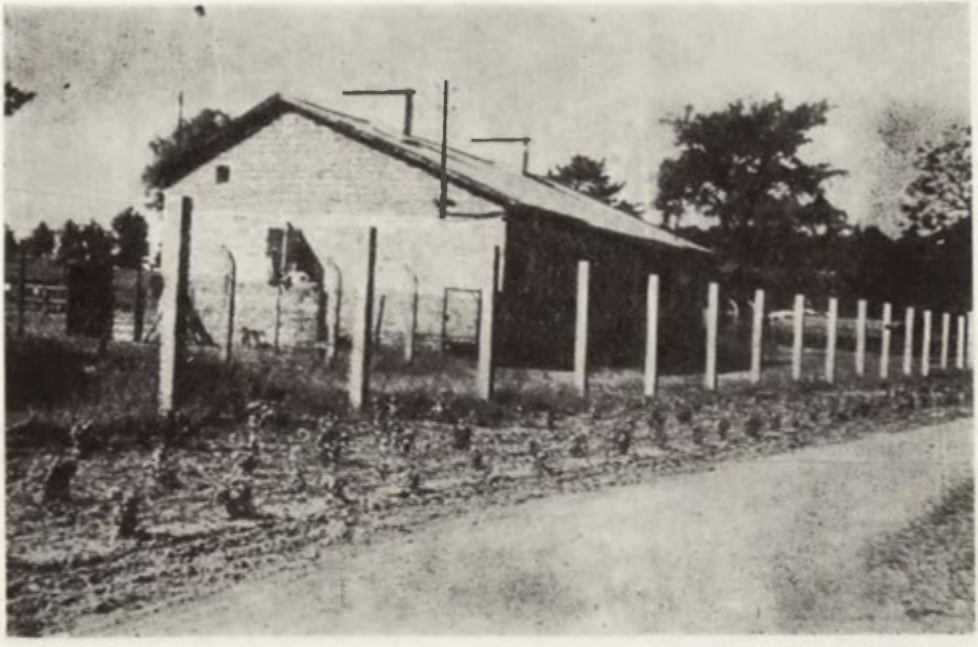
Fig. 2 State Farm Kobylniki — Hay raking



phot. W. Tyszkiewicz

Fig. 3 Rożniaty Forestry — Pheasant breeding farm

and used as paddocks where the animals have movement and light, nourishment, on the other hand, being given them in cow houses, stables and pig pens.

Grasslands in state farms generally occupy depressions along river banks or the shores of lakes where in view of a the small gradient, peat-forming processes developed. As a result of meadow management over a long period, the vegetation on these meadows has undergone a change and at present frequently resembles rather post *„łęg"* or post *„grond"* plant associations than original bog meadows. The yield obtained from meadows and pastures chiefly depends on the state of land-reclaiming measures taken. Two mows of hay giving a yield of 60 q/ha are harvested on areas where land had been improved and the meadows are managed. Some meadows are mown in spring and then grazed in the fall, their average yield being about 45 q/ha. The yield of pastures is estimated at about 25 q/ha because grazing is not propitious to the development of high grade species of grasses.

e. Forests

There is only one forest complex in the entire commune of Kruszwica on the terrain studied which has a surface area of 123.63 hectares

and which is under the administration of the State Foresty of Rożniaty. The main forest complex lies on the river Noteć and in the belt along Lake Gopło. The most frequent form of forest encountered are young growths of black alder with an admixture of birch, and sporadically spruce and elm. The undergrowth is formed of elderberries, buckthorn, alder buckthorn, currants and hops. Ferns, nettle, bittersweet and forget-me-nots grow on the forest ground cover.

A large surface area of the forest is covered by a monoculture of the spruce, the age of which does not exceed 20 years. As the above indicates, we have to deal here with an artificial tree stand introduced into what is peculiar to the Cuiavian Plain a luxuriant mixed „*łęg*" forest habitat.

In 1963 the State Forestry Rożniaty the pheasant breeding farm has been organized to increase their number in neighbouring forests, 500 phasants has been grown in 1963.

f. Settlement

The villages of Sławsko and Rzepiszyn are characterized by a nucleated, compact settlement stretched along the main road of the village (street village).

phot. W. Tyszkiewicz

Fig. 4 State Farm Rożniaty — Workers houses

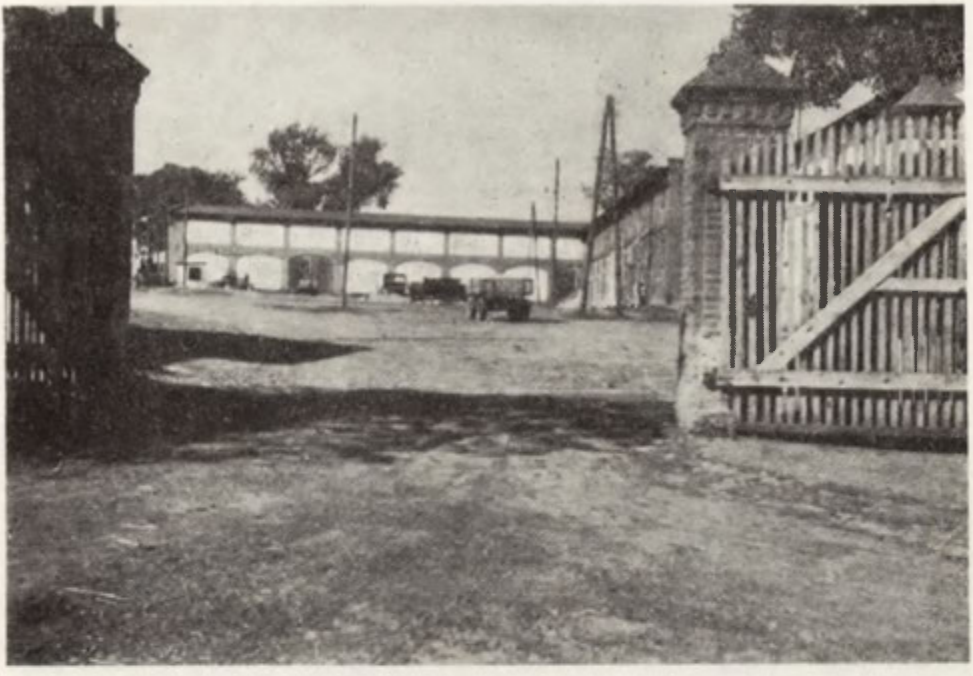


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Fig. 5 State Farm Rożniaty — Old farm buildings

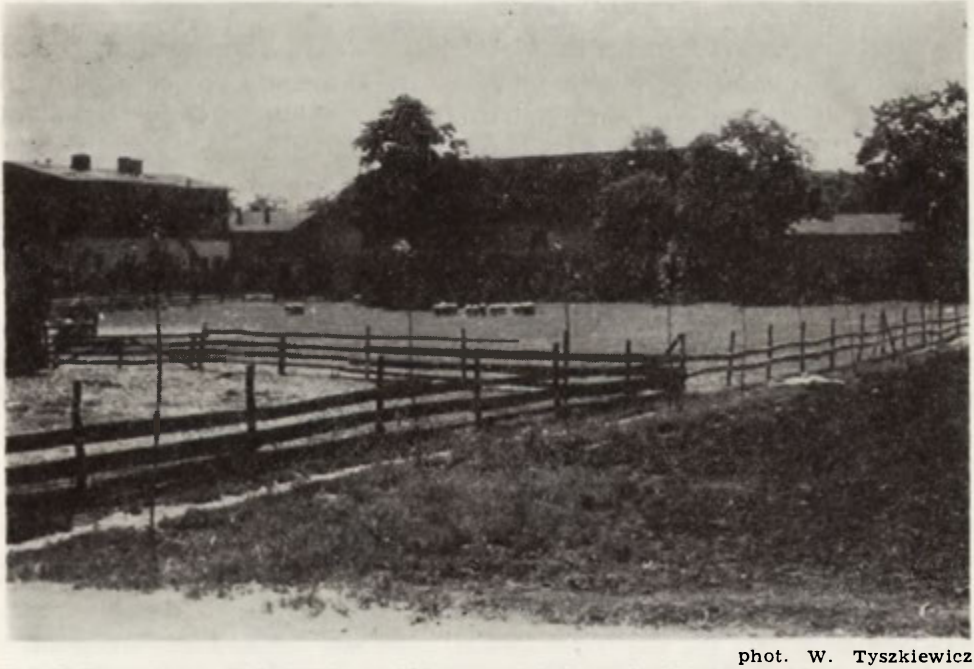

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Fig. 6 State Farm Kobylniki — Old manorial farm buildings, paddock for sheep

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Fig. 7 State Farm Kobylniki — New summer byre

The buildings are as a rule of bricks or stone. The dwelling houses are generally one-storey, with four rooms. The roofs are covered with various materials: tiles, iron or zinc plates or shingles. Only the oldest buildings have still, but occasionally roofs thatched of straw or reeds.

Generally there is a small home-yeard garden by the house, in which several fruit trees and vegetables are grown. Some of the farms have their own water supply (wells or pumps). Both villages have electric power.

A separate group of settlements is formed by the state farms. They are characterized by having noticeably larger buildings, erected almost exclusively of brick. The farm buildings from the former manor estates show wear to a high degree and must by repaired.

4. CROP PRODUCTION

The proper way of utilizing good natural conditions is expressed in the high production effects obtained on the terrain under investigation. Crop yields in Cuiavia especially in the county of Inowrocław rank among the highest in Poland. Owing to an intensive utilization

of arable lands and high yields, plant production on the terrain studied is high and varies within the limits of 34 to 38 grain units per 1 hectare of agricultured land.

The differences in crop yields of individual farms and the state farms are not significant. The Rożniaty State Farm attains the highest yields on the terrain investigated. The principal mass of plant production in both of the individual and state farms is gained from arable lands (Table 8 and 9).

Not any of the economic groups of crops has a decided preponderance in the individual farms at the villages of Sławsko and Rzepiszyn. The highest percentage of plant production falls to food plants. In the production of such, 70% of the share falls to wheat and rye. Of the remaining alimentary plant products, the largest role is played by potatoes. The other plant crops such as vegetables, fruit or edible leguminous crops constitute but a negligible percentage of the alimentary products.

Fodder plants are third in order. A lack of permanent grasslands in Sławsko and Rzepiszyn is compensated for by the large share of fodder plants in the production of arable lands. Plants supplying rough forage of which clover and in Sławsko also lucerne play the most important role in the group of fodder crops. In both villages, the leaves of sugar beets and mangolds are also of essential significance as forage.

A very important position in the production of fodder plants is taken by the succulent fodders — the fundamental element of such production being the potato. Not a very large role is played by concentrated foods (grains) of which the most important are oats.

Industrial plants in individual farming constitute almost over 1/4% of the crop production of Rzepiszyn and almost 1/3 of that of Sławsko. Almost one half of the production of this group is that of the sugar beet. An important item also is the production of malting barley which farmers cultivate within the framework of contracts[9]. The next industrial plant intended for nearby starch factories is the industrial potato. Of essential importance in the production of industrial plants is also the production of chicory and coriander in Sławsko, of coriander, flax and hemp in Rzepiszyn.

Inasmuch as prices for some of the industrial plants are several

[9] Contracting — an indirect form of planning the agricultural production practiced by the state in Poland on the principle of drawing up contracts between individual producers, collective or the state producing enterprises and factories. The producers enter into the obligation to supply a determined amount of determined products on determined date and on determined in advance terms

times as high as those paid for cereals (for instance in 1957 — 1 q coriander costed 1000—1500 zlotys whereas 1 q rye — 270—300 zlotys and wheat 330—370 zlotys) such production is very profitable.

In state farms fodders (Table 9) constitute over one half of the plant production. Lucerne and clover are the most important plants in the forage plant group; oats, potatoes and maize playing a somewhat smaller role. Hay from natural meadows and leaves from both sugar beet and mangolds are also important.

Such a high share taken by fodder plants in the state farms is reflected in a well-developed breeding of household animals.

About 1/3 of the plant production in State Farms are food crops. Wheat and rye are the main plants in this group, followed by potatoes and peas. About 1/5 of the production in this group in Kobylniki are fruits.

The last group — industrial plants constitute in the state farms about 15% of the crop production. The main plant in this group in Kobylniki is the sugar beet (making up about one half of the production of this group) a smaller role being played by malting barley (1/5) and rape seed (1/6). In Rozniaty about one half of the production of this group is contituted of sugar beets and 1/6 of rape seed.

About 60% of the plant production on the lots of the workers of both state farms constitutes the production of potatoes for consumption and vegetables, the remaining 40% falling mainly to potatoes for fodder. The plant production on the lots of workers of the State Forestry is made up from two groups:

1) food crops (about 1/3) — potato, vegetables, barley and fruit
2) industrial crops (over 1/3) — mainly sugar beet.

The total plant production on the lots of workers can be evaluated at about 1500 grains units.

In comparing plant production on individual and state farms the following conclusions may be made.

In individual farming about 1/3 of the plant production is constituted of food plants mainly rye and wheat and potatoes, about 1/3 of the production of various fodder plants and about 1/3 of industrial plants (Sławsko). In Rzepiszyn the percentage of food crops is higher and of industrial plants lower.

In the State Farms over one half of the plant production is made up of fodders crops. The cultivation of food crops mainly cereals is intended for certified seeds. The share of industrial plants in plant production is considerably lower.

5. LIVESTOCK BREEDING AND ANIMAL PRODUCTION

In spite of the small surface area of meadows and pasture lands the livestock breeding on the area studied is fairly well developed and is based on fodder plants cultivated on arable lands.

The total stock of livestock per 100 ha agricultural acreage amount for the village of Sławsko — 60.6 big animal units, for Rzepiszyn — 35.7

Table 6

Livestock Breeding, Individual Farming

Specification	Sławsko village					Rzepiszyn village				
	Heads	Big animal units	% of big animal units	Per 100 ha agricultural land		Heads	Big animal units	% of big animal units	Per 100 ha agricultural land	
				heads	big animal units				heads	big animal units
Horses young 1—3 years old	2	2.0	x	x	x	—	—	—	—	—
work horses	94	112.8	x	x	x	8	9.6	x	x	x
Horses—total	96	114.8	28.6	14.5	17.3	8	9.6	34.0	10.1	12.1
calves up to 6 months old	23	2.8	x	x	x	2	0.2	x	x	x
heifers 6—12 months old	19	7.6	x	x	x	3	1.2	x	x	x
heifers 1—3 years old	48	41.3	x	x	x	3	2.1	x	x	x
cows	153	153.0	x	x	x	11	11.0	x	x	x
bulls and oxen	1	1.2	x	x	x	—	—	—	—	—
Cattle — total	255	205.9	51.3	38.5	31.1	19	14.5	51.6	24.0	18 3
piglets up to 6 months old	382	19.1	x	x	x	28	1.4	x	x	x
pigs 6—9 months old	86	21.5	x	x	x	2	0.5	x	x	x
pigs over 9 months old	55	16.5	x	x	x	2	0.6	x	x	x
Pigs together	523	57.1	14.2	78.9	8.6	32	2.5	8.9	40.4	3.2
sheep up to 1 year old	10	0.5	x	x	x	2	0.1	x	x	x
sheep	68	6.8	x	x	x	3	0 3	x	x	x
Sheep — total	78	7.3	1.8	11.8	1.1	5	0.4	1.4	6.3	0.5
Goats	80	6.4	1.6	12.1	1.0	1	0.1	0.3	1.3	0.1
hens	1923	5.8	x	x	x	174	0 5	x	x	x
cocks	92	0 3	x	x	x	4	0.01	x	x	x
chickens	2166	2.2	x	x	x	263	0.3	x	x	x
Poultry — total	4481	8.3	2.5	677.9	1.5	441	0.81	3.8	616.5	1.4
Total	5523	401.7	100	333.7	60.6	505	28.21	100	698.6	35.7

Source: data of County Planning Commission, 1958 and 1960.

Table 7

Livestock Breeding, State Farming

Specification	State Farm Kobylniki					State Farm Rożniaty				
	Heads	Big animal units	% of big animal units	Per 100 ha agricultural land: heads	Per 100 ha agricultural land: big animal units	Heads	Big animal units	% of big animal units	Per 100 ha agricultural land: heads	Per 100 ha agricultural land: big animal units
A. State owned										
foals	1	0.6	x	x	x	1	0.6	x	x	x
young horses 1—3 years old	6	6.0	x	x	x	6	6.0	x	x	x
work horses	27	32.4	x	x	x	27	32.4	x	x	x
Horses total	34	39.0	15.6	7.9	9.0	34	39.0	22.6	7.4	8.5
calves up to 6 months	31	3.7	x	x	x	25	3.0	x	x	x
heifers, 6—12 months	17	6.8	x	x	x	12	4.8	x	x	x
heifers, 1—3 years	20	14.0	x	x	x	36	25.2	x	x	x
cows	84	84.0	x	x	x	61	61.0	x	x	x
bulls and oxen	4	4.8	x	x	x	3	3.6	x	x	x
Cattle — total	156	113.3	45.5	36.2	26.3	137	97.6	56.6	29.7	21.2
piglets up to 6 months old	73	3.7	x	x	x	179	8.9	x	x	x
piglets up to 6—9 months	169	42.2	x	x	x	—	—	—	—	—
pigs over 9 months	23	6.9	x	x	x	28	8.4	x	x	x
Pigs — total	265	52.8	21.2	61.4	12.2	207	17.3	10.1	44.9	3.7

lambs up to 1 years old	183	9.2	x	x	x	190	9.5	x	x	x
sheep	350	35.0	x	x	x	90	9.0	x	x	x
Sheep — total	533	44.2	17.7	123.6	10.3	280	18.5	10.7	60.7	4.0
Total	x	249.3	100	x	57.8	x	172.4	100	x	37.4
B. Workers property										
calves up to 6 months	3	0.4	x	x	x	—	—	—	—	—
heifers 3 years	3	2.1	x	x	x	3	2.1	x	x	x
cows	37	37.0	x	x	x	33	33.0	x	x	x
Cattle — total [1]	43	39.5	88.2	266.7	244.8	36	35.1	71.3	189.5	184.7
piglets up to 6 months old	70	3.5	x	x	x	165	8.2	x	x	x
pigs 6—9 years old	1	0.2	x	x	x	2	0.5	x	x	x
pigs over 9 months	—	—	—	—	—	3	0.9	x	x	x
Pigs — total [2]	71	3.7	8.4	440.4	23.4	170	9.6	19.6	894.7	50.5
lambs up to 1 year old	3	0.1	x	x	x	3	0.2	x	x	x
sheep	—	—	—	—	—	1	0.1	x	x	x
Sheep — total	3	0.1	0.3	18.6	0.9	4	0.3	0.5	21.1	1.6
Goats	2	0.2	0.3	12.4	1.0	3	0.2	0.5	15.8	1.1
hens	188	0.6	x	x	x	528	1.6	x	x	x
cocks	19	0.1	x	x	x	241	0.7	x	x	x
chickens	423	0.4	x	x	x	1441	1.4	x	x	x
Poultry — total	630	1.1	2.8	3808.2	6.5	2210	3.7	8.1	11631.55	19.7
Total	x	44.6	100 %	x	x	x	48.9	100 %	x	x
Grand total	x	293.9	100 %	x	68.1	x	221.3	100 %	x	48.0

Source: County Planning Commission in Inowrocław 1958, 1960.

[1] 2 cows owned by State Forestry Rożniaty,

[2] 3 hogs owned by State Forestry Rożniaty employees.

Specification	Sławsko village						Rzepiszyn village					
	Yield q per ha	Production q	Production in grain units	% gross production	% branch production	% given group	Yield q per ha	Production q	Production in grain units	% gross production	% branch production	% given group
Gross production	x	x	30937	100	x	x	x	x	3521	100	x	x
I. Plant production	x	x	23466	75.9	100	x	x	x	3008	85.4	100	x
A. Food crops	x	x	8418	27.2	35.9	100	x	x	1182	33.6	39.3	100
a. Grains	x	x	6545	21.1	27.9	77.8	x	x	614	17.4	20.4	52.0
wheat	28	2569	2569	8.3	10.9	30.5	28	316	316	9.0	10.5	26.7
rye	29	3296	3296	10.6	14.1	39.2	26	224	224	6.4	7.5	19.0
barley	23	675	675	2.2	2.9	8.0	25	66	66	1.8	2.2	5.6
peas, beans	16	3	5	0.02	0.02	0.06	18	5	8	0.2	0.2	0.7
b. Roots and vegetables	x	x	1717	5.6	7.3	20.3	x	x	476	13.6	15.8	40.2
cabbage	280	350	53	0.2	0.2	0.6	280	137	21	0.6	0.7	1.8
onions	200	184	55	0.2	0.2	0.64	200	130	39	1.1	1.3	3.3
carrots	220	257	39	0.1	0.2	0.5	220	84	13	0.4	0.4	1.1
beetroot	210	239	36	0.1	0.1	0.4	200	80	12	0.3	0.4	1.0
cucumbers	200	194	58	0.2	0.3	0.7	200	80	24	0.7	0.8	2.0
tomatoes	250	290	87	0.3	0.4	1.0	250	125	38	1.1	1.3	3.2
potatoes	160	5557	1389	4.5	5.9	16.5	170	1316	329	9.4	10.9	27.8
c. Fruits (diverse)	130	390	156	0.5	0.7	1.9	130	229	92	2.6	3.1	7.8
B. Fodder crops	x	x	7302	23.6	31.1	100	x	x	1106	31.4	36.8	100
a. Grains	x	x	801	2.6	3.4	11.0	x	x	91	2.6	3.0	8.2
oats	24	425	425	1.4	1.8	5.8	26	91	91	2.6	3.0	8.2
corn mixtures	—	—	—	—	—	—	—	—	—	—	—	—
fodder lupine	21	21	32	0.1	0.1	0.5	—	—	—	—	—	—
serradella	10	172	344	1.1	1.5	4.7	—	—	—	—	—	—
b. Succulent foods	x	x	2620	8.5	11.2	35.9	x	x	499	14.2	16.7	45.1
fodder roots	350	581	58	0.2	0.2	0.8	—	—	—	—	—	—
potatoes	160	7392	1848	6.0	7.9	25.3	170	1759	440	12.5	14.7	39.8
sugar beet (foliage)	100	6941	694	2.2	3.0	9.5	100	590	59	1.7	2.0	5.3
mangolds (foliage)	120	199	20	0.08	0.08	0.3	—	—	—	—	—	—
c. Rough fodder	x	x	3881	12.5	16.5	53.1	x	x	516	14.6	17.1	46,7
maize (green)	600	216	28	0.1	0.1	0.4	—	—	—	—	—	—
clover (green)	200	3020	453	1.5	1.9	6.2	210	181	27	0.8	0.9	2.4
lucerne (green)	350	2926	439	1.4	1.82	6.0	350	88	13	0.4	0.4	1.2
serradella (hay)	30	1033	310	1.0	1.3	0.2	—	—	—	—	—	—
vetch (green)	250	250	33	0.1	0.1	0.5	—	—	—	—	—	—
leguminous mixtures	350	10567	1374	4.4	5.9	18.8	350	2755	358	10.1	11.9	32.4

fodder lupine	650	650	85	0.3	0.4	1.2	—	—	—	—	—	—
meadows	26	149	60	0.2	0.3	0.8	28	21	8	0.2	0.2	0.7
spring cereals straw	22	3589	538	1.7	2.3	7.3	23	362	54	1.5	1.8	4.9
winter cereals straw	28	5558	556	1.8	2.4	7.6	28	557	56	1.6	1.9	5.1
d. Pastures	18	18	5	0.02	0.02	0.1	—	—	—	—	—	—
C. Industrial crops	x	x	7746	25.1	33.0	100	x	x	720	20.4	23.9	100
potatoes [1]	160	1536	384	1.3	1.6	5.0	170	374	94	2.6	3.1	13.1
malting barley [1]	23	2512	2512	8.1	10.7	32.4	23	221	221	6.3	7.3	30.7
sugar beet	200	13882	3471	11.2	14.8	44.8	200	1180	295	8.4	9.8	41.0
flax	20	64	64	0.2	0.3	0.8	20	10	10	0.3	0.3	4.4
poppy	16	36	72	0.3	0.3	0.9	16	16	32	0.9	1.1	1.4
hemp	60	60	42	0.1	0.2	0.5	—	—	—	—	—	—
coriander	25	180	360	1.2	1.5	4.7	27	34	68	1.9	2.3	9.4
chicory	180	3364	841	2.7	3.6	10.9	—	—	—	—	—	—
II. Animal production	x	x	7471	24.1	100	x	x	x	513	14.6	100	x
a. Milk (l per head)	x	453100	3458	11.2	46.3	100	x	30200	228	6.5	44.4	100
cow milk	2700	413100	3098	10.0	41.5	89.6	2700	29700	223	6.3	43.4	97.8
goat milk	500	4000	360	1.2	4.8	10.4	500	500	5	0.2	1.0	2.2
b. Meat-stock (live weight) kg/head	x	63280	3327	10.7	44.5	100	x	4247	226	6.4	44.1	100
beef	450	9900	594	1.9	7.9	17.8	450	900	54	1.5	10.5	23.9
veal	40	3360	202	0.7	2.7	6.1	40	240	14	0.4	2.7	6.2
pork	100	47000	2350	7.6	31.5	77.0	100	2800	140	4.0	21.3	62.0
mutton	40	520	31	0.1	0.4	0.9	40	40	2	0.1	0.4	0.9
hens	2	1210	73	0.2	1.0	2.2	2	110	7	0.2	1.4	3.1
chickens	1	1290	77	0.2	1.0	2.3	1	157	9	0.2	1.8	3.9
c. Eggs (ps/head)	120	230760	577	1.9	7.7	100	120	20880	52	1.5	10.1	100
d. Wool	3.5	273	109	0.3	1.5	100	3.5	17.5	7	0.2	1.4	100

Productivity per 1 ha of agricultural acreage

Specification	Grain units	Specification	Grain units
Plant production	35.4	Plant production	38.0
Animal production	11.3	Animal production	6.4
Total	46.7	Total	44.4
Per 1 person employed in agriculture	140.0	Per 1 person employed in agriculture	39.6

[1] Industrial part of the production of potatoes and barley estimated on the average for Inowroclaw (10.6% of the total production of potatoes, 78.8 of the barley).

Source: County Planning Commission data. 1958 and 1960.

Table 9

Gross Production.
State Farming

Specification	State Farm Kobylniki						State Farm Rożniaty					
	Yield q per ha	Production q	Product. in big animal units	% gross production	% branch production	% given group	Yield q per ha	Production q	Product. in big animal units	% gross production	% branch production	% given group
Gross production	x	x	20742	100	x	x	x	x	21538	100	x	x
I. Crop production	x	x	14771	71.2	x	x	x	x	16518	76.7	x	x
1. State farm	x	x	14156	68.2	100	x	x	x	15633	72.6	100	x
A. Food crops	x	x	4414	21.3	31.2	100	x	x	5311	24.7	34.0	100
a. grains	x	x	2968	14.3	21.0	67.3	x	x	5076	23.6	32.5	95.5
wheat	28	1512	1512	7.3	10.7	34.3	36	2268	2268	10.5	14.5	42.7
rye	24	1128	1128	5.4	8.0	25.6	42	2184	2184	10.2	14.0	41.1
barley	22	125	125	0.6	0.9	2.8	33	394	394	1.8	2.5	7.4
peas, beans	15	135	203	1.0	1.4	4.6	17	153	230	1.1	1.5	4.3
b. Roots and vegetables	x	x	563	2.7	4.0	12.7	180	938	235	1.1	1.5	4.5
cabbage	280	112	17	0.08	0.1	0.4	—	—	—	—	—	—
onions	230	138	41	0.2	0.3	0.9	—	—	—	—	—	—
carrots	220	154	23	0.1	0.2	0.5	—	—	—	—	—	—
beetroots	200	100	15	0.07	0.1	0.3	—	—	—	—	—	—
cucumbers	210	63	19	0.08	0.1	0.4	—	—	—	—	—	—
tomatoes	240	120	36	0.17	0.3	0.8	—	—	—	—	—	—
potatoes	160	1648	412	2.0	2.9	9.4	180	938	235	1.1	1.5	4.5
c. fruits (diverse)	140	2208	883	4.3	6.2	20.0	—	—	—	—	—	—
B. Fodder crops	x	x	7597	36.6	53.7	100	x	x	7166	33.3	45.8	100
a. Grains	x	x	897	4.3	6.3	11.8	x	x	935	4.3	6.0	13.0
oats	25	825	825	4.0	5.8	10.8	26	520	520	2.4	3.3	7.2

mixed corn	—	—	—	—	—	—	20	151	151	0.7	1.0	2.1
serradella	12	36	72	0.3	0.5	0.9	12	132	264	1.2	1.7	3.7
b. succulent fodders	x	x	1426	6.8	10.1	18.7	x	x	994	4.6	6.4	13.9
fodder roots	350	4900	490	2.4	3.5	6.4	350	3500	350	1.6	2.2	4.9
potatoes	160	2208	552	2.6	3.9	7.3	180	1240	310	1.5	2.0	4.3
sugar beet (foliage)	90	2160	216	1.0	1.5	2.8	80	2140	214	1.0	1.4	3.0
mangolds (foliage)	120	1680	168	0.8	1.2	2.2	120	1200	120	0.5	0.8	1.7
c. rough forage	x	x	5274	25.5	37.3	69.5	x	x	5237	24.4	33.4	73.1
maize (green)	700	4200	546	2.6	3.9	7.2	700	1400	182	0.8	1.2	2.5
clover (green)	230	3220	483	2.3	3.4	6.4	230	6900	1035	4.8	6.6	14.4
lucerne (green)	360	15480	2322	11.2	16.4	30.6	360	10800	1620	7.5	10.3	22.6
serradella (hay)	30	180	54	0.3	0.4	0.7	30	660	198	0.9	1.3	2.8
field pea (green)	—	—	—	—	—	—	200	3400	442	2.1	2.8	6.2
leguminous mixtures	350	6650	865	4.2	6.1	11.4	—	—	—	—	—	—
fodder lupine	—	—	—	—	—	—	450	1958	255	1.2	1.6	3.6
meadows	32	910	364	1.8	2.6	4.8	63	1615	646	3.0	4.1	9.0
spring cereals straw	22	1694	254	1.2	1.8	3.3	22	2066	310	1.5	2.0	4.3
winter cereals straw	27	2187	219	1.1	1.5	2.9	28	2940	294	1.4	1.9	4.1
pastures	18	557	167	0.8	1.2	2.2	27	849	255	1.2	1.6	3.6
C. Industrial crops	x	x	2145	10.3	15.1	100	x	x	3156	14.6	20.2	100
potatoes [1]	160	464	116	0.5	0.8	5.4	180	252	63	0.3	0.4	2.0
malting barley [1]	22	469	469	2.3	3.3	21.9	33	1465	1465	6.8	9.4	46.4
sugar beet	180	4320	1080	5.2	7.6	50.3	160	4280	1070	4.9	6.8	33.9
rapeseed	17	170	340	1.6	2.4	15.9	17	255	510	2.4	3.3	16.2
flax	20	140	140	0.7	1.0	6.5	—	—	—	—	—	—
root crop seedlings	—	—	—	—	—	—	4	24	48	0.2	0.3	1.5
2. State Farm workers' allotment	x	x	615	3.0	100	x	x	x	802	3.7	100	x
A. Food crops	x	x	385	1.9	62.6	100	x	x	480	2.2	59.9	100
a. vegetables	200	624	125	0.6	20.3	32.5	200	600	120	0.5	15.0	25.0
b. potatoes	160	1040	260	1.3	42.3	67.5	180	1440	360	1.7	44.3	75.0

Table 9a

Stale Farming

Specification	State Farm Kobylniki						State Farm Rożniaty					
	Yield q per ha	Production q	Product. in big animal units	% gross production	% branch production	% given group	Yield q per ha	Production q	Product. in big animal units	% gross production	% branch production	% given group
B. Fodder crops	x	x	230	1.1	37.4	100	x	x	322	1.5	40.1	100
a. potatoes	160	720	180	0.9	29.3	78.3	180	1080	270	1.3	33.7	83.8
b. oats	25	50	50	0.2	8.1	21.7	26	52	52	0.2	6.4	16.2
3. State Forestry workers' allotments				x	x	x	x	x	83	0.4	100	x
A. Food crops	x	x	x	x	x	x	x	x	53	0.25	63.9	100
a. barley	x	x	x	x	x	x	28	10	10	0.05	12.0	18.9
b. vegetables	x	x	x	x	x	x	200	66	13	0.06	15.7	24.5
c. potatoes	x	x	x	x	x	x	180	90	23	0.11	27.7	43.4
d. fruits	x	x	x	x	x	x	140	17	7	0.03	8.5	13.2
B. Individual crops	x	x	x	x	x	x	x	x	30	0.14	36.1	100
a. sugar beet	x	x	x	x	x	x	160	120	30	0.14	36.1	100
II. Animal Production	x	x	5971	28.8	100	x	x	x	5020	23.3	100	x
1. State Farm	x	x	4608	22.2	100	x	x	x	3091	14.4	100	x
a. Milk (1 per head) cow-milk	3000	252000	1890	9.1	41.0	100	3000	183000	1373	6.4	44.5	100
b) Meat stock (live weight kg/head)	x	34930	1865	9.0	40.5	100	x	24110	1270	5.9	41.0	100
beef	450	5850	351	1.7	7.6	18.8	450	4050	243	1.1	7.8	19.1
veal	40	1840	110	0.5	2.4	5.9	40	1280	77	0.4	2.5	6.1
pork	100	23000	1150	5.6	25.0	61.7	100	1770	885	4.1	28.6	69.7
mutton	40	4240	254	1.2	5.5	13.6	40	1080	65	0.3	2.1	5.1

c. Wool	4	2132	853	4.1	18.5	100	4	1120	448	2.1	14.5	100
2. State Farm workers' allotments	x	x	1363	6.6	100	x	x	x	1929	8.9	100	x
a. Milk[2] (litres)	x	100900	758	3.7	55.5	100	3200	90600	682	3.2	35.4	100
cow milk	2700	99900	749	3.61	54.9	98.8	2700	89100	668	3.1	34.7	97.9
goat milk	500	1000	9	0.05	0.6	1.2	500	1500	14	0.1	0.7	2.1
b. Meat-stock[3] (kg live/weight)	x	10285	545	2.6	40.1	100	x	20959	1083	5.0	56.1	100
beef	450	2250	135	0.65	10.0	24.8	450	2250	135	0.6	7.0	12.5
veal	40	520	31	0.15	2.3	5.7	40	520	31	0.1	1.6	2.8
pork	100	7100	355	1.7	26.0	65.1	100	16700	835	3.9	43.3	77.1
mutton	40	40	2	0.01	0.2	0.4	40	40	2	0.01	0.1	0.2
hens	2	122	7	0.03	0.5	1.3	2	460	28	0.1	1.4	2.6
chickens	1	235	15	0.07	1.1	2.7	1	865	52	0.3	2.7	4.8
c. Wool	3.5	10.5	4	0.02	0.3	100	3.5	14	6	0.03	0.3	100
d. Eggs (pieces)	120 szt	22560 szt	56	0.3	0.4	100	120 szt	63360 szt	158	0.7	8.2	100

Productivity per 1 ha of agricultural land

State Farm Kobylniki		State Farm Rożniaty	
Specification	grain units	Specification	grain units
Crop production	34.2	Crop production	35.8
Animal production	13.8	Animal production	10.9
Total	48.0	Total	46.7
Per 1 person employed[4] in agriculture	329.9	Per 1 person employed[4] in agriculture	245.0

[1] Industrial part of the production of potatoes and barley estimated on the average for Inowrocław county (10.6% of the production of potatoes, 78.8% of the barley)
[2] 2 cows owned by State Forestry Rożniaty employees
[3] 2 hogs owned by the State Forestry Rożniaty employees
[4] Without seasonal workers
Source: County Planning Commission in Inowrocław 1958, 1960.

units, for the Kobylniki State Farm — 57.8 units and for the Rożniaty State Farm — 37.4 units.

In connection with the higher level of mechanization, state farms have a smaller stock of horses than the individual farms.

In the villages the number of horses per 100 ha agricultural acreage fluctuates within the limits of 10—15 heads, and in the state farms from 7 to 8 heads. In the light of the demand for traction force, mechanization being incomplete, it seems that such a number is indispensable both for a proper tillage of the fields and for the care and cultivation of those crops, mainly root crops, the mechanization of cultivation and harvesting of which is difficult. A certain number of horses is also indispensable for internal transportation.

As Tables 8 and 9 indicate, the predominant element in livestock breeding on individual farms is horned stock bred mainly for the production of milk. Cows constituting on an average 65% of the total herd are predominant, the remainder being young cattle, the herd being renewed within a 5—6 year period. Only rejected and nonfertile cows which are not taken into account in renewing the herd and male calves are destined for slaughter. The average yearly milk yield of cows on the individual farms amounts to 2700 litres, on state farms — 3000 litres, with a fat content of 3.2—4%. The difference in yield results mainly from the better fodder which the state farms have at their disposal. The black-white lowland race of Dutch origin predominates The average weight of an adult individual amounts to 450 kg.

Breeding of pigs forms an important position in the livestock raising of the units discussed. The stock per 100 ha of agricultural areas amounts to 40—80 heads on the individual farms and from 45 to 60 heads on state farms.

A great many pigs are bred also by the workers of the State Farms on their lots. The Large White race, intended mainly for bacon predominates in pig breeding. The average weight of a bacon pig amounts to 100—110 kg.

Not many sheep are bred in either village (Table 6), the principal reason being almost complete absence of pasture lands. On the other hand the sheep population is quite considerable on the state farms, being 60—120 heads per 100 ha agricultural acreage. The sheep belong to the fine-fleeced Merino breed and are bred for their wool, the average yield of which amounts to from 3.5 kg to 4.0 kg yearly. Quite large amounts of poultry are bred on the individual farms. A breeding of poultry does not exist at all in the State Farms, although marked numbers of chickens are bred by the workers of the farms (Table 7).

As seen in Tables 6 and 7, the main position in the breeding of ani-

mals, both on state farms as on individual ones, calculated in terms of big animal units is occupied by cattle. It also furnishes the main productive mass in the total animal production. Milk production is predominant in the total animal production in individual farms, with a good share of meat stock, mainly pigs (Table 8). Hence, the orientation in livestock breeding is a dairy-meat one with a predominance of dairy cows and hogs. The total production of milk and meat stock in both villages amounts to about 90% of the total animal production. The remaining percentage of animal production devolves to eggs and wool.

The framework of animal production is similar in state farms, that is milk-meat with a slight predominance of dairy cows and hogs. The production of milk makes up 41.0% of the animal production in Kobylniki and 44.5% in Rożniaty, the percentage of meat is 40.5% in Kobylniki and 31.0% in Rożniaty. Wool plays the largest role in animal production in Kobylniki, amounting to almost 1/5 of the total production.

6. THE GROSS AGRICULTURAL PRODUCTION

The volume of the gross production and the orientations of agricultural production of the terrains investigated are presented in Tables 8 and 9. The material compiled in the Tables was based on statistics data supplemented by estimative data and on interviews.

As seen in the tables presented, productivity in both the farming sectors is high. The highest productivity of the units examined in attained by the State Farms of Kobylniki — 48.0 grain units per 1 ha, the lowest by the village of Rzepiszyn — 41.4 units, the average productivity of state farms being slightly higher than that of the individual farms. Plant production is predominant in all the farms on the terrain discussed, constituting 75.9%—85.4% of the gross agricultural production in individual farms and 71.2%—76.7% in the state farms. The highest percentage in plant production is attained in the village Rzepiszyn and in animal production in the State Farm in Kobylniki — 28.8%.

It may hence by assumed on the basis of calculations continued in Tables 7 and 8 that the farming orientation can be defined there as follows.

Sławsko — fairly productive, vegetable, fodder — food — industrial, rye — fodder mixtures — sugar beet with dairy cattle orientation — $4 \times V_3 (a_1 ry + f_2 mx + i_1 bs) + A_1 (cd)\, lm$.

Rzepiszyn — fairly productive, highly vegetable, food-fodder-industrial, wheat — potato — fodder mixtures — sugar beet orientation — $4 \times V_4 (a_1 wh + f_1 pt, mx + i_1 bs)$.

State Farm Kobylniki — highly productive, vegetable, food-fodder, wheat — lucerne with dairy cattle orientation — $5 \times V_3(a_1wh + f_1lc) + A_1\,(cd)\,lm$.

State Farm Rożniaty — fairly productive, vegetable, food-fodder, wheat — rye — lucerne with dairy cattle orientation — $4 \times V_3(a_1wh, ry + f_1lc) + (cd)\,lm$.

Recapitulating, one must assert that the areas studied on a Polish background are featured by a highly diversified farming of high productivity and marked commercial production. This concerns both individual farming as well as that of the state one which show a fairly equal level of farming.

There are large differences, however, in the labour efficiency between the individual farms and the state farms, which is defined approximately by the number of grain units per one person employed in agriculture. It amounts to about (140) in the village of Sławsko and it is considerably lower in the village of Rzepiszyn (40) whereas in the state farm the labour efficiency is noticeably higher, amounting to over (300) in Kobylniki and about (250) grain units per one person employed in Rożniaty. Attention must by called to the fact that calculations were made in the state farms on the basis of workers permanently employed only, owing to the absence of data on those employed seasonally. Taking into account workers seasonally employed would make the labour output slightly lower.

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THE COMMUNE OF MIŁOGOSZCZ ON THE POMERANIAN BALTIC SEA COAST

The Miłogoszcz commune occupies the north-eastern part of the Koszalin county [1]. It covers an area of 5.293.77 ha. Six State Farms and six villages belong this administrative unit [2].

The present report covers six economic units with a total area of 1.916.25 ha. The State economy is represented by the State Farms Gąski, Kładno and Pleśnia (total area 1.135.01 ha) and individual farming by the villages Gąski, Kładno and Śmiechów (total area 781.24 ha Table 1). The selected agricultural units border on each other and are situated in the northern part of the Miłogoszcz commune. The area under investigation borders on the Baltic in the north, on the Kołobrzeg county in the west, the Sarbinowo commune (Koszalin county) in the east, and other units belonging to the Miłogoszcz commune in the south.

The area under investigation is situated 15 to 20 km from Koszalin, a voivodship and county town. A railway line and a good high road (Koszalin-Kołobrzeg) runs through the village commune, parallel to each other. There are several bus stops in the Miłogoszcz commune and also two railway stations. These two main lines of communication are linked up with a well developed network of roads within the Miłogoszcz commune. Most of these roads are hard surfaced, so that

[1] Survey in the district of Koszalin was conducted by the Department of Agricultural Geography of the Institut of Geography, Polish Academy of Sciences 1958, under the direction of the present author. The Miłogoszcz, commune was surveyed and mapped by Miss Irena B a t o g o w s k a.

[2] Data for 1958, Central Statistical Office, Agricultural census.

they are suitable for any traffic, even big agricultural combines. Summing up, it can be said that the Miłogoszcz commune is in a good situation as regards administrative and transport conditions.

Table 1

The division of land according to ownership relations

Name of the unit	Number of farm units	Total area in ha	% of the total area
A. Total Koszalin District	5089	134332.00	100.0
I. State property (total)	126	101314.00	75.4
1. State Farms	70	33646.00	25.0
II. Individual property (total)	4963	33018.00	24.6
B. Miłogoszcz Commune (total)	14	5293.77	100.0
I. State property (total)	8	3853.16	72.7
1. State Farms property (total)	6	2339.84	44.1
a. Gąski State Farm	1	372.76	7.0
b. Kładno State Farm	1	443.16	8.4
c. Pleśnia State Farm	1	319.09	6.0
Total of State Farms under survey	3	1135.01	21.4
II. Individual property (total)	6	1440.61	27.3
a. Village of Gąski	1	299.95	5.8
b. Village of Kładno	1	112.14	2.1
c. Village of Śmiechów	1	369.15	6.9
Total of villages under survey	3	781.24.	14.8
Total area under survey	6	19.16.25	36.2

Source: Agricultural Census, 1958. Data from the County Planning Commission Koszalin.

1. NATURAL CONDITIONS

From the point of view of the physical setting, the area under survey is a part of the Slovinian Coastal Region, situated between the mouth of the Odra and that of the Vistula, and forming a narrow lowland belt. Within the investigated area the coastal lowland stretches some 20—30 km inland. It is formed from ground moraines and constitutes a plain with a flat or slightly undulating surface, rising 1 to 60 m above sea level [3].

The climate of the coastal region is definitely influenced by the

[3] S. Lencewicz, Geografia Fizyczna Polski, Warsaw, 1955, pp. 179—181.

ocean. The annual difference in the maximum and minimum temperatures is comparatively the lowest in this region (17.79, although it is higher in the localities situated farther from the sea (19.6°) [4]. The daily fluctuations of temperature are also the lowest in the coastal region. There are much fewer frosty days and slight morning frosts on the sea coast than in the southern part of the same district. In Koszalin there are about 70 days of frost annually, and farther to the south the winter in longer by 7—13 or even 25 days. In the coastal lowland the incidence of slight morning frosts ends the earliest in the whole district (at the end of May) in Spring, and come back the latest in Autumn (early November). Autumn is long and warm. The average temperature of the coldest month (February) is — 1.0°C, and that of the warmest month (July) is + 16.8°C. The vegetation season is over 15 days longer in the lowland than in the area of terminal moraines, and it lasts for 240 days with a temperature over +3°C, and the so called small season of vegetation (temperature over +5°C) lasts for 212 days. Field work in the lowlands begins in the second half of March. Thus the termic conditions of the area under survey should be evaluated as mild, and favourable for plant vegetation.

Rainfalls are frequent and abundant. The longest periods of draught occur in May and June. But as dew falls most frequently in the coastal region, the possible lack of rainfalls during drier periods is made good by the dew and the plants have better conditions of growth than in the regions situated farther from the sea. The annual rainfall is over 600 mm (Kolobrzeg 626 mm, Koszalin 687 mm). July and August are the wettest months and March is the driest [5]. The distribution of rainfall does not favour field work in the time of cereal harvesting, but is very advantageous for the cultivation of root crops, and grasslands which need humidity precisely in the summer months. Harvest time is comparatively late, coming on the average from August 25th to 31st. In all, the climatic conditions of the area under survey should be evaluated as advantageous for agriculture, particularly stock breeding.

The coastal lowland has the best soils in the whole Koszalin voivodship. Brown forest soils and podzolic soils [6] prevail in the area under survey, their distribution depending on whether broad-leaved or coniferous forests once grew there. Brown soils prevail in the Kładno State

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[4] K. Prawdzic, Zarys klimatu rolniczego województwa koszalińskiego. Szczecin 1962; pp. 54—55.

[5] K. Prawdzic, Zarys klimatu rolniczego województwa koszalińskiego. Szczecin 1962; pp. 69—70.

[6] Soil Map of Poland.

Farm and Kładno village, on a clay subsoil, while podzolic soils occur in the remaining part of the investigated area. The difference existing between the two types of soils is not distinctly marked, and their agricultural value is more or less the same, because podzolic soils occur on a subsoil of slightly sandy clays. This made the process of podzolization more difficult and as a result the podzolic soils are rich in humus and contain sufficient quantities of mineral compounds. When ameliorated, both types of soil bring good yields even of plants demanding comparatively better soil.

A small strip of the coast (25 to 100 m wide) is covered by sands forming dunes and beaches. The dunes are composed of completely barren sands, only partly fixed by sanddune vegetation.

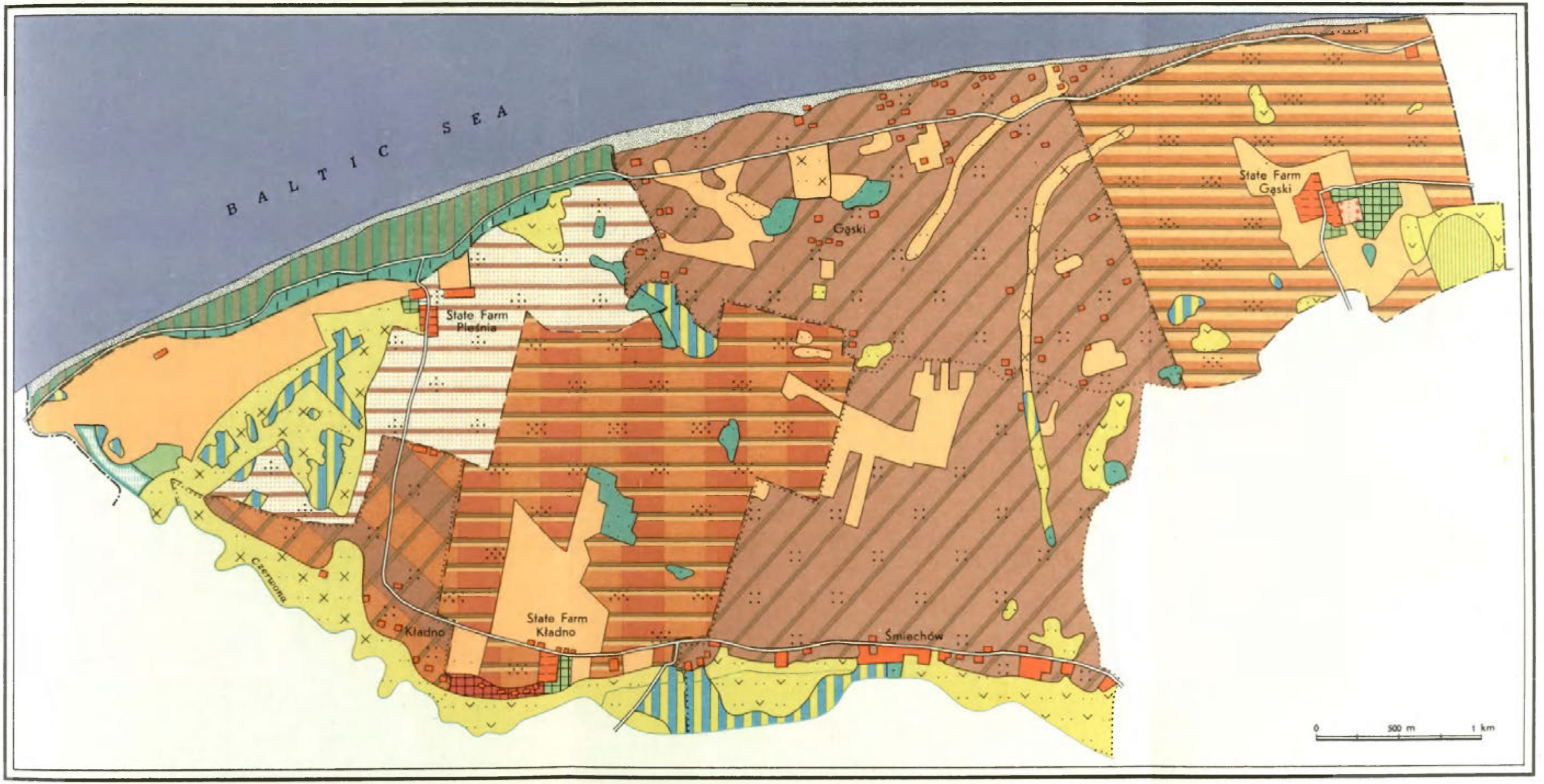
In the valley of the Czerwona stream, flowing along the southern borderline of the area under investigation, meadow peat bogs are to be found which are used as grassland, but call for systematic drainage work to prevent them from turning into swamps.

2. SOCIAL AND OWNERSHIP RELATIONS

The present structure with regard to property relations only partly reflects the pre-war situation in this area. Before the war the prevailing feature of Western Pomerania were big landed estates, so-called Junker manors, and big peasant farms (Grossbauer).

In April 1945, the territory was taken over by the Polish State administration which was faced with the most important and urgent task of efficiently conducting the settlement campaign. The northern part of the Koszalin district was the first to which the new settlers went because war damages were comparatively insignificant there. The good soils and advantageous geographical situation, near to the main transport routes, were an additional encouragement for the new settlers.

The big landed estates in western Pomerania were not parcelled out because there was sufficient farm land formerly belonging to the peasants. According to the rules of the settlement campaign a piece of land from 8 to 15 ha was to be allotted to one settler's family. Only in cases where it was impossible to divide one grossbauer farm into three parts of the required size, were they divided into two larger allotments. The small peasant farms although they were sometimes smaller than 8 hectares, were allotted to one settler each, because of the investments that had gone into them in the form of farm buildings and equipment. The former Junker estates became State Farms. As a result, the present property relations and the structure of farms with regard



Map 1. The commune of Mielęgoszcz. Land utilization map

to their size in the area under survey, as in the whole of Western Pomerania, is the result of the pre-war structure, of the 1945 land reform and of the subsequent settlement campaign.

In the Koszalin district State ownership is the dominating feature, although the area belonging to the State Farms (25%) is more or less the same as that belonging to individual farmers, (24.6% of the total district area). In the Miłogoszcz commune the State Farms prevail to an ever greater degree (44.1%), occupying more land than individual farms. All the State Farms dealt with in the present report, namely Gąski, Kładno and Pleśnia, are situated within the boundaries of the pre-war landed estates. The size of State Farms on the territory under survey (see Table 1) is smaller than the county average (480.6 ha), this being the result of of more favourable natural conditions, reflected in the higher percentage of arable land in these State Farms than in those situated in the southern part of the district, on the ridges of terminal moraines. In these conditions, the farms seem to be the proper size, because with the present level of mechanization, it guarantees the possibility of independent farming, and if work is properly organized, crop cultivation and stock breeding on a wide scale is possible.

On the other hand, there are more noticeable differences in the size of particular villages (see Table 1). This is the result of the historical process of settlement in this area. Nothing has been changed in this respect, apart from the distribution of land within the village itself.

As can be seen from Table 2, medium-size farms (from 7 — to 10 ha) dominate in the villages Gąski and Śmiechów, both as regards the area they occupy and the number of farms; but in addition Śmiechów also has quite a large number of big farms (10—15 ha.). The situation is similar in the whole Miłogoszcz commune and indeed in the whole Koszalin county. The village of Śmiechów is a good example of the average village of this region. The village of Kładno has a somewhat different structure, big farms (10—15 ha) decidedly predominating, and medium-size farms coming next. The number of smaller farms (5—7 ha) is insignificant, only in the village Gąski there are a few more of them, and also of very small farms (2—5 ha). There are only a few dwarf farms (0—2 ha) in these villages, as in the whole commune, and they occupy a quite insignificant area. The investigation has revealed that dwarf farms are not, as a rule, owned by farmers, but by teachers, workers of the village people's councils, fishermen etc. Thus they cannot be regarded as farms in the proper meaning of the word but rather as allotments bringing additional income to people working outside agriculture.

Size of Individual

Size groups of land holdings	Gąski — village				Kładno — village			
	Number		Area		Number		Area	
	number	%	ha	%	number	%	ha	%
0 — 2 ha	3	6.7	3.90	1.3	1	7.7	1.85	1.6
2 — 5 ha	9	20.0	24.25	8.1	1	7.7	3.50	3.2
5 — 7 ha	6	13.3	35.30	11.8	1	7.7	5.00	4.5
7 —10 ha	24	53.3	200.45	66.8	4	30.8	33.47	29.8
10 —15 ha	3	6.7	36.05	12.0	6	46.1	68.32	60.9
15 —20 ha	—	—	—	—	—	—	—	—
over 20 ha	—	—	—	—	—	—	—	—
Total	45	100.0	299.95	100.0	13	100.0	112.14	100.0

Source: Agricultural Census, 1958.

Land fragmentation in the area under survey is insignificant. As a rule, the settlers have a farm composed of one, and more seldom of two allotments. As a result, according to the type of settlement, either the allotment or the colony pattern dominates. The colony type, connected with dispersed settlement, is based on the former structure, only rarely being the result of recent division of land. The allotment type is most often the result of division of grossbauer farms, and only in single cases is it a form that has survived from the pre-war times.

Altogether, the above agrarian structure is rather typical of the Polish western and northern regions. After the withdrawal of the Germans, these regions were populated with people who came from various parts of Poland and settled there. According to L. Kosiński [7], over one third of the rural population in the Koszalin county arrived from the south-eastern voivodships (Rzeszów, Kielce, Lublin voivodships), some 15% each from the central (Warsaw and Łódź) and the neighbouring western voivodships (Bydgoszcz and Poznań), while the remaining 20% came from the territories now belonging to the USSR.

3. UTILIZATION OF LAND

As shown by Table 3, in all the economic units of the area under survey it is arable land that dominates, its percentage being different

[7] L. Kosiński, Pochodzenie terytorialne ludności Ziem Zachodnich w 1950 r. Dokum. geogr. 1960, v. 2.

Table 2

land holdings

Śmiechów — village				Vilages under survey				Miłogoszcz Commune		Koszalin County	
Number		Area		Number		Area		%		%	
number	%	ha	%	number	%	ha	%	of numb.	of area	of numb.	of area
4	7.8	6.05	1.6	8	7.3	11.80	1.5	9.0	1.4	17.3	2.5
10	19.7	24.75	6.7	20	18.3	52.50	6.7	21.0	8.5	18.3	8.4
4	7.8	20.25	5.6	11	10.2	60.55	7.8	11.5	8.2	42.3	49.2
20	39.2	161.50	43.7	48	44.0	395.42	50.6	35.0	39.2		
12	23.5	136.60	37.0	21	19.3	240.97	30.8	19.0	32.5	22.0	39.5
1	2.0	20.00	5.4	1	0.9	20.00	2.6	4.5	10.2		
—	—	—	—	—	—	—	—	—	—	0.1	0.4
51	100.0	369.15	100.0	109	100.0	781.24	100.0	100.0	100.0	100.0	100.0

Source: Agricultural Census, 1958.

in various farms, but in most cases higher than the average for the Koszalin county and Koszalin voivodship. On an average, the percentage of arable land is higher in individual farms than on the State Farms. The highest percentage of arable land is that in the village of Śmiechów (77.8%) and Gąski (77.5%), and in the Gąski State Farm (71.8%).

Next in importance are pastures and meadows, but their share is more varied in particular farms. The area under survey is almost completely devoid of orchards and forests.

a. Arable Land

The decisive predominance of arable land in the whole area under cultivation determines the agricultural character of the investigated territory.

As can be seen from Table 4 and 5, 100% of arable land is under crops. As there are no after crops, because of the late harvest time, the area under crops is equal to that of arable land.

The investigation has proved that some uniform methods of land cultivation are only gradually coming into being in this part of the Koszalin district. There are several reasons for this. Although this region was populated relatively early, it was impossible to avoid fluctuations of settlers and of State Farm managers. Individual farmers started work according to traditional methods they brought with them, methods that did not always suit the new natural conditions. It was only gradually, after years of trials and errors, that the farmers learned

Land

Specification	Total area		Arable land		Orchards	
	ha	%	ha	%	ha	%
State Farms						
— Gąski	372.76	100	267.69	71.8	4.28	1.2
— Kładno	443.16	100	305.96	69.0	—	—
— Pleśnia	319.09	100	145.16	45.5	—	—
Total	1135.01	100	718.81	63.3	4.28	0.4
Villages						
— Gąski	299.95	100	232.25	77.5	—	—
— Kładno	112.14	100	72.11	64.3	1.50	1.3
— Śmiechów	369.15	100	287.42	77.8	0.45	0.1
Total	731.24	100	591.78	75.7	1.95	0.2
Total area under survey	1916.25	100	1310.59	68.4	6.23	0.3
Miłogoszcz Commune	5293.77	100	2596.80	49.1	36.70	0.7
Koszalin County	134332.0	100	50994.00	38.0	308.00	0.2

Source: Agricultural Census, 1958.

by experience how to adapt their methods of farming to the new natural conditions. But this process often resulted in the deterioration of habitats. This adverse phenomenon was particularly evident in the village of Gąski.

In the period when the survey was being made, most of the individual farmers had adopted the four- and five-year crop rotation, and if leguminous plants were to be included in the rotation, the period was prolonged to six years. Below are some typical crop rotation successions:

1 root crops ++	1 root crops ++	1 root crops ++
2 wheat	2 spring crops	2 spring crops
3 oats, barley	3 papilionaceous	3 papilionaceous
4 rye	4 wheat	4 wheat
	5 rye	5 leguminous
		6 rye

This rotation is quite rational and apart from the excessive share of cereals, well adapted to the local natural conditions.

It may be said, in general that the land farmed by individual farmers is well cultivated. Ploughing is done in due time, often with tractors hired from the State Farms. For instance, 90% of ploughing in the village of Kładno and 50% in the village of Śmiechów is done by tractor. All the other field work, like sowing, and harvesting, is mechanized, although horses are often used as draft power. Manuring of land is adequate, amounting to 30 t/ha. Also mineral fertilizers are used

Table 3

utilization

Meadows		Pastures		Forests		Built up areas		Unproductive land	
ha	%	ha	%	ha	%	ha	%	ha	%
3.00	0.8	44.78	12.0	12.31	3.3	6.70	1.8	34.00	9.1
26.09	5.9	61.35	13.8	13.38	3.0	7.30	1.6	29.05	6.6
60.02	18.8	68.68	21.5	4.45	1.4	5.51	1.7	35.26	11.1
89.11	7.9	147.81	15.4	30.14	2.6	19.51	1.7	98.31	8.7
10.64	3.5	38.60	12.9	—	—	11.80	3.9	6.66	2.2
15.40	13.7	14.65	13.2	0.16	0.1	8.32	7.4	—	—
36.10	9.8	24.78	6.7	1.60	0.4	12.20	3.4	6.60	1.8
62.14	8.0	78.03	10.0	1.76	0.2	32.32	4.2	13.26	1.7
151.25	7.9	252.84	13.2	31.90	1.7	51.83	2.7	111.57	5.8
405.36	7.6	435.80	8.2	136.20	2.6	698.98	13.2	983.93	18.6
9560.00	7.1	7270.0	5.4	44924.0	33.4	15175.0	11.3	6101.0	4.6

in comparatively high quantities, on an average, 100 kg/ha of nitrogen and phosphorous fertilizers and 150 kg/ha of potash fertilizers. Tilling is well done, and the autumn post-harvest skimming satisfactory, winter ploughing being generally applied.

It results from an analysis of Table 4 that in individual farming, extractive crops dominate, above all cereals (over 60 of arable land). Rye is the most important item in this group, the village of Kładno being the only one where wheat occupies almost the same area as rye. Oats are another important item, occupying 25% of the area under extractive crops.

Over 25% of arable land is destined for intensifying crops. Here potatoes are the most important item, followed by flax and fodder root crops.

Structure farming plants are sown in small quantities, mixtures of the leguminous plants and clover being the main crops.

Analysis of the in individual farms has revealed the following orientations in utilizing arable land:

1) the definitely extractive orientation with intensifying plants: rye and potatoes being the main crops ($E_4ry + I_1pt$) in the villages of Gąski and Śmiechów;

2) the definitely extractive orientation with intensifying plants, rye, wheat and potatoes being the main crops ($E_4ry,wh + I_1pt$) in the village of Kładno.

Table 4

Agricultural land utilization. Individual farming

Specification	Gąski				Kładno				Śmiechów			
	ha	%			ha	%			ha	%		
		Arable land	Agricultural land	Given group		Arable land	Agricultural land	Given group		Arable land	Agricultural land	Given group
I. Arable land	232.25	100.0	82.5	x	68.66	100.0	68.5	x	286.52	100.0	82.4	x
A. Extractive crops	149.20	64.2	53.0	100.0	47.79	69.6	47.7	100.0	188.65	65.9	54.2	100.0
winter wheat	8.30	3.6	2.9	5.6	14.18	20.7	14.1	29.7	39.50	13.9	11.4	20.9
rye	68.60	29.5	24.5	46.0	17.96	26.2	18.0	37.6	71.20	24.8	20.4	37.7
spring wheat	22.60	9.7	8.0	15.2	1.40	2.0	1.4	2.9	13.50	4.7	3.9	7.2
spring barley	15.40	6.6	5.5	10.3	0.55	0.8	0.5	1.1	10.40	3.6	3.0	5.5
oats	32.40	14.0	11.5	21.7	12.50	18.2	12.5	26.2	49.30	17.2	14.2	26.2
mixed corn	1.80	0.8	0.6	1.2	1.20	1.7	1.2	2.5	4.75	1.7	1.3	2.5
B. Intensifying crops	65.65	28.3	23.3	100.0	16.77	24.4	16.7	100.0	72.32	25.2	20.8	100.0
potatoes	34.55	14.9	12.3	52.6	11.24	16.4	11.2	67.0	40.47	14.2	11.7	56.0
fodder roots	9.60	4.1	3.4	14.6	4.53	6.6	4.5	27.0	8.70	3.0	2.5	12.0
vegetables	—	—	—	—	—	—	—	—	0.10	—	—	0.1
root crop seedlings	—	—	—	—	—	—	—	—	0.10	—	—	0.1
flax	15.75	6.8	5.6	24.0	0.75	1.1	0.7	4.5	19.00	6.6	5.5	26.3
sugar beet	5.75	2.5	2.0	8.8	0.25	0.3	0.3	1.5	3.95	1.4	1.1	5.5
C. Structure forming crops	17.50	7.5	6.2	100.0	4.10	6.0	4.1	100.0	25.55	8.9	7.4	100.0
clover	3.90	1.7	1.4	22.3	3.30	4.8	3.3	80.5	1.00	0.3	0.3	3.9
lucerne	—	—	—	—	—	—	—	—	—	—	—	—
serradella	2.10	0.9	0.7	12.0	—	—	—	—	—	—	—	—
field pea	0.50	0.2	0.2	2.9	—	—	—	—	—	—	—	—
vetch	0.20	0.0	0.0	1.1	—	—	—	—	1.00	0.3	0.3	3.9
leguminous mixtures	10.80	4.7	3.9	61.7	0.80	1.2	0.8	19.5	23.55	8.3	6.8	92.2
Total	232.25	100.0	82.5	x	68.66	100.0	68.5	x	286.52	100.0	82.4	x
II. Perennial crops	—	—	—	—	1.50	x	1.5	100.0	0.45	x	0.1	100.0
III. Permanent grasslands	49.25	x	17.5	100.0	30.05	x	30.0	100.0	60.88	x	17.5	100.0
meadows	10.64	x	3.8	21.6	15.40	x	15.4	51.3	36.10	x	10.4	59.3
pastures	38.60	x	13.7	78.4	14.65	x	14.6	48.7	24.78	x	7.1	40.7
Total agricultural land	281.49	x	100.0	x	100.21	x	100.0	x	347.85	x	100.0	x

Source: Agricultural Census, 1958.

The State Farms experiencing a shortage of qualified manpower have not been able to take full adventage of the local natural conditions. Attempts were made to make good this state of affairs by means of imposing production plans by central authorities. The imposed structure of crop cultivation made correct crop rotation impossible, and this, added to a general shortage of manure and fertilizers, resulted on some places in the degradation of soil. The best lands were the first to be exhausted, because extensive cultivation of cereals was carried out there for several years. As long as there was enough humus, the yields were satisfactory. At present the yields are the lowest in the Kładno State Farm, having the best soils in the whole area embraced by the present report.

It was only in 1956 that the erroneous policy towards the State Farms was given up, and they were granted some independence. At the same time the so-called management plans were drafted for the State Farms and rational crop rotation has been started.

In 1958, i. e. when the present survey was conducted, the State Farms had started elaborating plans for the rotation of crops, based on scientific principles. It was recognized that in view of the kind of soils and the amount of manure and fertilizers at the disposal of State Farms, the crop rotation cycle should embrace an eight-year period. The succession of crops in the State Farms at that time was either dictated by the current needs of the Farm or was a transition to the correct rotation. Below are examples of crops rotation applied in the Gąski and Kładno State Farms:

1) root crops ++
2) barley
3) clover, winter wheat
4) rye. rape
5) oats
6) mixtures of leguminous plants
7) wheat
8) mixed corn

1) root crops ++
2) peas
3) wheat
4) rye
5) oats
6) papilionaceous plants
7) rye
8) mixed corn

The rotations in the Pleśnia State Farm was shorter, namely:

1) root crops ++
2) spring crops
3) papilionaceous
4) rye
5) leguminous mixtures

1) root crops ++
2) spring crops
3) papilionaceous
4) rye

The field work in the State Farms is completely mechanized. Horses are only used as draft power where there is no convenient access for tractors. Mineral fertilizers are used according to the norms established

Table 5

Agricultural land utilization. State Farming

Specification	State farm Gąski				State farm Kładno				State farm Pleśnia			
	ha	%			ha	%			ha	%		
		Arable land	Agricultural land	Given group		Arable land	Agricultural land	Given group		Arable land	Agricultural land	Given group
I. Arable land	267.07	100.0	83.6	x	305.96	100.0	77.8	x	145.16	100.0	53.0	x
A. Extractive crops	98.00	36.7	30.7	100.0	139.38	45.6	35.5	100.0	42.05	29.0	15.5	100.0
winter wheat	8.00	3.0	2.6	8.2	42.00	13.7	10.6	30.2	—	—	—	—
rye	30.00	11.3	9.4	30.6	31.00	10.2	7.9	22.2	21.00	14.5	7.7	50.0
winter barley	—	—	—	—	5.00	1.6	1.3	3.6	—	—	—	—
spring wheat	30.00	11.3	9.4	30.6	—	—	—	—	5.00	3.4	1.9	11.8
spring barley	20.00	7.4	6.2	20.4	29.10	9.5	7.4	20.8	5.00	3.4	1.9	11.8
oats	10.00	3.7	3.1	10.2	11.02	3.6	2.8	7.9	—	—	—	—
mixed corn	—	—	—	—	21.26	7.0	5.5	15.3	11.05	7.7	4.0	26.4
B. Intensifying crops	66.27	24.8	20.7	100.0	81.97	26.8	20.8	100.0	26.19	18.0	9.6	100.0
potatoes	33.00	12.4	10.4	49.8	45.92	15.1	11.6	56.1	17.30	11.8	6.3	66.1
fodder roots	10.00	3.7	3.1	15.1	10.00	3.3	2.5	12.1	8.00	5.6	3.0	30.5
vegetables	1.77	0.6	0.5	2.6	1.05	0.3	0.2	1.3	0.89	0.6	0.3	3.4
rape seed	11.00	4.2	3.5	16.6	15.00	4.9	4.0	18.4	—	—	—	—
sugar beet	10.50	3.9	3.2	15.9	10.00	3.2	2.5	12.1	—	—	—	—
C. Structure forming crops	102.80	38.5	32.2	100.0	84.61	27.7	21.5	100.0	76.92	53.0	28.1	100.0
clover	53.00	19.9	16.6	51.6	42.07	13.8	10.7	49.8	—	—	—	—
lucerne	3.00	1.2	1.0	2.9	—	—	—	—	3.00	2.0	1.1	3.9
serradella	10.80	4.0	3.4	10.5	—	—	—	—	—	—	—	—
vetch	16.00	6.0	5.0	15.5	11.37	3.7	2.9	13.4	—	—	—	—
leguminous mixtures	20.00	7.4	6.2	19.5	21.17	7.0	5.4	25.0	73.92	51.0	27.0	96.1
pea	—	—	—	—	10.00	3.2	2.5	11.8	—	—	—	—
T o t a l	267.07	100.0	83.6	x	305.96	100.0	77.8	x	145.16	100.0	53.0	x
II. Perennial crops	4.28	x	1.4	100.0	—	—	—	—	—	—	—	—
III. Permanent grasslands	47.78	x	15.0	100.0	87.44	x	22.2	100.0	128.70	x	47.0	100.0
meadows	3.00	x	0.9	6.3	26.09	x	6.6	29.8	60.02	x	21.9	46.6
pastures	44.78	x	14.1	93.7	61.35	x	15.6	70.2	68.68	x	25.1	53.4
Total agricultural land	319.13	x	100.0	x	393.40	x	100.0	x	273.86	x	100.0	x

Source: Agricultural Census, 1958.

for various categories of crop (110) kg of pure compound per one hectare). Organic fertilizing is sufficient, taking into account the amount of manure and the period of rotation. The cultivation is satisfactory excessive amounts of weeds were not observed in the area under survey.

Analysis of Table 5 proves that the structure of crops differs greatly in the various State Farms. On the basis of this structure it is possible to define the orientations in the utilization of arable land prevailing in State Farms. In the Gąski State Farm the extractive and structure forming orientation with intensifying plants: wheat, clover and potatoes being the main crops ($E_2wh + I_1pt + S_2cv$); in the Kładno State Farm the extractive orientation with intensifying and structure forming crops: wheat, barley, potatoes and clover being the main items (E_3wh, $bl + I_1pt + S_1cv$); in the Pleśnia State Farm, the structure forming orientation with extractive crops; leguminous mixtures with rye being the dominating feature ($E_1ry + S_3mx$).

From the above examples it can be seen that cultivation of cereals is the dominating feature in individual farming, potatoes coming next, while in the State Farms cultivation of cereals and structure forming plants plays an equally important role.

b. Workers' Allotments

At the Kładno State Farm the workers have allotment gardens where they grow vegetables for their own needs. The total area of these allotments is about 5 ha, each one being at least 0,05 ha.

Usually there are some raspberry and currant bushes on each allotment, and sometimes a fruit tree. Apart from allotments, the workers are given field plots on which potatoes and sometimes papilionaceous plants are grown. The workers of other State Farms are also allocated plots they can cultivate themselves, the size of one plot being 0,5 ha. Apart from potatoes vegetables are cultivated there too. Every year, different parts of the fields are allocated for the workers plots. The plots are fertilized with manure from the workers own cowsheds and pigsties.

c. Perennial Crops

Analysis of the map of land cultivation and Table 3 show that there are hardly any orchards in the area under survey and those that exist occupy insignificant areas. The only large orchard is at the Gąski State Farm. It is composed of old trees mostly sour cherry, plum and apple trees, and is now used as a run out for pigs. The remaining ones are small home-yard orchards, composed of a few old sour cherry, plum and apple trees. This situation is the result of a lack of tradition, interest,

and also lack of suitable varieties of fruit trees. Experimantal work is now going on in the Koszalin voivodship to raise varieties of fruit trees and bushes best adapted to the local climatic and soil conditions. One of the experimental stations has been set up in the Miłogoszcz commune.

d. Permanent Grassland

There is a compartively large percentage of grassland in the area under survey (Table 3), but the percentage differs considerably in various farm units (from 13% to 40% of the total farm area). Pastures commonly dominate with the exception of the villages of Śmiechów and Kładno where there are more meadows than pastures.

The grassland in the area under survey occupies a well developed system of valleys and also local land depressions without surface runoff. The valleys of the rivers and streams, whose waters may flow constantly, or only occasionally, were formed in the glacial age and are pradolinas unproportionally wide in comparison to the water flowing through them at present. The valleys of the rivers are usually meadows, while depressions with seasonal streams are pastures.

The extensive flat valleys with their gentle slopes, the depressions with little or no runoff combined with abundant rainfall, have created propitious conditions for the development of peat forming processes. Thus the majority of these areas were peatbogs. Owing to the long lasting grassland management and the developed system of drainage, the vegetation of these areas has been transformed and is now similar to that of inundated post *łęg* or even post *grond* meadows. The pastures situated somewhat higher are covered with vegetation.

The poor conservation of drainage and irrigation instalations and above all the loss during the war of the schemes of underdrainage which were destroyed over an area covering 40% of the grassland, mainly because cattle was allowed to graze without control (the drains were laid too near the surface), all this has led to the meadows turning boggy again. The arable lands bordering on the damaged drainage system are getting damp and the sodden fields are gradually turning into meadows, while cultivated meadows are turning into swamps. This situation calls for a quick repair of the drainage network. But this, in turn, calls for big financial outlays and drawing up a new general plan for the whole reclaiming system. Up to 1958, the drainage system had only been repaired on meadows situated on the sector near the outflow of the Czerwona stream.

The yields of the meadows and pastures in the area under survey

depend first and foremost on the state of the reclamation system. In the villages and State Farms where subdrainage has either been repaired or preserved in good condition, the yields from two hay harvests vary from 50 to 70 q per hectare. Where the drainage system has been destroyed or damaged, two harvests bring no more than 30 q/ha of hay or even less than that. Meadows with a well preserved drainage system are fertilized with mineral fertilizers and compost, the latter only being used by some individual farmers. Hay is harvested with horse-driven-mowers and hay rakes as tractors could damage the drains.

The crops from pastures are some 20 to 30 q lower than those from meadows, as excessive grazing has caused the disappearance of high quality grasses. The pastures are not regularly fertilized.

e. Forests

The area under survey is almost devoid of forests which is in striking contrast with the remaining part of the county of Koszalin (the percentage of forests in this county being 34.3%). In the particular villages and State Farms the percentage of forested area varies from 0—3%, mostly young forests or thinned forests with trees of various age. Most of the forests are alder young growths. Some of them have deliberately been planted on the area of the most boggy meadows, as a form of natural draining, and others are the remnants of former alder forests growing on the low peat bogs. Most of them are composed of coppice stand bringing very little gain. There is only one bigger stretch of forest occupying an area of 80 ha which is situated north of the Pleśnia State Farm. It is owned by the State Land Fund. As was proved by observation, this is the Baltic mixed forest with trees of different age, mostly beech and pine. A thorough examination of the innermost part of the forest was impossible during the period of the survey, as the area was still mined from the times of the Second World War. A very interesting example of an oak forest can be found in the Pleśnia State Farm, but unfortunately it has been badly damaged by grazing cattle. The Pleśnia State Farm has also set up an osier plantation for the production of baskets. If this venture proves to be a success, it will be introduced in the whole area covered with water vegetation. Another interesting example of vegetation is provided by the parks entouring the former manor houses. Apart from native trees (e. g. in the Gąski State Farm a spruce with several trunks which grew from the offshoots), there are many exotic trees which seem to be well acclimatized, because they have multiplied through natural sowing. The county authorities take care of these parks.

f. Settlement

In the State Farms the quadrilateral arrangement of farm buildings predominates. The former Junker manor houses has been taken over for the administration of the State Farms (offices, the manager's flat, and often accomodation for seasonal workers). The residential buildings for the State Farm workers are the same buildings that were used for this purpose formerly, usually consisting of 6 or 12 rooms. The other two sides of the rectangular farmyards are made up of cowsheds, stables, pigsties, storehouses etc. The barns usually stand apart from the main set of buildings. The residential buildings on the State Farms are usually brick-built, sometimes of hollow bricks or walls of the so-called post and pan type. They are roofed with tiles, several of them being roofed with pitch-paper or tarboard, but 50% of buildings in the State Farms Gąski and Kladno have roofs thatched with reeds. The administration offices and managers flats are in two-storey buildings, while the farm workers live in single-floor buildings. Most of the State Farms buildings are linked with the water supply and the sewage system and all of them have electricity laid on.

The building materials used for the farm buildings are bricks, hollow bricks and post and pan walls; the roofs are mostly covered with tarboard. The barns are usually made of timber and roofed with tarboard.

In the villages under survey dispersed settlement dominates. Only in the village of Smiechów is there a nucleated settlement with the buildings scattered loosely along the main street. In this village there were many grossbauer farms which were divided between two, and sometimes even between four new settlers. The division was also extended to the farmhouse and the farmyard buildings. Investigations carried out on the spot have shown that in many cases the farmers sharing the farm buildings began to built their own houses and farmyard buildings, one of them remaining in the old set of buildings. The dwelling houses usually have four rooms and are built of brick. The roofing materials vary however. In the village of Gąski all the houses are roofed with tarboard, in the villages of Smiechów and Kładno the roofs are either tiled or thatched with reeds. Some of the houses are connected up to the water supply and sewage system. All the villages have electricity laid on and in each of them there is a department shop and a school.

The typical farmstead among the individual farmers is also quadrilateral. Opposite the farmhouse is the barn, while stables, byres and other sheds form the other two sides of the rectangular farmyard which

is usually large. The farmyard buildings are usually built of bricks and hollow bricks, and most of the roofs are covered with tarboard or tiles, roofs thatched with reeds are not so common. The barns are usually wooden; in the village of Smiechów 50% of the barns have post and pan walls.

g. Waste Land

A separate problem in this area is that of Waste Land, particularly if we compare the map showing the utilization of land with Table 3 concerned „Land Utilization". According to the map, showing the utilization of land, there is no waste land in the area under investigation. On the other hand, the column marked Waste Land in Table 3 includes, according to the rules of the Central Statistical Office, all the areas not liable to land taxation. To be more explicit, these areas are the beach in the village of Gąski, the former small lakes and pools now overgrown with water plants in the village of Smiechów and in all the State Farms. Both the beach and the small lakes overgrown with reeds are utilized, the first by holidaymakers and the second as a source of material used for various purposes, e. g. for thatching roofs, litters, etc.

4. CROP PRODUCTION

a. State Farms

The yields in the State Farms[8] are higher than the average for the whole country and the Koszalin voivodship, and are not much different from the county averages for the pre-war period.

The highest yields of cereals have been achieved by the Gąski State Farm, the lowest yields, apart from oats, are in the Kładno State Farm. A further analysis (see Table 6) shows that the yields of sugar beet and fodder beet are the highest in the Kładno State Farm, where on other hand, the lowest yield of potatoes has been recorded. The remaining State Farms have higher potato yields, but lower beet yields. High yields of clover and other fodder crops are recorded.

The bulk of State Farm production is gained from arable land. The productivity of the utilized land in the various Farms does, however,

[8] Yields for each of the State Farms were estimated on the basis of interviews on the spot and data supplied by agricultural correspondents, obtained from GUS (Central Statistical Office) from its own archives.

vary considerably. The following yields in grain units are obtained from one hectare:

	Gąski	Kładno	Pleśnia
Grassland	6.9	13.8	19.4
Perennial crops	5.5	—	—
Arable land	32.7	30.0	34.5

Yields are the highest in the Pleśnia State Farm, both from arable land and from grassland. The yield from grassland in the Gąski State Farm is particularly low. It is so because in the Pleśnia State Farm peat-bog meadows and pastures have just been drained and improved and in the Gąski State Farm the post *grond* meadows are not manured, only exploited.

Table 6

Yields in q/ha

Specification	Gąski in 1958	Kładno 1958	Pleśnia 1958	Poland 1959*	Koszalin Voivodship 1959*	Koszalin district 1937**
Wheat	20	16	20	17.3	12.0	20.3
Rye	19	15	17	15.6	13.1	17.7
Barley	23	18	20	16.2	11.1	21.0
Oats	25	24	—	14.7	11.1	19.9
Potatoes	120	110	140	128	138	162
Sugar beet	150	220	—	159	129	220

* Statistical Yearbook 1960, Warsaw, GUS 1960 p. 194

** Postępy Nauk Rolniczych, Warsaw, PWRiL, 1957, fascicle 5, p. 90.

In plant production, fodder crops occupy a dominant position (see Table 10). In the Gąski and Kładno State Farms they account for over 75% of plant production, and in the Pleśnia State Farm as much as 92.6%. In the two first mentioned State Farms, red clover plays the most important role in the group of fodder crops, followed by potatoes and mixed leguminous crops; in the Kładno State Farm fodder roots too. In the Pleśnia State Farm, the main volume of production is accounted for by leguminous plant mixtures (38.4%), followed by meadows (18.7%) and pastures (14.6%). Red clover is cultivated almost exclusively for hay, and other papilionaceous and leguminous plants for green fodder and hay.

Food crops take the second place, but their share is insignificant in plant production. Only in the Gąski State Farm they play a slightly more important role.

Wheat, accounting for over 50% in this group is the main food crop. Only in the Pleśnia State Farm, where the percentage of food

crops in total plant production is excessively low (7.4%), rye predominates in this group. Other plants, such as vegetables and fruit, account for an insignificant parcentage of food crops.

Industrial plants are only grown in the Gąski and Kładno State Farms and account for less than 10% of the total crop production. Sugar beet is the most important crop here, it accounts for over 50% of industrial plant output.

Apart from the production obtained from the State Farm land, which accounts for over 95% of the agricultural production of each State Farm, a small percentage is accounted for by crops produced on the allotments of the State Farm workers.

Vegetables are only grown on these allotments, and only for their holders'own use. Apart from vegetables, workers use their allotments almost exclusively for growing potatoes. Table 10 only shows the production of beetroots and carrots, as these vegetables dominate. Many other vegetables are grown, but only in very small quantities, e. g. several tomato plants, some rows of onions, etc.

b. Individual Farms

As can be seen on Table 7, the lowest yields of all crops are in the village of Gąski. The remaining villages have yields, several quintals higher than the average for the village of Gąski.

Table 7

Yields in q/ha

Specification	Gąski 1958	Kładno 1958	Śmiechów 1958	Poland 1959*	Koszalin Voivodship 1959*	Koszalin District 1937**
Wheat	12	18	18	17.3	12.0	20.3
Rye	10	16	16	15.6	13.1	17.7
Barley	15	20	20	16.2	11.1	21.0
Oats	15	20	20	14.7	11.1	19.9
Potatoes	150	150	150	128	138	162
Sugar beet	150	200	200	159	129	220

* Statistical Yearbook 1960, Warsaw, GUS, 1960 p. 194

** Postępy Nauk Rolniczych, Warsaw, PWRiL, 1957, fascicle 5 p. 90.

In comparison with the average for the whole of Poland, the village of Gąski has lower yields of wheat and rye, and slightly higher yields of other plants. The villages of Kładno and Śmiechów have slightly higher yields than the national average and several quintals higher than the average for the Koszalin Voivodship. On the other

hand, they have not yet caught up with the yields obtained before the war.

The following yields from one hectare of various land uses are obtained in comparable grain units:

	Gąski	Kładno	Śmiechów
Grassland	11.6	16.9	24.4
Perennial crops	—	6.6	4.4
Arable land	22.1	29.1	27.2

The best output is from the arable land in the village of Kładno, which is the result of the proper farming methods used on the best soils. The high productivity of the meadows and pastures in the village of Śmiechów is also the result of good farming, for the meadows are fertilized there and the drainage installations are kept in good condition.

In all the three villages, the highest percentage is accounted for by fodder crops, which in some villages constitute two thirds of the plant production (see Table 11). In this group succulent foods, particularly potatoes, are predominant in the village of Gąski. On the other hand, in the remaining two villages, the production of other fodder plants predominates mainly from meadow and pasture, but also papilionaceous and leguminous plants.

The share of food crops is comparatively the highest in the village of Kładno, where they account for one fourth of the whole of plant production. Rye plays the most important role in the food crops group, but in the villages of Kładno and Śmiechów wheat occupies almost the same place as rye. As regards other food crops, potatoes are the most important ones.

The share of industrial plants is small. Only in the village of Gąski does this group of plants account for more than 10% of plant production. In the individual farms flax is the most important industrial crop, sugar beet being a secondary one.

In making a comparison of the plant production in the State Farms and individual farms (Tables 10 and 11), the following conclusions have been drawn:

The yields of cereals in the area under survey are higher in the State Farms, while the yields of root crops, particularly potatoes, are better in the individual farms.

The yields obtained by the State Farms equal and often surpass those obtained in the same area before the war. The productivity per ha of arable lends in comparable units is higher in the State Farms, while the yield from grasslands is higher in the individual farms.

Fodder crops account for the main volume of plant production both in the State Farms and in the individual ones. In the State Farms fodder crops account for 3/4 and in the individual farms for 2/3 of the whole agricultural production. As regards fodder crops, in two of the State Farms clover is the main production item, in the third one leguminous mixtures. In individual farms, the main volume of fodder production comes from pastures and meadows, and potato plantations.

Food crops account for a larger percentage in the production of individual farms, rye being the most important crop in this group, while wheat takes the lead in the State Farms.

Industrial crops, both in the State Farms and in the individual ones, account for only a small percentage of plant production. In the State Farms, the main role is played by sugar beet and rape, and in the individual farms flax is the most important crop in this group.

5. LIVESTOCK BREEDING AND ANIMAL PRODUCTION

There is no essential difference in the breeds of the stock kept in the State Farms and individual farms in the area under survey. There is, however a difference in the productivity of the animals. This is the result of the more rational feeding and more healthy conditions of animal breeding in the State Farms.

The horses bred in this area are mixtures of various breeds as a result of numerous crossings. The prevailing type of horse there is light but strong.

The cattle is of the black-and-white breed, known for its high milk yield and medium fat content (3.6%).

The pigs kept there are of the dual purpose pork and lard type. The animals kept for fattening weigh from 120 to 150 kg.

Similarly the sheep are a mixture of various breeds brought with them by the settlers when they arrived.

As there was no available data concerning the slaughter of animals, the number of animals slaughtered was estimated in the present survey on the basis of data pertaining to the reproduction of the herd. With a given size of the herd it is possible to calculate the growth of the herd and also the number of culled animals, no longer fit for production. The annual culling of animals is based on the period during which the various breed of animals can be used for production. In the area under survey they are as follows: cows 10 years, pigs (sows) 4 years, sheep 5 years and laying hens 3 years.

Livestock breeding

Specification	State farm Gąski				
	Heads	Big animal units	% in big animal units	Heads per 100ha agricultural land	Big animal units per 100 ha agricult. land
A. State owned					
work horses	17	20.4			
young horses	3	3.0			
foals	6	3.6			
Total horses	26	27.0	19.7	8.1	8.5
bulls	—	—			
cows	54	54.0			
heifers over 12 monts old	16	11.2			
heifers 6—12 months old	18	7.2			
calves	16	1.9			
Total cattle	104	74.3	54.0	32.6	23.3
pigs over 9 months old	29	8.7			
pigs 6—9 " "	106	26.5			
piglets up to 6 months old	20	1.0			
Total pigs	155	36.2	26.3	48.6	11.3
T o t a l	x	137.5	100.0	x	43.1
B. Workers' property					
cows	22	22.0			
heifers	—	—			
calves	4	0.5			
Total cattle	26	22.5	78.4	8.1	7.0
pigs over 9 months	—	—			
pigs 6—9 months	8	2.0			
pigs up to 6 months	62	3.1			
Total pigs	70	5.1	17.8	21.9	1.6
sheep	—	—			
lambs up to 1 yr					
Total sheep	—	—	—	—	—
hens	307	0.9			
chickens	199	0.2			
Total poultry	506	1.1	3.8	158.5	0.3
T o t a l	x	28.7	100.0	x	8.9
Together State and workers property					
horses *	26	27.0	16.2	8.1	8.5
cattle	130	96.8	58.3	40.7	30.3
pigs	225	41.3	24.8	70.5	12.9
sheep **	—	—	—	—	—
fowl **	506	1.1	0.7	158.5	0.3
GRAND TOTAL	x	166.2	100.0	x	52.0

Source: Agricultural Census, 1958.
* State Farm only
** Workers' only

Table 8

State Farming

State farm Kładno					State farm Pleśnia				
Heads	Big animal units	% in big animal units	Heads per 100 ha agricultural land	Big animal units per 100 ha agricult. land	Heads	Big animal units	% in big animal units	Heads per 100 ha agricultural land	Big animal units per 100 ha agricult. land
17	20.4				14	16.8			
3	3.0				—	—			
3	1.8				2	1.2			
23	25.2	13.4	5.8	6.4	16	18.0	20.2	5.8	6.6
—	—				1	1.2			
82	82.0				39	39.0			
24	16.8				14	9.8			
17	6.8				5	2.0			
26	3.1				8	0.9			
149	108.7	57.8	37.9	27.6	67	52.9	59.6	24.5	19.3
4	1.2				36	10.8			
212	53.0				—	—			
—	—				144	7.2			
216	54.2	28.8	54.9	13.8	180	18.0	20.2	65.7	6.6
x	188.1	100.0	x	47.8	x	88.9	100.0	x	32.5
15	15.0				8	8.0			
4	2.8				—	—			
1	0.1				2	0.2			
20	17.9	60.3	5.1	4.6	10	8.2	75.9	3.6	3.0
—	—				1	0.3			
41	10.3				4	1.0			
—	—				13	0.6			
41	10.3	34.7	10.4	2.7	18	1.9	17.6	6.6	0.7
1	0.1				1	0.1			
3	0.1				—	—			
4	0.2	0.7	1.0	0.0	1	0.1	0.9	0.4	0.0
305	0.9				114	0.3			
422	0.4				300	0.3			
727	1.3	4.3	184.8	0.3	414	0.6	5.6	151.3	0.3
x	29.7	100.0	x	7.5	x	10.8	100.0	x	3.9
23	25.2	11.6	5.8	6.4	16	18.0	18.0	5.8	6.6
169	126.6	58.1	42.9	32.2	77	61.1	61.3	28.1	22.3
257	64.5	29.6	65.3	16.4	198	19.9	20.0	72.3	7.3
4	0.2	0.1	1.0	0.0	1	0.1	0.1	0.4	0.0
727	1.3	0.6	184.8	0.3	414	0.6	0.6	151.2	0.3
x	217.8	100.0	x	55.4	x	99.7	100.0	x	36.4

a. State Farming

In connection with the high degree of mechanization, the State Farms have only a small number of horses. The figures for the three State Farms under survey are as follows: Kładno and Pleśnia have 6 horses each and Gąski has 8 horses per 100 hectares of agricultural land. As the heavy agricultural machines now applied cannot be used for certain kinds of work, e. g. harvesting hay, ploughing on slopes, etc., and as there is a lack of various means of conveyance in and between the farm buildings, a certain number of horses are necessary for transport on the farm itself, for cultivating uneven grounds etc. (see Table 8).

Cattle is reared mainly for milk production. Only cows culled because of unsufficient milking capacity and, heifers not destined for the renovation of the herd and also bull calves, are destined for slaughter. The sale of pedigree cattle has been suspended temporarily to prevent spreading of tuberculosis. In 1958, the State Farms exchanged their cattle for healthy animals. The number of cows per 100 ha of utilized land was over 40 in the Gąski and Kładno State Farms and 28 in the Pleśnia State Farm (see Table 8).

The average milk yield per cow is 3,000 litres annually, this being higher than the average for the State Farms in this country (2,387 litres) and in the Koszalin Voivodship (2,217 l).

Pig breeding is an important part of stock breeding in the State Farms. The number of pigs per 100 ha of utilized farm land is as follows: 48.6 in the Gąski State Farm, 54.9 in Kladno and 67.7 in the Pleśnia State Farm. The pig population is higher, where that of cattle is lower.

Cows and pigs are also kept by the State Farm workers. In the Gąski State Farm 1/4 of the cattle belong to the farm workers, and in the remaining two State Farms the figure is 1/7 and 1/8 respectively. Similarly, the number of pigs belonging to the workers varies from half of all the pig population in the Gąski State Farm to one tenth of all the pigs on the farm in the Pleśnia State Farm.

Poultry and sheep are only kept by the State Farm workers; every one of them having no more than a few sheep (Table 8) but quite a large number of hens.

Altogether, the livestock population per 100 ha of utilized farm land in the area under survey is 52 big animal units in the Gąski State Farms, 55.4 in the Kładno State Farm and 36.4 in the Pleśnia State Farm. This is less than the pre-war average for the Koszalin District

which was about 90 big animal units (100 ha of utilized form land) [9]. The cattle population is particularly small. Having in mind the fodder supplies available in the area under survey, the cattle population has real prospects of increasing by 20 to 30 big animal units per 100 ha of utilized farm land, on condition, however, that the drainage installations are kept in good condition.

As regards animal production, the share of meat and milk is almost equal, with the exception of the Pleśnia State Farm where meat production predominates (see Table 10). Eggs and wool only account for an insignificant percentage of animal production. Animals kept by the State Farm workers on their own allotments account for 14—32% of the total animal production, meat being the main produce and milk coming next. In all three State Farms surveyed animal production is being oriented along the same lines, meat and milk being the main objectives, pigs and milch cows accounting for the major part of the animals. In the Gąski and Kładno State Farms both these elements are well balanced, whereas in the Pleśnia State Farm, which concentrates on pig breeding, the output of meat is much higher than that of milk.

b. Individual Farming

In the individual farms, horses are still the main draft power. The number of horses per 100 ha or utilized farm land varies between 13 to 15 animals in the three villages under survey. In view of the need for draft power because of inadequate mechanization, this number is necessary for the cultivation of the rather heavy soils. A proof of the appreciation of the role played by the horses in the individual farms is the large share of colts in the herd structure. The present number of horses is not very much different from that before the war, when the average for the Koszalin county was 14.1 horses per 100 hectares of agricultural land (see Table 9).

The cattle population is 40 to 60 heads per 100 ha of farmed land in the three villages. The high number in the village of Kładno (60.9 per 100 ha) is the result of better farming in that village. The present cattle population is not far from the prewar figure, which was 54 heads per 100 ha of farmed land. The milk yield is higher than the national average, amounting to 2.300—2.600 l annually.

The pig population varies from 65—85 animals per 100 ha of agricultural acreage. This is quite a large figure, but it does not equal the

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[9] Statistik des Deutschen Reichs, Berlin 1938.

Livestock breeding. Individual farming — Table 9

Specification	Gąski Village					Kładno Village					Śmiechów village				
	Heads	Big animal units	% big animal units	Heads per 100 ha agricult. land	Big animal units per 100 ha agricult. land	Heads	Big animal units	% big animal units	Heads per 100 ha agricult. land	Big animal units per 100 ha agricult. land	Heads	Big animal units	% big animal units	Heads per 100 ha agricult. land.	Big animal units per 100 ha agricult. land
work horses	43	51.6		15.3	18.3	14	16.8		13.9	16.8	51	61.2		14.6	17.6
young horses	2	2.0				—	—				—	—			
foals	12	7.2				—	—				7	4.2			
Total horses	57	60.8	30.7	20.2	21.6	14	16.8	22.6	13.9	16.8	58	65.4	29.5	16.7	18.8
bulls	—	—				—	—				3	3.6			
cows	90	90.0				33	33.0				93	93.0			
heifers	5	3.5				3	2.1				12	8.4			
heifers 6—12 months old	9	3.6				13	5.2				12	4.8			
calves	27	3.2				12	1.4				16	1.9			
Total cattle	131	100.3	50.6	46.5	35.6	61	42.7	57.5	60.9	42.6	145	111.7	50.5	41.7	32.1
pigs over 9 months old	16	4.8				3	0.9				50	15.0			
pigs 6—9 months old	54	13.5				35	8.7				47	11.7			
piglets up to 6 months old	120	6.0				48	2.4				126	6.3			
Total pigs	190	24.3	12.2	67.5	8.6	86	12.0	16.2	85.8	11.9	223	33.0	15.0	64.1	9.5
sheep	66	6.6				10	1.0				54	5.4			
lambs up to 1 year	48	2.4				12	0.6				45	2.2			
Total sheep	114	9.0	4.5	40.5	3.2	22	1.6	2.2	21.9	1.5	99	7.6	3.6	28.5	2.2
goats	1	0.1	0.0	0.3	0.0	—	—	—	—	—	1	0.1	0.0	2.3	0.0
hens	947 *	2.8				260 *	0.8				929 *	2.8			
chickens	1072	1.1				285	0.3				1517	1.5			
Total poultry	2019	3.9	2.0	717.3	1.2	565	1.1	1.5	563.8	1.1	2446	4.3	1.4	703.2	1.2
Grand total	x	198.4	100.0	x	70.5	x	74.2	100.0	x	74.0	x	222.1	100.0	x	63.8

* Source: Agricultural Census, 1958, 1960.

pre-war one which in the Koszalin county was 109 pigs per 100 ha of farmed land (see Table 9).

On the other hand there is quite a large number of sheep, from 20 to 40 heads per 100 hectares of agricultural land. The comparison of these figures with the pre-war ones (16.2 heads per 100 ha of utilized farm land in Koszalin county in 1937 [10]), indicates a considerable increase in the number of sheep in the villages of Gąski and Śmiechów. There are good chance of maintaining this number of sheep as they feed on pastures not good enough for other animals.

There is extensive poultry breeding in the area under survey, particularly of hens. The average for an individual farm is 50 birds.

It results from the above survey that the leading position in animal production in terms of big animal units is occupied by cattle. Cattle supply the main volume of produce in the whole of animal production. In animal production as a whole, output of meat stock and milk dominates, the figure for meat being slightly higher. Altogether, meat and milk account for about 90% of the total animal production, the rest is accounted by eggs and wool (Table 9).

Comparison of the stockbreeding situation in the State Farms and individual farms led to the following conclusions;

In the individual farms, the number of livestock population is higher on an average by 20 to 30 big animal units per 100 ha of farmed land.

In connection with the high degree of mechanization the number of horses is much lower in the State Farms.

State Farms breed cattle and pigs, only State Farm workers also keep sheep and hens. On the other hand, the individual farmers breed all kinds of domestic animals.

In both, State Farms and individual farms, cattle dominates in the stock-breeding structure. The cattle population per 100 hectares of agricultural land is higher in the individual farms by several big animal units on an average.

Despite the fact that the pig population is larger in the individual farms than in the State Farms, it accounts for 50% of the big animal units in State Farms and for one fourth of the big animal units in individual farms, which means that pig breeding plays a comparatively more important role in the stockbreeding structure of State Farms than in individual ones. This is not typical either for Poland as a whole or for that part of the Northern Regions in which the area under survey is situated, because as a rule the share of pigs is larger

[10] Statistik des Deutschen Reichs, Berlin 1938.

Gross agricultural

Specification	State farm Gąski					
	Yield	Production	Production in grain units	% gross production	% branch production	% given group
Gross Production	x	x	12497	100.0	x	x
I. Crop production [1]	q per ha	in q	9121	73.0	100.0	x
A. Food crops	x	x	1494	12.0	16.4	100.0
a. Grains	x	x	1330	10.6	14.6	89.0
wheat	20	760	760	6.1	8.3	50.9
rye	19	570	570		6.3	38.1
pea	—	—	—	—	—	—
b. Vegetables [2]	x	x	140	1.1	1.5	9.4
beet root	180	144	21		0.2	1.5
carrots	200	194	29		0.3	1.9
potatoes	120	360	90		1.0	6.0
c. Fruits	x	x	24	0.0	0.3	1.6
apples	16	36	18		0.2	1.2
sour cherries	8	16	6		0.1	0.4
B. Fodder crops	x	x	6926	55.4	75.9	100.0
a. Grains	x	x	710	5.7	7.8	10.3
oats	25	250	250	2.0	2.8	3.6
barley	23	460	460	3.7	5.0	6.7
mixed corn	—	—	—	—	—	—
b. Succulent foods	x	x	1318	10.5	14.4	19.0
potatoes	120	3600	900	7.2	9.9	13.0
mangolds	250	2500	250	2.0	2.7	3.6
sugar beet (foliage)	75	787	86		0.9	1.2
mangolds (foliage)	82.5	825	82		0.9	1.2
c. Rough forage	x	x	4563	36.5	50.1	65.9
red clover (hay)	90	4770	2385	19.8	26.1	34.4
lucerne (green)	350	1050	157		1.7	2.3
serradella (green)	220	2376	261	2.1	2.9	3.8
vetch (green)	280	4480	582	4.7	6.4	8.4
leguminous mixtures	300	6000	780	6.2	8.6	11.3
meadow hay	20	60	18		0.2	0.3
spring cereals straw	31.5	1575	236		2.6	3.4
winter sereals straw	38	1444	144		1.6	2.0
d. Pasture	25	1119	335	2.7	3.6	4.8

Production State Farming

Table 10

State farm Kładno						State farm Pleśnia					
Yield	Production	Production in grain units	% gross production	% branch production	% given group	Yield	Production	Production in grain units	% gross production	% branch production	% given group
x	x	14455	100.0	x	x	x	x	9918	100.0	x	x
q per ha	in q	10388	71.9	100.0	x	q per ha	in q	7513	75.8	100.0	x
x	x	1512	10.5	14.6	100.0	x	x	555	5.6	7.4	100.0
x	x	1377	9.5	13.3	91.1	x	x	457	4.6	6.1	82.3
16	672	672	4.6	6.5	44.4	20	100	100	1.0	1.3	18.0
15	465	465		4.5	30.8	17	357	357	3.6	4.8	64.3
20	200	240		2.3	15.9	—	—	—	—	—	—
x	x	135	0.9	1.3	8.9	x	x	98	1.0	1.3	17.7
180	90	13		0.1	0.9	180	72	10		0.1	1.8
200	110	16		0.2	1.0	200	98	14		0.2	2.5
110	426	106		1.0	7.0	140	299	74		1.0	13.4
x	x	—	—	—	—	x	x	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
x	x	7816	54.1	75.2	100.0	x	x	6958	70.2	92.6	100.0
x	x	1127	7.8	10.9	14.4	x	x	299	3.0	4.0	4.3
24	264	264		2.5	3.4	—	—	—	—	—	—
18	523	523	3.6	5.0	6.7	20	100	100		1.3	1.4
16	340	340		3.4	4.3	18	199	199	2.0	2.7	2.9
x	x	1975	13.7	19.0	25.2	x	x	955	9.6	12.7	13.7
110	4625	1156	8.0	11.1	14.8	140	2122	530	5.3	7.0	7.6
500	5000	500		4.8	6.4	400	3200	320	3.3	4.3	4.6
110	1100	121		1.2	1.5	—	—	—	—	—	—
198	1980	198		1.9	2.5	132	1056	105	1.0	1.4	1.5
x	x	3733	25.8	35.9	47.8	x	x	4605	46.5	61.3	66.2
90	3786	1893	13.1	18.2	24.2	—	—	—	—	—	—
—	—	—	—	—	—	350	1050	157		2.1	2.3
—	—	—	—	—	—	—	—	—	—	—	—
220	2501	325		3.1	4.2	—	—	—	—	—	—
280	3927	770	5.3	7.4	9.9	300	2217.6	2883	29.1	38.4	41.4
30	783	234		2.2	3.0	60	3601	1404	14.2	18.7	20 2
28.5	1749	263		2.6	3.3	28.5	600	90		1.2	1.3
32	2496	249		2.4	3.2	34	714	71		0.9	1.0
40	2454	981	6.8	9.4	12.6	40	2747	1099	11.1	14.6	15.8

Table 10a

Specification	State farm Gąski					
	Yield	Production	Production in grain units	% gross production	% branch production	% given group
C. Industrial crops	x	x	701	5.6	7.7	100.0
rape seed	14	154	308		3.4	43.9
sugar beet	150	1575	393	3.1	4.3	56.1
malting barley	—	—	—	—	—	—
II. Animal production (total) [3]	x	x	3376	27.0	100.0	x
A. Milk (in litres)	2884.2	219200	1534	12.3	45.5	100.0
B. Meat-stock (kg lives weight)	x	x	1750	14.0	51.8	100.0
beef	437.5	3500	210	1.7	6.2	12.0
veal	40	1740	104		3.1	6.0
pork	130	26520	1326	11.1	39.3	75.8
piglets [4]	10	1250	62		1.8	3.5
mutton [2]	—	—	—	—	—	—
hens [2]	2	184	11		0.3	0.6
chickens	1	614	37		1.1	2.1
C. Eggs [2]	120	36840	92	0.7	2.7	100.0
D. Wool [2]	—	—	—	—	—	—
1. State Farm only	x	x	2298	18.4	100.0	x
A. Cow milk (litres)	3000	162000	1134	9.1	49.3	100 0
B. Meat stock (kg live weight)	x	x	1164	9.3	50.7	100.0
beef	450	2700	162		7.1	13.9
veal	40	1160	69		3.0	5.9
pork	130	17420	871	7.0	37.9	74.9
piglets	10	1250	62		2.7	5.3
2. Workers' property only	x	x	1078	8.6	100.0	x
A. Cow milk (litres)	2600	57200	400	3.2	37.1	100.0
B. Meat-stock (kg live weight)	x	x	586	4.7	54.4	100.0
beef	400	800	48		4.5	8.2
veal	40	580	35		3.2	6.0
pork	130	9100	455		42.3	77.7
mutton	—	—	—	—	—	—
hens	2	184	11		1.0	1.8
chickens	1	614	37		3.4	6.3
C. Eggs	120	36840	92	0.7	8.5	100.0
Wool	—	—	—	—	—	—
—			440		4.8	

[1] Therein plant productiono on workers' allotments
[2] State Farm employees only
[3] Average for State and Individual Farming
[4] State Farm only

State farm Kładno						State farm Pleśnia					
Yield	Production	Production in grain units	% gross production	% branch production	% given group	Yield	Production	Production in grain units	% gross production	% branch production	% given gronp
x	x	1060	7.3	10.2	100.0	x	x	—	—	—	—
14	210	420		4.0	39.6	—	—	—	—	—	—
220	2200	550	3.8	5.3	51.9	—	—	—	—	—	—
18	90	90		0.9	8.5	—	—	—	—	—	—
x	x	4067	28.1	100.0	x	x	x	2405	24.2	100.0	x
2938.1	285000	1995	14.4	49.1	100.0	2934	137800	964	9.7	40.1	100.0
x	x	1976	13.7	48.6	100.0	x	x	1406	14.2	58.5	100.0
444.4	4000	240		6.0	12.1	440	2200	132	1.1	5.5	9.5
40	2080	124		3.0	6.3	40	1000	59		2.5	4.2
130	30940	1546	10.8	38.0	78.3	130	22230	1111	12.0	46.2	79.0
10	340	17		0.4	0.8	10	1700	85		3.5	6.0
40	40	2		0.0	0.1	40	40	2		0.1	0.1
2	182	11		0.3	0.6	2	68	4		0.2	0.3
1	610	36		0.9	1.8	1	228	13		0.5	0.9
120	36600	91	0.6	2.2	100.0	120	13680	34	0.3	1.4	100.0
3	12	5	0.0	0.1	100.0	3	3	1	0.0	0.0	100.0
x	x	3340	23.1	100.0	x	x	x	2056	20.7	100.0	x
3000	246000	1722	11.9	51.6	100.0	3000	117000	819	8.3	39.8	100.0
x	x	1618	11.2	48.4	100.0	x	x	1237	12,5	60.2	100.0
450	3600	216		6.5	13.3	450	1800	108		5.4	8.7
40	1760	105		3.1	6.5	40	840	50		2.4	4.0
130	25610	1280	8.9	38.3	79.1	130	19890	994	10.0	48.3	80.4
10	340	17		0.5	1.1	10	1700	85		4.1	6.9
x	x	727	5.0	100.0	x	x	x	349	3.5	100.0	x
2600	39000	273	1.0	37.6	100.0	2600	20800	145	1.5	41.5	100.0
x	x	358	2.5	49.2	100.0	x	x	169	1.7	48.5	100.0
400	400	24		3.3	6.7	400	400	24		6.9	14.2
40	320	19		2.6	5.3	40	160	9		2.6	5.3
130	5330	266	1.8	36.6	74.3	130	2340	117		33.5	69.2
40	40	2		0.2	0.6	40	40	2		0.6	1.2
2	182	11		1.5	3.1	2	68	4		1.2	2.4
1	610	36		4.9	10.0	1	228	13		3.7	7.7
120	36600	91	0.6	12.5	100.0	120	13680	34	0.3	9.7	100.0
3	12	5	0.0	0.7	100.0	3	3	1	0.0	0.3	100.0
		46.8		4.5				268		3.6	

Gross production —

Specification	Gąski village					
	Yield	Production	Production in grain units	% gross production	% branch production	% given group
Gross production	x	x	9317	100.0	x	x
I. plant production	q per ha	in q	5693	61.1	100.0	x
A. Food crops	x	x	1304	14.0	22.9	100.0
a. Grains	x	x	1117	12.0	19.7	85.7
wheat	12	371	371		6.5	28.5
rye	10	686	686	7.4	12.2	52.6
barley	15	60	60		1.0	4.6
b. Roots and vegetables	x	x	187	2.0	3.3	14.3
beetroot	—	—	—	—	—	—
carrots	—	—	—	—	—	—
potatoes	150	750	187		3.3	14.3
c. Fruits	x	x	—	—	—	—
sour cherries	—	—	—	—	—	—
apples	—	—	—	—	—	—
B. Fodder crops	x	x	3779	40.6	66.3	100.0
a. Grains	x	x	680	7.3	11.9	18.0
oats	15	486	486	5.2	8.5	12.9
barley	15	171	171	1.9	3.0	4.5
mixed corn	13	23	23		0.4	0.6
b. Succulent foods	x	x	1538	16.0	27.0	40.7
potatoes	150	4433	1108	11.9	19.5	29.3
mangolds	300	2880	288		5.0	7.6
sugar beet (foliage)	75	431	47		0.8	1.3
mangolds (foliage)	99	950	95		1.7	2.5
c. Rough forage	x	x	1214	13.0	21.3	32.1
red clover (hay)	90	351	176	1.9	3.1	4.7
serradella (green)	200	420	46		0.8	1.2
field pea (green)	200	100	13		0.2	0.3
vetch (green)	250	50	7		0.1	0.2
leguminous mixtures (green)	270	2916	379	4.1	6.7	10.0
meadow hay	50	532	213	2.3	3.7	5.6
spring cereals straw	19.5	1408	211	2.2	3.7	5.6
winter cereals straw	22	1692	169	1.8	3.0	4.5
d. Pasture	30	1158	347	3.7	6.1	9.2

Table 11

individual farming

Kładno village						Śmiechów village					
Yield	Production	Production in grain units	% gross production	% branch production	% given group	Yield	Production	Production in grain units	% gross production	% branch production	% given group
x	x	3946	100.0	x	x	x	x	12942	100.0	x	x
q per ha	in q	2538	64.3	100.0	x	per ha	in q	9102	70.3	100.0	x
x	x	794	20.1	31.3	100.0	x	x	2336	18.0	25.7	100.0
x	x	579	14.7	22.8	72.9	x	x	2150	16.6	23.6	92.0
18	281	281	7.1	11.1	35.4	18	954	954	7.4	10.5	40.3
16	287	287	7.1	11.3	36.1	16	1139	1139	8.8	12.5	48.8
20	11	11		0.4	1.4	20	57	57		0.6	2.4
x	x	205	5.2	8.1	25.9	x	x	184	1.4	2.1	7.9
180	54	8		0.3	1.0	180	54	8		0.1	0.4
200	60	9		0.4	1.1	200	50	7		0.1	0.3
150	750	188		7.4	23.8	150	675	169		1.9	7.2
x	x	10	0.2	0.4	1.2	x	x	2	0.0	0.0	0.1
8	4	2		0.1	0.2	8	2	1		0.0	0.0
16	16	8		0.3	1.0	16	3	1		0.0	0.0
x	x	1713	43.4	67.5	100.0	x	x	6091	47.0	66.9	100.0
x	x	272	6.8	10.7	15.9	x	x	1222	9.4	13.4	20.1
20	250	250	6.3	9.9	14.6	20	986	986	7.6	10.8	16.2
—	—	—	—	—	—	20	151	151	1.2	1.7	2.5
18	22	22		0.8	1.3	18	85	85		0.9	1.4
x	x	478	12.1	18.9	27.9	x	x	1854	14.3	20.4	30.4
150	936	234	5.9	9.2	13.7	150	5395	1348	10.4	14.8	22.1
400	1812	181		7.2	10.6	400	3480	348		3.8	5.7
100	25	3		0.1	0.2	100	395	43		0.5	0.7
132	598	60		2.4	3.5	132	1148	115		1.3	1.9
x	x	787	19.9	31.0	45.9	x	x	2718	21.0	29.8	44.6
90	297	149	3.8	6.0	8.7	90	90	45		0.5	0.7
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	280	280	36		0.4	0.6
300	240	31		1.2	1.8	300	7065	918	7.1	10.1	15.1
70	1078	431	10.9	16.9	25.1	70	2527	1010	7.8	11.1	16.6
28.5	446	67		2.6	3.9	28.5	2221	333	2.6	3.6	5.4
34	1093	109	2.8	4.3	6.4	34	3763	376	2.7	4.1	6.2
40	586	176	4.5	6.9	10.3	40	991	297	2.3	3.3	4.9

Specification	Gąski village					
	Yield	Production	Production in grain units	% gross production	% branch production	% given group
C. Industrial crops	x	x	610	6.5	10.8	100.0
flax	25	394	394	4.2	6.9	64.6
sugar beet	150	863	216		3.9	35.4
root crops seedlings	—	—	—	—	—	—
II. Animal production	x	x	3624	38.9	100.0	x
A. Milk (litres)	x	x	1494	16.0	41.2	100.0
cow milk	2300	207000	1449	15.6	40.0	97.0
goat milk	500	500	45		1.2	3.0
B. Meat stock (kg live-weight)	x	x	1710	18.4	47.2	100.0
beef	400	3600	216	2.3	6.1	12.6
veal	40	1960	117	1.2	3.2	6.8
pork	130	20800	1040	12.2	28.7	60.9
piglets	10	2000	100		2.8	5.9
mutton	40	1360	81		2.2	4.7
lamb	10	150	9		0.2	0.5
hens	2	568	34		0.9	2.0
chickens	1	1894	113		3.1	6.6
C. Eggs	120	113640	28	3.0	7.3	100.0
D. Wool	3	342	136	1.5	3.8	100.0

in the individual farms than in the State Farms. This is the result of the better management of the surveyed State Farms, their more intensive farming, and higher productivity than the average.

6. GROSS AGRICULTURAL PRODUCTION

It results from Tables 12 and 13 that the output per unit area is quite high in both State Farms and individual ones. From 33 to 40 grain units are obtained from one ha of farmed land.

In both social sectors plant production is the main object; in the State Farms it accounts for 71—74% and in the individual farms for 61—70% of the gross production (Tables 10 and 11). Here the Pleśnia State Farm is in the lead, the Gąski village being first in stock-breeding. The share of plant production in the State Farms would be

Table 11a

Kładno village						Śmiechów village					
Yield	Production	Production in grain units	% gross production	% branch production	% given group	Yield	Production	Production in grain units	% gross production	% branch production	% given group
x	x	31	0.8	1.2	100.0	x	x	675	5.2	7.4	100.0
25	19	19		0.7	61.3	25	475	475	3.8	5.2	70.4
200	50	12		0.5	38.7	200	790	197		2.2	29.2
—	—	—	—	—	—	10	1	3		0.0	0.4
x	x	1408	35.7	100.0	x	x	x	3840	29.7	100.0	x
x	x	600	15.2	42.6	100.0	x	x	1738	13.4	45.3	100.0
2600	85800	600		42.6	100.0	2600	241800	1693	13.1	44.1	97.4
—	—	—	—	—	—	500	500	45		1.2	2.6
x	x	698	17.7	49.6	100.0	x	x	1706	13.2	44.4	100.0
400	1600	96	2.4	6.8	13.7	400	3600	216	1.7	5.6	12.7
40	720	43		3.1	6.2	40	2000	120	0.9	3.2	7.0
130	10140	507	12.8	36.0	72.7	130	22880	1144	8.8	29.8	67.0
—	—	—	—	—	—	10	600	36		0.9	2.1
40	120	7		0.5	1.0	40	520	31		0.8	1.8
10	40	2		0.1	0.3	10	250	15		0.4	1.0
2	168	10		0.7	1.4	2	556	33		0.8	1.9
1	560	33		2.4	4.7	1	1858	111	0.9	2.9	6.5
120	33600	84	2.1	6.0	100.0	120	111480	278	2.1	7.2	100.0
3	66	26	0.7	1.8	100.0	3	297	118	0.9	3.1	100.0

even higher if the output from State Farm workers allotments were not counted, animal production being predominant there.

Taking as a basis the figures on Tables 10 and 11, the following farming orientations may be distinguished in the area under survey.

Individual villages: 1) productive: vegetable, fodder with food, potato-meadow hay, with rye-wheat and dairy cattle orientation — $4 \times V_3(a_1ry,wh + f_2pt,mh) + A_1(cd)lm$ in the village of Kładno,

2) productive: vegetable, fodder, meadow hay-fodder mixtures with dairy cattle orientation — $4 \times V_3(f_2mh,mx) + A_1(cd)lm$ in the village of Śmiechów,

3) medium productive: vegetable, fodder, potato-fodder mixtures-pasture with dairy cattle orientation — $3 \times V_3(f_2pt,mx,ps) + A_1(cd)lm$ in the village of Gąski.

State Farms 1) productive: vegetable, fodder, clover with dairy

Table 12

Agricultural productivity

Specification	Total		State farm Gąski		State farm Kładno		State farm Pleśnia	
	Total production in grain units	Per 1 ha of agricultural land	Total production in grain units	Per 1 ha of agricultural land	Total production in grain units	Per 1 ha of agricultural land	Total production in grain units	Per 1 ha of agricultural land
A. State Farming								
Plant production	25846	26.2	8681	27.2	9920	25.2	7245	26.5
Animal production	7694	7.8	2298	7.2	3340	8.5	2056	7.5
Total	33540	34.0	10979	34.4	13260	33.7	9301	34.0
B. Workers allotments								
Plant production	1176	1.2	440	1.4	468	1.2	268	1.0
Animal production	2154	2.2	1078	3.4	727	1.8	349	1.3
Total	3330	3.4	1518	4.8	1195	3.0	617	2.3
Total (A + B)								
Plant production	27022	27.4	9121	28.6	10388	26.4	7513	27.5
Animal production	9848	10.0	3376	10.6	4067	10.3	2405	8.8
Total	36870	37.4	12497	39.2	14455	36.7	9918	36.2

cattle orientation in the State Farm of Gąski and Kładno — $4 \times V_3 (f_2 cv) + A_1 (cd)\, lm$,

2) productive: vegetable, fodder, fodder mixtures with pork stock and dairy catle breeding orientation — $4 \times V_3(f_3 mx) + A_1(pk + cd)m$ in the State Farm of Pleśnia.

Out of these villages, the lowest productivity is recorded in the village of Gąski, particularly as regards plant production (more rye being

Table 13

Agricultural Productivity

Specification	Gąski		Kładno		Śmiechów		Ogółem	
	Total production in grain units	Per 1 ha of agricultural land	Total production in grain units	Per 1 ha of agricultural land	Total production in grain units	Per 1 ha of agricultural land	Total production in grain units	Per 1 ha of agricultural land
Plant production	5693	20.2	2538	25.3	9102	26.2	17333	23.8
Animal production	3624	12.9	1408	14.0	3888	11.2	8920	12.2
Total	9317	33.1	3946	39.3	12990	37.4	26253	36.0

sown there than wheat and sugar beet); the highest output with regard to plant production was recorded in the village of Kładno (Table 11).

As regards the State Farms, the level of plant production is more or less the same in all of them, whereas in animal production the Pleśnia State Farm which concentrates mainly on pig breeding, is slightly behind the others. But all in all the differences both in productivity and in orientations in production, existing between the State and individual farms, are less marked here than in the other parts of Poland.

GEOGRAPHIA POLONICA 5, 1965

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THE VILLAGE OF PODGORJE IN THE SLOVENIAN SUB-ALPINE REGION

1. SITE

The village of Podgorje lies in the region of the industrial Alpine landscape of Gorenjsko on the Bistrica plain in Slovenia, in the North-West of Yugoslavia. It is a long linear village with the traditional long strip field pattern extending some kilometres to the SW from the industrial centre of Kamnik, on the route between the tertiary hills of Tunjiske Dobrave to the large diluvial gravelly plain of Bistrica. The settlement is in its population and physiognomy fairly urbanized. Most of the active population is employed outside the settlement in non-agricultural occupations. Only a minor part of the population is occupied with farming. It must be underlined, however, that farming as a secondary occupation supports most of the non — agricultural population.

2. POPULATION AND SETTLEMENT

In its physiognomy of houses and in the economic orientation of the population Podgorje represents a strongly urbanized settlement. In 1869 when Podgorje was a purely peasant village it had 414 inhabitants; by 1910 the number of inhabitants had decreased to 410. With the advance of the urbanizing influences from Kamnik the number of inhabitants had risen in 1931 to 442, and after World War II under the influence of growing industry the population in 1953 reached 538 inhabitants, and by 1961, 560 inhabitants. According to its economic activities, in 1961 Podgorje had a population which was 75% non — agricultural and 25% agricultural.

Fig. 1. A modernized farm house with farm buildings, owned by a farmer with 12 ha of land. In the background a type of mixed, immature forest of pine and beech

Fig. 2 The house of a farmer with 10 ha of land, modernized after World War II

The number of houses in the settlement being 73. between the years 1869—1910 showed a stagnation. Since 1910 the number of houses had been continously growing and in 1961 there were as many as 124 houses.

In the classification of buildings two types prevail: firstly the old farm house type, found along the forest boundary; and secondly the urban type of house, concentrated along the road, but also mixed with the old farm type particularly in the northern and southern areas, near to the industrial centres of Kamnik and Duplica. The new type of urban house however already prevails, and the old farm houses constitute only one third of the total number of homes. Podgorje is likewise characterized by a considerable diversity in the outlook of farm houses as well as in the number and size of the farmsteads belonging to the individual farms. Farmers possesing more land have larger houses and more numerous and bigger farmsteads while, those possessing less land have smaller houses and smaller farmsteads. The urban houses are practically villas, surrounded by gardens. Most of them have been built within the last ten years and this explains why they are very similar in their design.

Fig. 3. Houses of farmers with up to 5 ha of land. The buildings are situated on the loamy zone on the passage from the gravelly terrace of the fields to the tertiary hills of the forests. In the background immature forest with beeches in the foreground and pine trees behind them

Fig 4. The extended corn-shed is a typical Slovene drying-frame for drying hay, clover cereals during summer; the rain in the warm half of the year often does not allow drying in the open air. The corn-shed is owned by a bigger farmer whose land extends in one continual track from the forest past the house and the orchard to the long zone of field stips

3. NATURAL CONDITIONS

The position on the brink of Ljubljana Basin in the immediate vicinity of the Kamniške Alps results in the village having a typical Central European climate. All meteorological data refer to the Meteorological Station in Kamnik. Precipitation reaches its highest points in springtime and in autumn. The average temperature during the year for the period 1925—1940 is 8.6°C.

The lowest average temperature is in January: with —0.7°C, and the highest average in July: with 19°C. During this period the temperature fell below —20°C only twice; when it sank to —25 to —27°C, in January 1929 causing harm to the fruit trees. The highest temperatures reach about 30°C. The average minimum monthly temperature is below zero during the winter months: December, January, and February. In the vegetation season the average monthly temperature in April and in October falls between 8,5 and 9°C; and from May to September between 13 and 19°C. The last light frost falls about 20

April, and not infrequently at the beginning of May. The autumn light frost comes as early as in the beginning of October. The spring frost does no particular harm because the village faces south and so is protected against the influx of the cool air from the Alps, which flows into the lower regions along the Bistrica but which seldom reaches the terrace on which Podgorje is situated.

Precipitation amounts yearly for the period 1925—1940 to 1.406 mm and varies between the lowest absolute yearly total of 1.100 mm to the highest total of 1.900 mm. Precipitation is distributed throughout the year. The month of May however carries the highest monthly total of precipitation — 130 mm and the month of February the smallest total of 70 mm. For the farm economy it is of particular importance that the absolute monthly total of precipitation for the period 1925—1940, between April and October never sank below 30 mm. Periods of a fortnight without rain are seldom, but when they do come during the vegetation season they do great harm to the farming because the permeable gravelly ground, does not hold moisture well.

The tertiary hills are composed of marl and gravel and covered with loam soil. The area of transition between the tertiary hills and the gravelly plain is covered with a richer layer of loam soil that has been brought down from the hills. The plain is covered with incompact gravel on which roughly 30 cm deep soil horizon has developed favourable for agriculture. In the middle of the forest complex on the tertiary hills lies the small unregulated stream Tunjscica, the bottom of which is marshy and overlain with degraded soil.

4. LAND USES AND THE SOCIAL AND OWNERSHIP RELATIONS

Two sources have been used for the data concerning land use and they do not give always the same figures. The first source is represented by cadastrian information, and the second source constitute the statistical data from the registering of farms in 1960. Because the owners of land keep a better record of field-surfaces and have all changes regarding the field-surfaces regularly registred in the cadaster, the cadastrian data regarding the field-surfaces and the statistical data are found to be indentical. The proportions between the surfaces of meadows, pastures, and forest which are likewise constantly changing are not regularly registered in the cadaster on account of which the cadastrian and the statistical information regarding these land categories sometimes disagree. The whole area of the village comprises 555.21 ha. The land categories follow one another in zones. Half of the surface is taken by

forest which covers nearly the whole of the tertiary hills. Second, with one third of the village area, come fields, which are found on the gravelly terrace. Meadows and pastures occupy only a smaller part of the land: together roughly 14% and they are spread in narrow tracts along the widened section of Tunjscica and along the loam soil zone at the foot of the tertiary hills in the transition zone to the gravelly plain. They are mostly intermingled with orchards (Table 1).

Table 1

The size in hectares of land uses according to the social and ownership groups

Social and ownership categories		Field	Meadow	Orchard	Garden	Pasture	Forest	Waste land	Built-up area	Total
0 — 0.5	ha	8.19	0.42	0.56	—	0.21	0.18	—	1.42	10.98
	%	74.5	3.8	5.2	—	1.9	1.7	—	12.9	100%
0.5— 2	ha	9.57	1.96	1.35	—	1.02	10.43	0.10	0.49	24.92
	%	39.39	7.72	5.33	—	4.03	41.19	0.40	1.94	100%
2 — 3	ha	8.64	1.37	0.87	—	0.21	10.71	—	0.30	22.10
	%	37.9	6.3	4.0	—	0.9	49.5	—	1.4	100%
3 — 5	ha	16.18	2.45	0.97	—	0.97	16.86	—	0.51	37.94
	%	42.65	6.45	2.55	—	2.56	44.45	—	1.34	100%
5 — 8	ha	9.83	2.41	0.71	—	1.24	11.21	—	0.21	25.61
	%	38.39	9.43	2.76	—	4.86	43.76	—	0.80	100%
8 — 10	ha	22.60	4.90	1.18	—	0.90	25.66	—	0.31	55.55
	%	49.69	8.82	2.12	—	1.62	46.19	—	0.56	100%
above 10	ha	109.13	48.82	6.92	0.08	10.42	200.02	0.54	2.18	378.11
	%	28.86	12.92	1.83	0.02	2.76	52.90	0.14	0.57	100%
Total	ha	184.14	62.33	12.56	0.08	14.97	275.07	0.64	5.42	555.21
	%	33.2	11.2	2.3	0.01	2.7	49.5	0.11	0.98	100%

Podgorje shows a prevalence of small peasant holdings of up to 15 hectares in size (Table 2).

Table 2

The number of farms according to the social and the ownership categories

Name	Social and ownership categories	0—0.5	0.5—2	2—3	3—5	5—8	8—10	Above 10	Total
Podgorje	number	74	23	9	10	4	6	23	149
	%	49.6	15.4	6.1	6.7	2.7	4.1	15.4	100%

Fig. 5. A view of the gravelly field plain as seen from the tertiary hills across the loamy zone with the old orchard. In the background an urbanized part, lying on the outskirts of the village area, in the vicinity of Kamnik

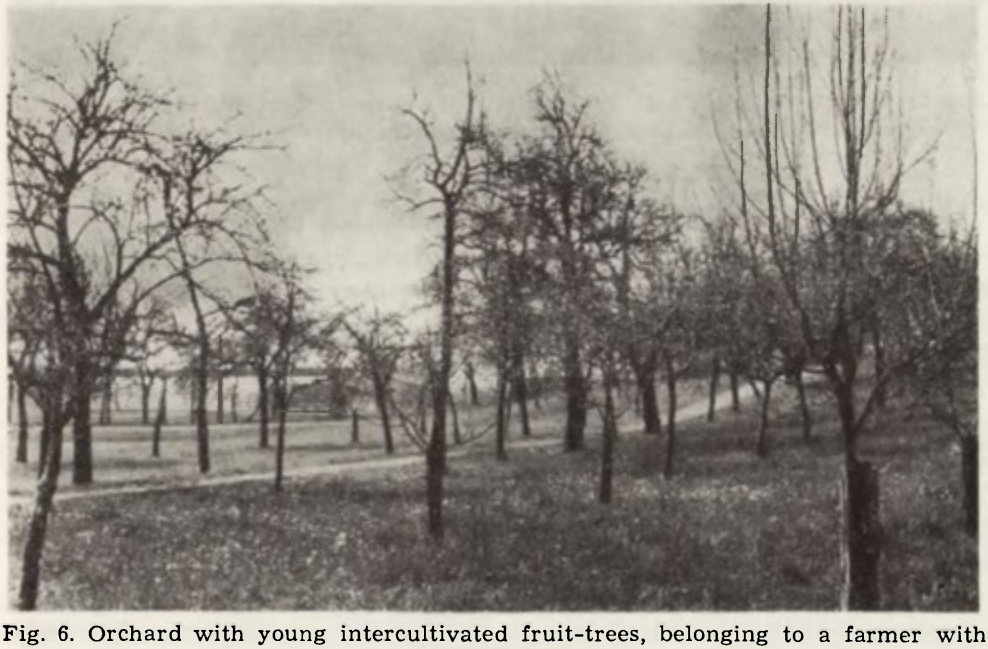


Fig. 6. Orchard with young intercultivated fruit-trees, belonging to a farmer with more than 12 ha of land

With most households possessing more than 0,5 ha of land, half of the land surface is taken by forest and the other half is cultivated land. Field-surfaces cover 30—40% of the surface, the rest is taken by meadows, orchards, pastures, built up areas or waste land.

Fig. 7. A worker's dwelling house, built in the years before World War II, with a small farmbuilding, as the family is additionally occupied with farming

The process of occupational re-orientation of farmers towards non-agrarian jobs outside the village has greatly increased recently. It is mostly people over forty that remain in farming; a number of the larger households have only inhabitants of over sixty years in age. From 1953 to 1961 the numbers of the farm population decreased from 77 to 64. In 1962 there were only 41 active male farmers in the village, which is, compared to other occupations, an insignificant minority. Most of the landholders however are part-time farmers or non-farmers. There are only 14 full time farmers families and they possess half of the land. About 10% of the landholders belong to the category of part-time farmers and they possess one third of the land. A weak one fifth of the families with their own land have most of their active members employed outside farming; farming being the main occupation only of the housewives. Those landholders possess one tenth of the land.

Owing to the urbanization of the village, a good half of the total number of the families are non-farming, possessing only a few ares of land, which constitues only 3% of the village land (Table 3, 4).

Table 3

The number of land holdings according to the economic activity and according to the social and the ownership categories

The social and the ownership categories	A		B		C		D		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
0 — 0.5	—	—	—	—	—	—	74	100	74	100
0.5— 2	1	4.3	3	13	12	52.2	7	30.5	23	100
2 — 3	—	—	1	11.1	7	77.8	1	11.1	9	100
3 — 5	1	10	1	10	8	80	—	—	10	100
5 — 8	2	50	2	50	—	—	—	—	4	100
8 —10	4	66.7	2	33.33	—	—	—	—	6	100
above 10	13	56.5	10	43.5	—	—	—	—	23	100
Total	21	14.1	19	12.7	27	18.1	82	55.1	149	100

A = pure farming households
B = mixed half-farming households with preponderance of active members occupied with farming
C = mixed half-farming households with preponderance of active members not occupied with farming
D = non-farming households

Table 4

The size in hectares of landholdings according to the economic activities and according to the social and the ownerships categories

The social and the ownership categories	A		B		C		D		Total	
	ha	%	ha	%	ha	%	ha	%	ha	%
0 — 0.5	—	—	—	—	—	—	10.98	100	10.98	100
0.5— 2	1.60	6.4	4.84	19.1	14.11	55.7	4.77	18.8	25.32	100
2 — 3	—	—	2.67	12.3	16.71	77.0	2.31	10.7	21.69	100
3 — 5	4.13	10.9	4.49	11.8	29.31	77.3	—	—	37.93	100
5 — 8	13.18	51.4	12.44	48.6	—	—	—	—	25.62	100
8 —10	36.94	66.5	18.61	33.5	—	—	—	—	55.55	100
above 10	226.19	59.8	151.92	40.2	—	—	—	—	378.11	100
Total	282.04	50.8	194.97	35.1	60.13	10.8	18.06	3.3	555.20	100

A = pure farming households
B = mixed half-farming households with preponderance of active members occupied with farming
C = mixed half-farming households with preponderance of active members not occupied with farming
D = non-farming households

Fig. 8. A new modern urban house built in 1960. As the family do not pursue any farming, no farm buildings are attached to the house

5. THE WAY OF LAND UTILIZATION

In spite of the relatively small number of active farm population the land is very actively utilized. The farmers have provided themselves in the last decades with cultivation and tilling machines for draft animals. The large farmer is assisted in his work by smaller farmers, and the smaller farmer by the bigger with draft animals, and machines in turn. In the village there are 57 ploughs, 70 harrows, 33 ridge-hoes, 4 sowing machines, 24 mowers, 10 corn-cutters, 62 straw-cutters, 2 cider presses, 24 alembic retorts, 21 carts, and 19 other machines (sprayers, etc.). Since the village has well developed cattle-breeding, the land is manured mostly by stable dung, plus fertilizers. Manuring is practiced by all farmers and for all crops. Differences are observed, however, in the quantity of manure, given by individual farmers under various crops. With regard to the manuring of crops, the farmers in the village practice rotation-systems which depend on the size of the farm. Non-farmers grow in the fields and in their gardens either vegetables or potatoes. Farmers with up to 2 ha of farm surface practice a three-year rotation system with the following sequence: 1) clover, 2) wheat, 3) potatoes.

Bigger farmers use a six-year rotation:

1) oats — red clover
2) clover — winter wheat
3) wheat — a) buckwheat
b) silo-maize
c) fallow
4) potatoes — winter barley
5) barley — carrots-winter rye
6) rye — a) turnips
b) fallow

The distribution of the land is very favourable for the petty ownership situation. Most of the farmers have their land in one long strip that spreads from the forest on the tertiary hills over the loam-soil on the meadow and the orchard to the fields on the gravelly plain. The homes are situated on the border between the forest on the one hand and the meadows and fields on the other. Originally the field strips were some 900 m long and 50 to 90 m broad, but they were already decreasing at the beginning of the 19th century. Today on an average, a landowner has nine broken plots of land: 3 field-plots, 1 meadow-plot, 1 pasture-plot, and 2 forest ones. The size of the plots is likewise favourable. The average size of a plot is 40 ares: field-plots — 42 ares, meadow-plots — 34 ares, and pasture or orchard-plots — 12 ares (Tables 5, 6).

Table 5

Average number of land plots per 1 landholding according to the social and the ownership categories

The social and ownership categories	Fields	Meadows	Orchard	Vineyard	Garden	Pasture	Forest	Waste landbuilt-up area	Total
	ha	ha	ha	ha	ha	ha	ha	ha	ha
0 — 0.5	0.9	0.05	0.1	—	—	0.08	0.01	0.9	2.2
0.5— 2	1.6	0.5	0.5	—	—	0.5	1.1	1.0	5.0
2 — 3	2.4	1.0	0.7	—	—	0.4	1.5	1.3	7.5
3 — 5	5.0	1.8	1.5	—	—	0.9	2.8	1.8	13.8
5 — 8	6.5	2.2	1.5	—	—	2.2	3.7	1.2	17.5
8 —10	9.0	3.1	1.5	—	—	1.1	7.0	1.1	23.0
above 10	8.5	5.0	1.9	—	0.4	3.6	6.3	1.5	27.0
Total	3.1	1.2	0.6	—	0.006	0.8	1.8	1.1	8.9

The land as a whole is intensivelly tilled and no patches of uncultivated land are to be observed. The reason for that is to be found in the blood relationships between the urbanized, the semi-urbanized and the farming population. The population has a strongly developed practice of co-operation and help with the work on the farms. Workers and part time-farmers employed in the factories and elsewhere will readily cooperate in farming in the afternoon.

Table 6

Average size of land plots per 1 landholding according to the social and ownership categories

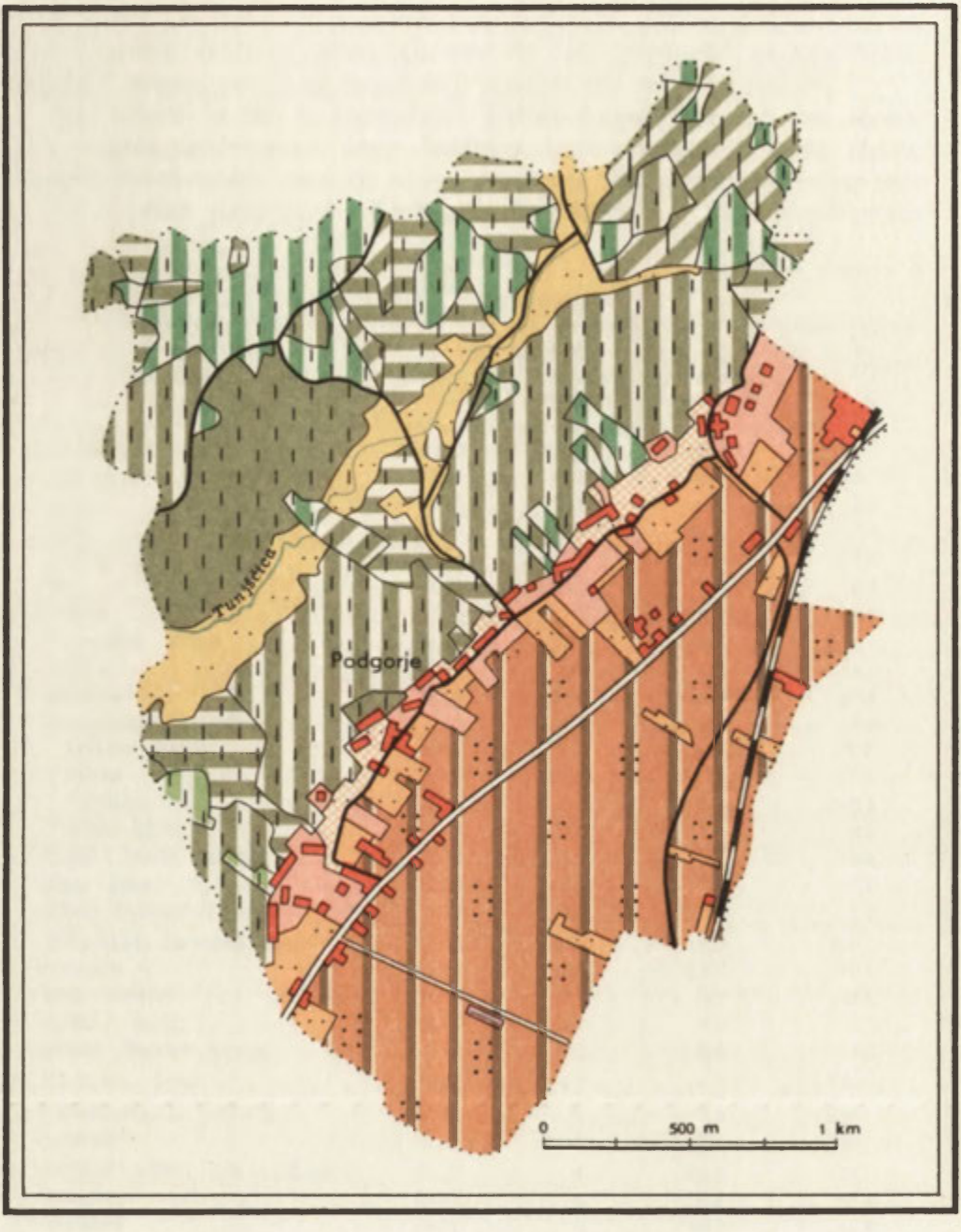
The social and the ownership categories	Fields	Meadows	Orchard	Vineyard	Garden	Pasture	Forest	Waste landbuilt-up area	Total
	ha	ha	ha	ha	ha	ha	ha	ha	ha
0 — 0.5	0.11	0.10	0.06	—	—	0.04	0.18	0.02	0.7
0.5— 2	0.27	0.18	0.11	—	—	0.09	0.40	0.03	0.21
2 — 3	0.37	0.15	0.12	—	—	0.05	0.77	0.03	0.32
3 — 5	0.32	0.14	0.07	—	—	0.11	0.60	0.03	0.27
5 — 8	0.38	0.27	0.12	—	—	0.14	0.75	0.04	0.37
8 —10	0.42	0.26	0.13	—	—	0.13	0.61	0.04	0.40
above 10	0.55	0.42	0.16	—	0.8	0.12	1.38	0.08	0.61
Total	0.40	0.34	0.12	—	0.8	0.12	1.02	0.04	0.42

6. LAND USES

Podgorje was quick to adapt its farm economy to the requirements of the market in the nearby-industrial Kamnik. The reorientation from a self subsistent farm economy to cattle-breeding for selling meat and milk, towards growing table fruit, and in connection with the cattle -breeding towards wheat and potatoes has been most important. The specialization of the farm economy in cattle-breeding and fruit is to some extent based on the favourable climatic and pedological conditions. The rational and partly commercialized economy is reflected in the relatively low percentage of cereals (41,2%) and in the high percentage of intensifying crops (30%) and fodder crops (29%).

a. Arable Land

With the cereals a good half of production is taken up by wheat (62%), the rest of the fields are sown in oats, barley, millet, which are intended for the domestic animals. With ridged up crops the production of potatoes prevails; it takes up more than half of the surface sown with those crops. Potatoes are intended on the one hand for domestic food, but mostly for sale. Maize occupies among the ridged up crops a significant place with nearly 15%. The specialization of agricultural production is shown as well in the large amount of vegetables grown on the field surfaces. They take more than 10% of the field surfaces sown with intensive crops. With structure forming crops high yielding lucerne and red clover are predominant. The general orientation of the arable



Map 1. The village of Podgorje. Land utilization map

land utilization may be determined (Table 7) as a wheat with potatoes and lucerne one ($E_2wh\ I_1pt\ S_1lc$).

Gardens are not very numerous in Podgorje. All vegetables, onions, garlic, beans, cabbage, salad, carrots etc. are produced in the fields. Gardens proper, are to be found only around the workers houses.

The effects of the intensive and well-managed economy are shown with regard to the small farm holdings, in the relatively high yields, per ha. The average yield of wheat per ha is 18.2 q which corresponds to the average yield in the Ljubljana district (18.8 q) which comprises

Table 7

Utilization of farmed land

Specification	ha	% of field-surfaces	% of farming-surfaces	% from groups A, B, C, D, II, III
I. ARABLE LAND	183.28	100	63.0	x
A. Extractive crops	75.55	41.2	26.0	100
wheat	46.85	25.5	16.1	62.0
rye	5.29	2.9	1.8	7.0
barley	13.14	7.2	4.5	17.4
oats	7.75	4.2	2.7	10.3
millet	2.52	1.4	0.9	3.3
B. Intensive crops	54.18	29.6	18.6	100
maize	7.33	4.0	2.5	13.5
potatoes	30.51	16.6	10.5	56.3
vegetables, together	5.92	3.3	2 0	10.9
onions, garlic	0.02	0.0	0.0	0.0
beans	1.02	0.6	0.3	1.9
cabbage	0.20	0.1	0.1	0.3
other kinds	4.68	2.6	1.6	8.7
fodder beets, carrots	8.90	4.9	3.1	16.4
flax, hemp	0.36	0.2	0.1	0.7
other industrial crops	1.16	0.6	0.4	2 2
C. Structure forming crops	53.35	29.1	18.3	100
lucerne	35.21	19.2	12.1	66.0
red clover	17.98	9.8	6.2	33.7
vetch, tare	0.06	0.0	0.0	0.1
other fodder crops	0.10	0.1	0.0	0.2
D. Unsown land	0.22	0.1	0.1	100
II. PERENNIAL CROPS	20.90	x	7.2	100
orchard	20.90	x	7.2	100
III. PERMANENT GRASSLAND	86.75	x	29.8	100
meadow	56.72	x	19.5	65.4
pasture	30.03	x	10.3	34.6
T o t a l	290.95	x	100	x

most of the Alpine and sub-Alpine regions. It is, however, lower than the average yield in Slovenia (20.9 q), but higher than that in Yugoslavia (17.3 q). The yield of potatoes per ha is also good; potatoes being a typical crop that is used both as food, for sale and as fodder. The high yield per ha 210 q must be set down above all to the choice of high yielding varieties and to the very favourable sandy ground. The yield is considerably above the Slovenian average (178 q) or that of Yugoslavia (112 q). The gravelly and rather well drained ground accounts for the relatively low yield of lucerne par ha. The yield of 48 q is for 8 q lower from that in the Ljubljana district or in Slovenia, and 13 q lower from the average Yugoslav yield. The negative influence of the gravelly ground unable to retain water for long, is felt with other crops as well. A proportionately lower yield from that in the Ljubljana district, in Slovenia, or in Yugoslavia is a regular feature of maize, beans and other crops that require a great deal of moisture.

b. Perennial Crops

Between the two World Wars, the growing of fruit trees was an important branch of the farm economy. In the vicinity of the houses there are large orchards on the gentle grassy slopes. The growing of orchard trees is favoured by the fact that the orchards lie in the zone which is out of the danger of the spring frost. Most of the orchards have high growing trees, low headed trees are found more often in the non-farmers' gardens around their houses. Farmers' orchards have not been looked after in the recent years quite so well, for the farmers feel the shortage of manpower required for the cultivation and trimming of the trees as well as for gathering fruit. Orchards are nevertheless important in the farm economy, which is shown by the fact that one third of the trees are young trees. The number of young trees is still greater in the gardens of the workers' houses. Among the species grown apple-trees, pear-trees, and cherry-trees prevail. The fruit crops are very good, and fruit is used either fresh or dried as a vital part in everyday food as well as for the production of brandy. Considering the number of trees the value of the yield and the wood itself, the walnut-tree must also be considered important.

c. Permanent Grassland

Grassland is comparatively abundant; according to its quality, location, and method of utilization it is divided in to three separate and different parts. The first tract of the poorest grassland is in the middle of the forest beside the Tunjscica on moist loamy soil. Owing to its poor

quality it is used primarily as fodder for horses. It is mown only once yearly; recently it has become neglected and overgrown with shrubs and forest partly of its distance from the village. The second tract of grassland lies beside the houses on the forest fringe and is mainly overgrown with orchards. This is utilized for fresh fodder throughout the summer, and for pasture in autumn. The third region of grassland is not confined to one place but is scattered on the plain between the fields.

On the basis of a comparison of the recent data about land utilization with those before World War I and II it can be ascertained that whereas arable surfaces are decreasing the size of the area under grass land is increasing. This is related to the growing economic importance of cattle breeding. Grassland as well as the orchard is manured with domestic dung, and it represents a very important source of fodder during the winter.

d. Forest

Forest covers nearly the whole of the tertiary hills and it is privately owned. Until recently the farmer utilized the forest according to his private needs. The wood was utilized for heating, and for the repairs of the wooden parts of the farmstead, while forest litter was also collected. In years of economic crisis or difficulties in the farm economy the farmers were able, despite the scarcity of good-quality forest to resort to the selling of wood or timber. During recent years however the felling of trees has been restricted to individual mature trees. Because of this, immature, or up to 30 years old forest prevails, whereas mature or very young forest is scarce. At the foot of the hills or on the northern slopes beech is mostly found; higher up the pine-tree. Because of the practise of gathering forest litter, fallen-off leaves, ferns etc. the undergrowth is not particularly developed; the ground in the forest is covered with shallow, leached soil.

7. PLANT PRODUCTION

The plant productivity in the village of Podgorje is comparatively high: 22,5 grain units per 1 ha of farmed surface. The average productivity of arable land is 28,9 grain units per 1 ha. Since the meadows and pastures lie mostly on the poorer loamy ground and are not as intensively cultivated, the production on the grassland is comparatively low: 15.2 grain units per 1 ha on meadows, and 2,9 grain units per 1 ha of pasture. Since a large proportion of orchards are made up of young trees their productivity is only 12,7 grain units per 1 ha.

The economic orientation of farmers towards cattle-breeding is clear from the proportions between, the production of fodder and that of food crops. Each of them yields about 2.900 grain units, i.e. roughly 44% of the total production. The production of industrial crops, shows a comparatively high percentage for a village with small households viz: 10% of the total plant production. With food crops, as with the crops in general, potatoes are most important making up 24,5% of the production in grain units. In addition the high productive values of potatoes is reflected in the fact, that the total surface o fland sown with potatoes (36 ha) comes distinctly second to the land sown with wheat (46,8 ha). By virtue of high production in grain units we must mention also wheat, lucerne and grass. With each of these three crops, their production takes some 13% of the total crop production expressed in grain units. (Table 8).

Table 8

Plant production

Crops	Yield in q/ha	Yield in q	Production in grain units	% of vegetable production	% from I, II, III
I. FOOD CROPS	x	x	2995.3	45.8	100
wheat	18.2	851.8	851.8	13.0	28.4
rye	16.5	85.8	85.8	1.3	2.9
millet	12.0	30.0	30.0	0.4	1.0
potatoes	210.0	6405.0	1601.2	24.5	53.5
beans	13.0	13.0	3.9	0.1	0.1
vegetables	x	x	155.1	2.4	5.2
onions	120.0	2.4	0.7	0.0	0.0
cabbage	200.0	40.0	6.0	0.1	0.2
other kinds	107.5	494.5	148.4	2.3	5.0
fruit	32.0	668.8	267.5	4.1	8.9
II. FODDER CROPS	x	x	2861.1	43.8	100
maize	20.0	146.0	146.0	2.2	5.1
barley	14.8	193.9	193 9	3.0	6.8
oats	14.4	110.9	110.9	1.7	3.9
beetroot, carrots	185.0	1646.5	164.6	2.5	5.8
lucerne	48.0	1689.6	844.8	12.9	29.5
red clover	50.0	895 0	447.5	6.9	15.6
vetch, tare	45.0	2.7	0.4	0.0	0.0
other kinds	120.0	12.0	1.2	0.0	0.0
hay	38.0	2154.6	861.8	13.2	30.1
pasture	10.0	390.0	90.0	1.4	3.2
III. INDUSTRIAL CROPS	x	x	678.8	10.4	100
flax, hemp	50.0	15.0	3.65	0.1	0.5
other industrial crops	24.5	269.5	673.2	10.3	99.5
Total	x	x	6533.2	100	x

8. LIVESTOCK BREEDING AND ANIMAL PRODUCTION

Cattle-breeding represents in Podgorje a significant branch of the farm economy; it has been mentioned already that the agriculture is orientated and adapted to the requirements of cattle-breeding. The first place according to the number of heads of domestic animals is taken by cattle, with more than 63 percent of this made up by cows. Horses, in number occupy the second place. Most households with more than 5 ha of land have one horse; the bigger farmers have generally two. Horses are used in the tilling of land, and for the transportation of agricultural products and wood. During the period when there is no work in the fields, horses are used for transportation in building enterprises and other economic activities in Kamnik. Transportation services represent for the farmers an important additional source of income.

Third in rank of importance are pigs. In the village most of the bigger farmers have swine for the rearing and selling of young pigs. Domestic fowls are kept in all houses irrespective of their size but are mainly for domestic use.

According to the number of animals per 100 ha of agricultural land,

Table 9

Livestock Breeding

Kind of animals	Number	Big animal units	% of animal units	Number of animals per 100 ha of farmed surface	Number of big anim unit per 100 ha farmed surface	Number of anim. un per 100 of farn popula- tion
I. Horses	63	81.9	24.3	21.7	28.2	24.1
II. Cattle	264	218.5	64.9	90.7	75.1	64.3
calves up to 5 m	42	6.3	x	14.4	2.1	1.9
bull-calves	42	29.4	x	14.4	10.1	8 7
cows	167	167.0	x	57.4	57.4	49.1
bulls	1	1.4	x	0.4	0.5	0.4
oxen	12	14.4	x	4.1	5.0	4.2
III. Sheep, goats	5	0.28	0.08	1.7	0.1	0.1
lambs	4	0.2	x	x	x	x
goats	1	0.08	x	x	x	x
IV. Pigs	269	25.91	7.8	92.5	8.9	7.6
pigs up to 5 m	192	5.76	x	x	x	x
pigs	59	14.75	x	x	x	x
sows	18	5.4	x	x	x	x
V. Fowl	651	9.765	2.9	223.8	3.3	2.9
hens	651	9.765	x	x	x	x
Total	x	336.36	100	x	115.6	99.0

and the number of big animal units per 100 ha of farmed surface and per 100 of farming population, cattle, with 90.7 heads per 100 ha of farmed land, and 75.1 animal units per 100 ha of farmed land and 64.3 animal units per 100 of farm population are most important. Horses also have a high density: 21,7 horses per 100 ha of farming surface, 34 per 100 ha of arable land, 28,2 animal units per 100 ha of farming surface and 24,1 animal units per 100 ha farming population. The breeding of pigs is important as well; the numbers here are: 92,5 heads per 100 ha of farming surface, 8,9 animal units per 100 ha of farming surface, and 7,6 animal units per 100 of farming population. All in all the number of all kinds of animals comes to 115,6 animal units per 100 ha of farming surface and 99 animal units per 100 ha of farming population. (Table 9).

In stock-raising the main emphasis lies on the production of milk and meat, less on the rearing of stock. The products like milk or meat are sold partly in the village to the non-agrarian population, the larger part, however, is for sale in Kamnik.

Table 10

Animal production

Kind of product	Number of productive animals	Average yield	Production	Production in grain units	% in grain units
milk (litres)	167	2240	374 080	2795	58.5
meat (kg)				1214	25.4
bulls	4	600	2 400	144	3.0
cows	16	400	5 400	384	8.0
calves	69	70	4 830	241	5.1
young cows	3	350	1 050	63	1.3
pigs	59	110	6 490	324	6.8
sows	9	130	1 170	58	1.2
eggs					
hens	651	95	61 845	154	3.2
Total	x	x	x	4163	37.1
		B			
Sold for stock					
cows	8	400	3 200	192	4.1
calves	3	70	210	10	0.2
pigs	78	10	780	39	0.8
swine	12	80	960	48	1.0
horses	12	450	5 400	324	6.8
Total	x	x	x	613	12.9
Total from A & B:	x	x	x	4776	100

One of the most significant products is milk, which supplies 58,5% of the total animal production. The quantity of meat sold in the village amounts to 25,4% of the animal production. Cattle is sold mostly for meat, for feeding they sell only a few months-old pigs. The total animal production of the sold stock amounts to 613 grain units or 12,9% of the animal production. Milk and meat plus eggs together, on the other hand, make up 87,1% of the animal production. (Table 10).

9. GROSS PRODUCTION

In the foreground of the farming production in Podgorje village both plant and animal production are equally important. According to table 11 plant production takes up some 57,7% of the total agricul-

Table 11

Gross production

Specification	Production in grain units	% in grain units	% of the group
A) Food crops	2 995	26.5	100
wheat	852	7.5	28.4
potatoes	1 601	14.1	53.5
vegetables	155	1.4	5.2
fruit	268	2.4	8.9
other food crops	119	1.1	4.0
B) Fodder crops	2 861	25.2	100
maize	146	1.3	5.1
barley	194	1.7	6.8
oats	111	1.0	3.9
beetroot, carrots	165	1.4	5.7
lucerne	845	7.5	29.5
red clover	447	3.9	15.7
meadows	862	7.6	30.1
other fodder crops	91	0.8	3.2
C) Industrial crops	677	6.0	100
Total crop production	6 533	57.7	x
D) Milk	2 795	24.7	100
E) Meat	1 214	10.8	100
pork	324	2.9	26.7
beef	528	4.7	43.5
other kinds	362	3.2	29.8
F) Eggs	154	1.4	100
G) Sold for stock	613	5.4	100
Total animal production	4 776	42.3	x
Grand total	11 309	100	100

tural production and animal production — 42,3% of gross production. The meat consumed at home is not taken into account here, so we can assume that animal production is in fact bigger than plant production. Each farming household butchers at least one pig yearly, bigger farms two or even more of them. Since the production of fodder crops reaches a relatively high percentage in plant production, and the production from livestock breeding nearly half of the total gross production, we can classify the village of Podgorje as oriented mainly towards livestock breeding [1] (Table 11).

[1] Using the same methods as in previous Polish studies, the agricultural productivity has been established as 38,8 grain units per 1 km of agricultural land (22,4 grain units of plant production and 16,4 grain units of animal production). Since, according to the author the whole animal production is not taken into account here, the animal productivity should be estimated higher and the total productivity surpasses probably 40 grain units per 1 ha of agricultural land. By the same methods the farming orientation of Podgorje may be determined as productive, vegetable-animal, food-fodder, potato-meadow hay-lucerne-dairy cattle orientation — $4 \times V_2(a_1pt + f_1mh,lc) + A_2(cd)l$ (Editor's comment).

GEOGRAPHIA POLONICA 5, 1965

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THE VILLAGE OF SEBEBORCI ON THE SLOVENIAN FRINGES OF THE GREAT PANNONIAN PLAIN

Sebeborci is an agrarian settlement lying on the northewestern fringes of the Pannonian Plain in Slovenia (in the North-West of Yugoslavia). The village territory consists mainly of a pleistocene alluvial terrace, and of a part of a group of tertiary hills called Goricko. The settlement is 7 km away from the local centre of Murska Sobota, which was until the World War II primarily an administrative centre of the agricultural area but in the last decade has become industrialized. The village is connected with Murska Sobota only by a road of grade II rank; the nearest railway station is 3 km away. The houses of the village are distributed between the terrace plain and the hills in a line along the road. The number of houses is growing slowly: in 1869 it had 79 houses, in 1910 — 122 houses, in 1962 — 130 houses. The growth of the population in the present century has also been slow. In recent years owing to increasing emigration, it has even retrograded. In 1869 the village had 440 inhabitants, in 1910 — 592, and to-day it has 544 inhabitants.

1. NATURAL CONDITIONS

In microgeographic respect, the territory of Sebeborci occupies three natural geomorphological units: the plain and somewhat dry diluvial terrace, the fringe of the tertiary hills, and a more moist area, where the brooks from the tertiary hills force their way inte the terrace. The largest in size and the most suitable part for agricultural utilization is repsesented by the kilometres broad diluvial terrace. The terrace is composed of gravel and sand and is overlain with thin loamy soil. The

Fig. 1. A view from the dilluvial terrace towards the tertiary hills of Goricko

area of the terrace is, because of the favourable natural conditions, mainly utilized for fields. It is also the oldest infield („Polje-Field") with an open-field strip pattern surrounded by smaller and more recent regularly divided out-fields on the borders of or beyond the terrace. The moist area, around the streams, is in the main an alluvial plain which is covered with deposits of loam. As this is a worse kind of land, it is chiefly used for meadows and forest.

The fringe of the tertiary hills which lie west of the village is composed of tertiary sands covered with poor soil. This part is; used in a variety of ways and although it is mainly covered with forest, fields and vineyards are also found.

In Prekmurje, the province to which the village of Sebeborci belongs, the characteristics of a continental climate, with rather cool winters and preportionately warm summers, prevail. The average monthly temperature is below zero in December, January, and February. Then, from April till October the average monthly temperature is above 9.5°C; between July and August it varies from 18 to 20°C. A sign of the long and warm autumn is the average September temperature of 15°C.

The distribution of precipitation is another climatic feature which favours the farm economy. The mean yearly quantity of precipitation is 766 mm, with the yearly variation between 700 and 900 mm. More

Table 1

The average monthly and yearly temperature in Murska Sobota for the period 1925—1956

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Degrees in C:	-2.6	-0.7	4.1	9.7	14.0	17.8	19.5	19.7	15.0	9.4	4.7	-0.2

The medium yearly temperature for 1925—1956 period: 9.1

of the precipitation falls in the warm half of the year — in the vegetation season. From April to October the monthly average of precipitation increases to above 50 mm; the months with most rain — on the average more than 75 mm per month — are June, July, August, and September. A most favourable circumstance in the regime of precipitation is the high amount of rain in the late spring months and in the early summer, when the crops need a great deal of moisture. In summer, precipitation comes in the form of showers, chiefly thunderstorms. When the temperatures are high, strong evaporation may cause drought.

Table 2

Medium monthly and yearly amount of precipitation in Murska Sobota for the period 1948—1956

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Millimetres:	47.7	41.5	25.0	54.1	79.2	102.0	74.5	75.5	99.7	66.2	65.6	44.1

Medium yearly amount: 766 mm

Fig. 2. A view from the tertiary uplands of the field surfaces on the dilluvial terrace

The favourable distribution of precipitation and high temperatures during the whole of autumn forms the basis for a long vegetation season, which makes it possible to grow two crops: a main crop and a stubble field crop, as well as providing favourable conditions for the growing of orchard trees and vines.

3. THE SOCIAL AND OWNERSHIP RELATIONS

The agricultural land of Sebeborci is privately owned. Only a small part of the land is state-owned. The social and ownership conditions vary a great deal. Of the total number of farm holdings, 15% have up to 2 ha of land, 10% from 2 to 3 ha, 25% from 3 to 5 ha, 25% again from 5 to 8 ha and another 25%, more than 8 ha of land. (Table 4).

Table 3

The size in hectares of land uses according to the social and ownership groups

Social and ownership categories		Arable field	Meadow	Orchard	Vineyard	Garden	Pasture	Forest	Waste land	Built-up area	Total
0 — 0.5	ha	0.73	0.13	0.20	0.11	—	—	0.05	—	0.21	1.43
	%	51.2	9.3	13.7	7.5	—	—	3.7	—	14.6	100 %
0.5 — 2	ha	7.52	3.13	1.13	0.40	—	—	3.32	—	0.52	16.02
	%	46.9	19.5	7.0	2.5	—	—	20.8	—	3.3	100 %
2 — 3	ha	21.85	5.89	2.16	0.79	0.02	—	5.66	—	0.87	37.24
	%	58.7	15.8	5.8	2.10	0.05	—	15.2	—	2.35	100 %
3 — 5	ha	63.36	21.08	5.93	2.50	0.23	0.07	19.35	0.07	1.71	114.32
	%	55.4	18.5	5.2	2.2	0.15	0.05	16.9	0.05	1.55	100 %
5 — 8	ha	95.11	37.77	7.91	4.17	0.12	0.41	39.03	0.16	2.13	186.81
	%	50.9	20.2	4.2	2.3	0.06	0.24	20.9	0.08	1.12	100 %
8 — 10	ha	37.46	14.38	3.71	1.60	0.01	0.03	28.62	0.03	0.77	86.61
	%	34.2	16.6	4.3	1.7	0.02	0.04	33.2	0.04	0.9	100 %
above 10	ha	109.50	49.32	9.20	4.75	0.02	0.72	58.10	0.12	1.76	233.49
	%	46.9	21.3	3.9	2.1	0.00	0.30	24.9	0.05	0.55	100 %
Total	ha	335.53	131.72	30.25	14.32	0.40	1.23	154.15	0.38	7.97	675.95
	%	49.6	19.6	4.4	2.1	0.06	0.2	22.8	0.05	1.19	100 %

90% of the land therefore is in the hands of landholders with more than 2 ha a large part — 50% — of land belonging to land holdings that have more than 8 ha (Table 3).

Even in the past, the village was not able to maintain the whole of its, population. Part of it emigrated as early as before World War II for good. Another part of population, particularly smaller farmers, found already before World War I and between the Wars a source of additional income in seasonal work outside the village. Before World War I they used to migrate for seasonal work on the farms to Hungary; and between the Wars to France, Germany, and to Vojvodina (Yugoslavia). Since World War II however they find such work on the larger farms in Slovenia, or in the building industry in the towns. In recent years seasonal employments has been on the decrease because by finding employment in other parts of Slovenia or in Murska Sobota the population tends to migrate permanently, or journeys daily to work in Murska Sobota or in the nearby Panonce. One consequence of this has been the decrease in the number of inhabitants, another the decreasing percentage of the farming population. Of the total 544 inhabitants, 72% live by farming and the rest are employed in other occupations in Murska Sobota of Panonce.

Table 4

The number of farm holdings according to the social and the ownership categories

Localities	Social and ownership categories	0—0.5	0.5—2	2—3	3—5	5—8	8—10	above 10	Total
Sebeborci	number	7	12	14	29	31	10	20	123
	%	5.6	9.7	11.4	23.8	25.2	8.1	16.2	100%

In the process of the farming population transferring to non-agrarian occupations, four types of land holdings have developed. The first type represents pure farm holdings, with all members of the family working permanently on the farm. The second type are the half-farming holdings, where some members of the family work as well outside the farm, in non agricultural occupations. The third type of land holdings are those, where all of the household, except the housewife, work outside the farm. The fourth type are the worker's households which consist simply of a house and a garden.

53% of the holdings are of the pure farm type and these possess two thirds of the land. The second type occupies one fourth of the land and the part-time farmers possess another fourth of the land.

The remaining 20% belongs to the non-farming families who have in their hands 9% of land (Table 5, 6).

Table 5

The number of land holdings according to the economic activity and according to the social and the ownership categories

The social and the ownership categories	A		B		C		D		Total	
	number	%	number	%	number	%	number	%	number	%
0 — 0.5	1	14.3	—	—	—	—	6	85.7	7	100
0.5— 2	3	25	3	25.0	4	33.3	2	16.7	12	100
2 — 3	4	28.6	3	21.4	7	50.0	—	—	14	100
3 — 5	15	51.7	12	41.4	2	6.9	—	—	29	100
5 — 8	19	61.3	9	29.0	3	9.7	—	—	31	100
8 —10	8	80.0	1	10.0	1	10.0	—	—	10	100
above 10	15	75.0	5	25.0	—	—	—	—	20	100
Total	65	52.8	33	26.8	17	13.9	8	6.5	123	100

A = pure farming households
B = mixed half-farming households with preponderance of active members occupied with farming
C = mixed half-farming households with preponderance of active members not occupied with farming
D = non-farming households

Table 6

The size in hectares of landholdings according to the economic activities and according to the social and the ownership categories

The social and the ownership categories	A		B		C		D		Total	
	ha, a	%	ha, a	%	ha, a	%	ha, a	%	ha, a	%
0 — 0.5	0.21	15.00	—	—	—	—	1.21	85.0	1.42	100
0.5 — 2	4.65	29.10	3.34	20.8	5.22	32.5	2.83	17.6	16.03	100
2 — 3	10.50	30.6	7.46	21.7	16.33	47.7	—	—	34.29	100
3 — 5	58.52	51.2	47.46	41.5	8.34	7.3	—	—	114.32	100
5 — 8	115.60	61.9	53.89	28.8	17.33	9.3	—	—	186.82	100
8 —10	70.18	81.1	8.27	9.5	8.18	9.4	—	—	86.63	100
above 10	176.32	75.5	57.16	24.5	—	—	—	—	233.49	100
Total	435.98	64.8	177.58	26.4	55.40	8.2	4.04	0.6	673.00	100

Even more characteristic is the proportion between the size and the professional structure of the landholdings. In the group of landholders with 0.0—0.5 ha of land all the households are of the working-class type; in the group of landholders with 0.5 to 3 ha of land, one fourth hold pure farming landholdings, one fourth are part-time farmers, and one half non-farmers, where only the housewives work at home. Of the land holdings with more than 3 ha of land, 90% are

comprised of farming and part time farming households. It is worthy of note, that among the households with more than 8 ha of land, already one fourth are half-farming holders, which indicates, that the process of disintegration of the farming households has in recently started to affect all sizes of holdings (Table 3).

4. LAND UTILIZATION

The total area of Sebeborci comprises 675.96 ha. Three quarters of it are taken up by cultivated land. Here arable fields are predominant (with 49% of the total area): next come the meadows (with 19.6%) followed by orchards (with 4.4%) and vineyards (2.1%). Forest occupies 23%; and there are also some insignificant patches of waste land. (Table 1). The proportions between land use and the categories of land-holders show arable fields in every case to hold the first place. The proportion between meadows and forest differs with all groups of land-owners, some have more meadows, other more forest. For the size of the areas of land use two sources of information have been drawn upon: the cadaster, and the statistical data from the registration of farm economy in 1960. The data given by the two sources are seldom identical. The statistical registration from 1960 compared with the cadastrian data shows 10 ha less land, 7 ha more meadows. 2 ha less vineyards, and 1.5 ha less orchard. The differences are due on the one hand to the different oriteria of registration, and on the other, to the process of turning worse-quality fields, orchards and vineyards into meadows.

a. The Way of Land Utilization

Although in the recent years the professional structure of the farming has shown changes in all directions, there are no traces of changes in the ways of land utilization. The method of tilling the land is, in all the social and ownership categories is very similar. The more primitive methods of tilling the land, which prodominated until recently, are slowly being substituted by more modern ones. Tillage with draft animals however is only slowly replaced by tillage by machines.

As the raising of live stock is very well developed, stable dung is everywhere used as manure, to which fertilizers are added. Potatoes and maize are manured with stable dung; rye and wheat with stable dung and fertilizers; meadows in certain places with dung.

The crops are rotated in three ways: in a three-year rotation system and in two variations of a four-year rotation system.

I) the three year rotation system:
   1) wheat
   2) rye — turnip or buckwheat (stubble crop)
   3) maize or potatoes

II) a four year rotation system:
   1) wheat
   2) rye — turnip or buckwheat
   3) clover
   4) maize or potatoes

III) a four year rotation system:
   1) wheat
   2) rye — turnip (stubble crop)
   3) potatoes or maize
   4) clover

Small landownership and the fragmentation of the plots in the village area makes only modest forms of mechanization possible; in the main just those confined to draught cattle or horses.

On an average, of 21 plots of land on one farm 6 are arable land plots, 6 meadow plots, 4 forest plots, 1.1 plots of vineyard, and 1.4 plot of orchard (Table 7).

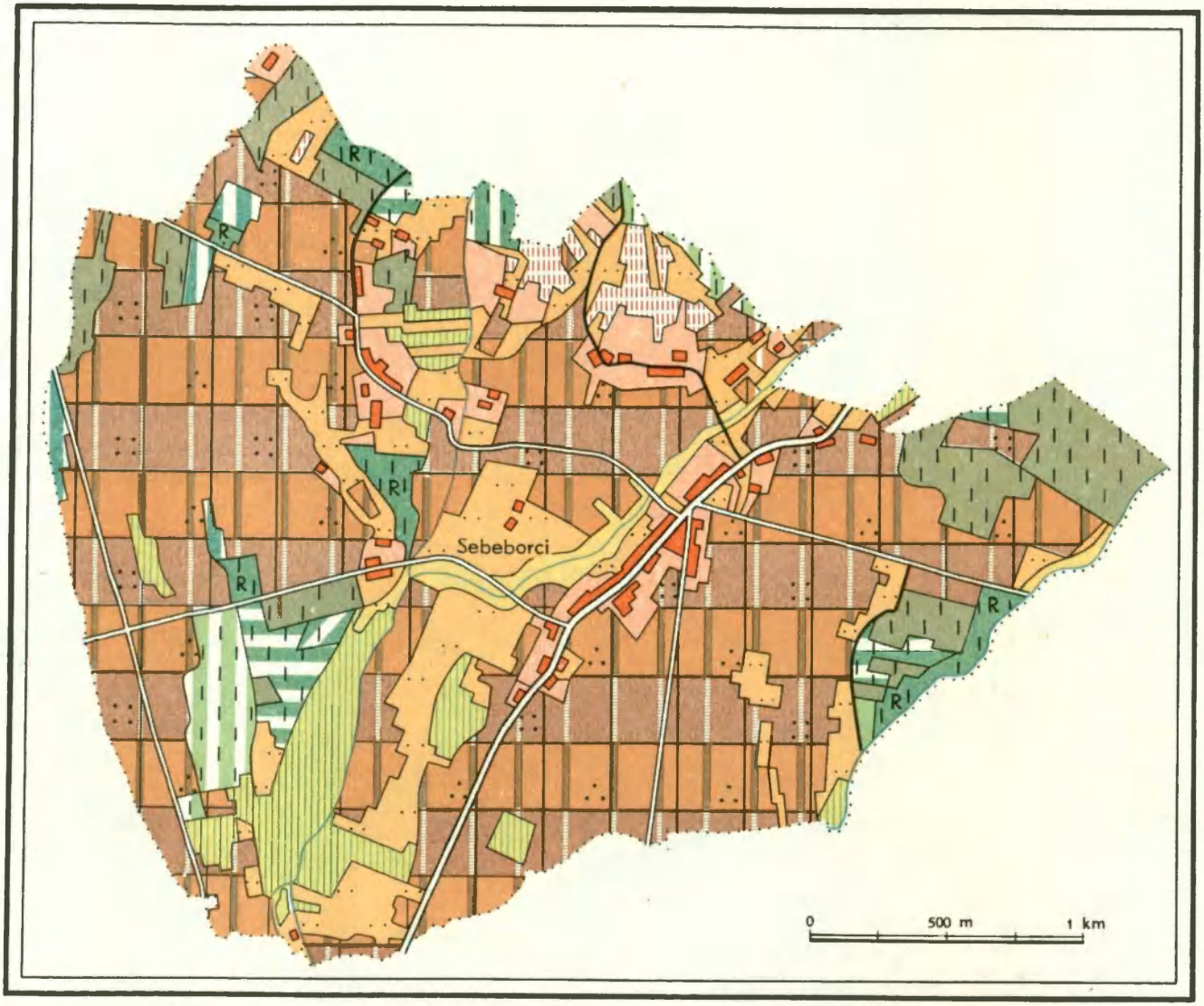
Table 7

Average number of land plots per 1 landholder according to the social and the ownership categories

The social and the ownership categories	Arable fields	Meadows	Orchard	Vineyard	Garden	Pasture	Forest	Waste built-up land	Total
	ha, a	ha, a	ha, a	ha, a	ha, a	ha, a	ha, a	ha, a	ha, a
0 — 0.5	0.8	0.2	0.2	0.1	—	—	0.1	1.2	3.0
0.5— 2	2.3	2.1	0.6	0.5	—	—	1.5	1.7	9.0
2 — 3	4.6	3.4	1.5	0.7	0.2	—	2.0	2.1	14.8
3 — 5	6.3	4.5	1.2	1.3	0.3	0.03	3.7	2.0	19.6
5 — 8	7.9	6.0	1.6	1.3	0.1	0.06	3.9	2.2	23.2
8 —10	7.5	6.1	1.7	1.8	0.2	0.1	7.7	2.0	27.1
above 10	10.3	8.2	2.1	1 9	0.05	0.3	7.5	2.5	33.0
Total	6.5	5.0	1.4	1.2	0.1	0.0	4.1	2.0	20.8

The average size of a plot is 26 ares; in greater detail — that of an arable field plot — 41 ares, of a meadow plot — 21 ares, of a vineyard one — 0.9 are, of an orchard plot — 0.9 are, and of a forest plot — 31 ares (Table 8).

All the land is cultivated. Farmers assist one another in their work. Bigger farmers help the smaller ones with draught cattle, horses, machines, and the smaller ones help them with their labour in turn. For the kind of work that requires a lot of hands at one time, as is the case with the harvest or threshing, the additional help is received



Map 1. The village of Sebeborci. Land utilization map

Table 8

The average size of land plots per 1 landholder according to the social and the ownership categories

The social and the ownership categories	Arable fields	Meadows	Orchard	Vineyard	Garden	Pasture	Forest	Waste built-up land	Total
	ha, a	ha, a	ha, a	ha, a	ha, a	ha, h	ha, a	ha, a	ha, a
0 — 0.5	0.12	0.7	0.10	0.11	--	—	0.5	0.2	0.7
0.5— 2	0.27	0.12	0.14	0.7	—	—	0.17	0.2	0.15
2 — 3	0.34	0.12	0.10	0.7	0.53	—	0.20	0.3	0.18
3 — 5	0.34	0.16	0.16	0.6	0.2	0.7	0.18	0.3	0.20
5 — 8	0.39	0.20	0.16	0.10	0.3	0.20	0.32	0.3	0.26
8 —10	0.50	0.24	0.22	0.9	0.1	0.3	0.37	0.4	0.32
above 10	0.53	0.30	0.22	0.13	0.2	0.10	0.39	0.4	0.35
Total	0.41	0.21	0.17	0.9	0.2	0.11	0.31	0.3	0.26

from neighbours and from the emigrated relatives, who come back to the village on such occasions.

For land tillage, the village has at its disposal: 119 ploughs, 176 harrows, 34 sowing frames, 2 mowers, 138 straw-cutters, 58 wine-presses, 9 alembic retorts, and 92 other machines. In addition, there are in the village two threshing-machines, one of which is private property, while the other one is owned by the co-operative farm.

b. The Land Utilization Orientation

The outskirts of the Panonnion Plain, where Sebeborci lies, are characterized by a general orientation towards the production of cereals. Up to World War II, 90% of the field surfaces in Prekmurje were sown with cereals. However, the percentage of surfaces sown with cereals owing to the re-orientation towards stock raising, is every year growing smaller. In 1962 it amounted in Sebeborci to only 62%. This quick re-orientation can be ascribed on the one hand to the dairy recently built in Murska Sobota, which daily buys off any quantities of milk, and on the other hand to the extensive possibilities of selling young stock to a factory of meat products, in Murska Sobota for export. As a result the role of stock raising is growing, and the area sown with cereals is decreasing, while the production of fodder crops is growing in importance from year to year.

c. The Utilization of Arable Land

Five crops predominate in the fields. Of cereals wheat and rye, of ridged up crops potatoes and maize, and of fodder crops red clover are the most important. Wheat and rye occupy together 50% of arable land.

maize and potatoes 30%, while the remaining 20% is taken by the rest of the crops. A typical feature here is also the sowing of high-quality grass for seeds, used for grassland surfaces in towns (parks), which gives on small areas a relatively high yield (Table 9). The yields of wheat, maize, potatoes, and rye are as high as the average yields in Slovenia. The yield of wheat per hectare (20.5 q) corresponds to the Slovenian average and is 3 q higher than the Yugoslav average. The average yield of maize is 33.5 q per hectare and is higher both than the

Utilization of farmed land

Table 9

Land categories and crops	ha	% of arable land	% of agri-cultural land	% from group
I. FIELD SURFACES	325.30	100	64.2	x
A) Extractive crops	200.32	61.6	39.5	100
wheat	87.73	27.0	17.3	43.8
rye	78.44	24.1	15.5	39.1
barley	4.15	1.3	0.8	2.1
oats	17.79	5.5	3.5	8.9
millet	12.21	3.7	2.4	6.1
B) Intensifying crops	85.58	26.3	16.9	100
maize	30.59	9.4	6.1	35.7
potatoes	35.77	11.0	7.1	41.8
vegetables, together	5.41	1.7	1.0	6.3
onions, garlic	0.2	0.0	0.0	0.0
paprika	0.10	0.1	0.0	0.1
other kinds	5.29	1.6	1.0	6.2
fodder beets, carrots	4.25	1.3	0.8	5.0
sugar beet	1.34	0.4	0.3	1.6
sunflower	0.2	0.0	0.0	0.0
flax, hemp	0.1	0.0	0.0	0.0
other industrial crops	8.19	2.5	1.6	9.6
C) Structure forming crops	37.88	11.6	7.5	100
lucerne	0.3	0.0	0.0	0.1
red clover	34.70	10.7	6.8	91.6
vetch, tare	0.74	0.2	0.2	1.9
other fodder crops	2.41	0.7	0.5	6.4
D) Unsown land	1.52	0.5	0.3	100
II. PERENNIAL CROPS	39.86	x	7.9	100
orchard	28.54	x	5.7	71.6
vineyard	11.32	x	2.2	28.4
III. PERMANENT GRASSLAND	141.41	x	27.9	100
meadow	138.24	x	27.3	97.8
pasture	3.17	x	0.6	2.2
T o t a l	506.57	x	100	x

Slovenian (28.7 q/ha) and the Yugoslav yield (23.9 q/ha). The yield of fodder crops, particularly of lucerne is comparatively low (58q/ha) and is below the Slovenian average yield (61 q/ha).

A comparatively small parcentage of cultivated land is taken up by gardens, which are normally distributed around or in the vicinity of the houses. In the gardens various kinds of vegetables are grown, such as paprika, tomatoes, lettuce, and some other garden plants, all of which grown mostly for home use [1].

d. Perennial Crops

The growing of orchards and vineyards in Sebeborci is fairly well developed. Both branches however had in the various periods of their economic development a variable history. The conditions of climate are favourable for orchards as well as for vineyards, the long and warm autumns being particularly appropriate. Decades ago, the growing of vineyards was more important than the growing of fruit-trees. On the slope of the tertiary hills each farmer had at least one large or small plot of vines. In post-war years however the growing of vines has decreased — largely because the care of vineyards calls for considerable means, pains and labour, all of which have in recent times been in short supply due to emigration. In most of the vineyards they grow „šmarnica" sometimes called „samorodnica", and many of the plantations are old. The actual size of the vineyards is also rapidly diminishing. Most of the grapes are used for the production of poor-quality wine, consumed mainly at home. Orchards are distributed around the houses and on the slopes of the tertiary hills between the vineyards. Apple-trees and plum-trees are most numerous. Each is represented by about 2000 trees. The remaining fruit trees are: pear-trees, cherry-trees, mahaleb-cherries, peach-trees, and walnut-trees — altogether about 800 trees. With the retrogression of vineyards, the orchards are growing in importance, this is evident from the number — of young trees which make up one third of the number. The orchards are carefully cultivated. Fruit is intended for home-use, for making brandy; and for sale.

e. Permanent Grasslands

Grassland has no particular significance in Sebeborci and it occupies relatively poor and less favourable tracts of the village land. The bree-

[1] Considering the proportion between various field crops the orientation in the utilization of arable land may be determined as wheat — rye with potatoes and maize one ($E_4wh, ry + I_1pt, mz$) (Editor's comment).

ding of cattle is not to any large extent dependent on hay, but more on a chaffed mixture of straw and clover. According to the quality and character, the meadows may be classified in three groups. The first zone of meadows is on the poorer moist ground around the unregulated streams which is covered with alder-wood and false acacia. The second zone is found along the fringe of the forest and nearly everywhere is over grown with shrubbery. The third zone lies near the houses and below the orchards. The meadows are not regularly manured, and indeed are only mown twice a year. In autumn, however, the meadows situated near the village are partly used for pasture.

f. The forest

There is little forest on the territory of Sebeborci and it is broken up into three complexes. The first large tract of forest is in the southern part of the village territory, the second is on the eastern tertiary hills, and the third one, which is in turn broken up into smaller complexes, is on the northern border of the village territory. On the moist ground around the streams hornbeam, alder tree and false acacia are mostly found; on the tertiary hills there is a mixture of pine tree, beech and oak. The preponderance of one kind of tree varies from one tract to another. The forest is privately owned and is devided up into plots. Farmers utilized it until recently for their private needs unsystematically, mostly for fuel and building. Consequently the trees seldom reach mature age. Practically everywhere the immature type of forest prevails, from 20 to 30 years old. The younger stands, up to ten years old, predominate near streams. Trees of mature age are to be found only sporadically. As the use of wood in building has decreased in recent years, and as more and more coal is used for heating, a more rational forest economy is coming under way. The area of the forest has slightly grown in the last 50 years; for parts of the field surfaces on the tertiary land have had to be afforested owing to increasing erosion.

g. Settlement

The settlement of Sebeborci is a typical example of a village, where the houses are all distributed along the roads. In the village there are still a considerable number of houses built of wood and loam, and covered with straw. Before World War I a number of houses were modernized in the style of Panonnian houses. Since World War II some urbanized worker's houses have been erected.

Most of the farmsteads are built „in a key", the first part being the

Fig. 3. An old type of farmstead with houses built „in a key", first being a dwelling house, than the stable and the barn in the background

Fig. 4. An old type of farmstead — „a protracted house" of a farm with 5 hectares of land

Fig. 5. A more recent farmstead, built after World War I, of a land holding with more than 10 ha of land

Fig. 6. A village street with village homes. A more recent part of the village

dwelling house, the second the stable and the third the barn. With a „protracted" type of house those functions follow one another in the same order.

Fig. 7. A village street with village homes. An older part of the village

5. PLANT PRODUCTION

The intensive cultivation of land is best reflected in the comparatively high yields per hectare. The average productivity per 1 ha of agricultural land is 20.9 grain units; 23.9 grain units per 1 ha of arable land, 16 grain units per 1 ha of meadows, 5 grain units per 1 ha of pasture, and 14 grain units per 1 ha of orchard.

The total absolute plant production of the village amounts to 10.585 grain units. The production of food crops occupies more than 50%. Among food crops wheat and potatoes take the first place. The production of wheat amounts to 16.8% of plant production. Potatoes bring 16.8% of plant production, the production of rye and meslin 12% of crop production.

The production of fodder crops amounts to 43.7% of plant production. The most important crop among fodder crops is maize with about 10% of plant production. It must be stressed that in this part of the country maize is used for food as well. Among strictly fodder crops first

comes clover with 8% of the total plant production. Production on the meadows amounts to 21% of plant production.

Industrial crops are in the process of expansion; so far, only a comparatively small part of the field surfaces has been sown with them. The total production of industrial crops is about 1.6% of plant production.

Orchard and vineyard are rather noticeable in the physiognomy of the landscape yet their production compared to other crops remains somewhat low, amounting in total to 5.5% of plant production (Table 10).

Table 10

Plant production

Crops	Yield in q/ha	Yield in q	Production in grain units	% of plant production	% from I, II, III
I. FOOD CROPS	x	x	5792.1	54.7	100
wheat	20.0	1754.0	1754 0	16.6	30.3
rye	16.5	1293.6	1293.6	12.2	22.3
millet	13.2	161.0	161.0	1.5	2.8
potatoes	193.6	7109.9	1777.4	16.8	30.7
vegetables	x	x	224.6	2.1	13.9
onions	184.5	36.9	11.1	0.1	0.2
paprika	70.0	7.0	2.1	0.0	0.0
other kinds	133.0	704.9	211.4	2.0	3.7
fruits	24.0	684.0	273.6	2.6	4.7
grapes	54.5	615.8	307.9	2.9	5.3
II. FODDER CROPS			4629.5	43.7	
maize	33.9	1037.3	1037.3	9.8	22.4
barley	21.0	86.1	86.1	0.8	1.8
oats	15.4	274.1	274.1	2.6	5.9
fodder beetroot, carrots	340.9	1431.7	143.2	1.4	3.1
lucerne	47.0	14.1	7.1	0.1	0.2
red clover	48.2	1672.5	836.2	7.9	18.1
vetch, tare	46.2	32.3	4.2	0.0	0.1
other kinds	60.0	144.0	14.4	0.1	0.3
hay	40.0	5528.0	2211.2	20.9	47.8
pasture	16.9	52.4	15.7	0.1	0.3
III. INDUSTRIAL CROPS	x	x	163.6	1.6	100
sunflower	12.0	2.4	4.8	0.1	2.9
sugar-beet	330.6	429.8	107.4	1.0	65.7
flax, hemp	50.0	5.0	1.2	0.0	0.7
other industrial crops	24.5	200.9	50.2	0.5	30.7
Total	x	x	10585.2	100	

6. LIVESTOCK BREEDING AND ANIMAL PRODUCTION

Since a few years before World War II, livestock breeding has gained in importance; this is particularly due to the food factories in Murska Sobota as well as to the planned purchasing of stock. Stock raising is becoming modernized above all by a careful choice of breed. Farmers have taken to breeding, primarily, young cattle for butchery, cows, and pigs. The number of stock expressed in big animal units is 584. Of that number 67.7% are cattle. Pigs are second in number (19.9%), then horses (7.6%) and the domestic fowl (4.6%). The economic significance of domestic fowl breeding is not satisfactorily expressed in big animal units, since the selling of eggs similarly to the selling of milk, brings a regular and significant income (Table 11).

Table 11

Livestock breeding

Kind of animals	Number	Total number in big animal units	% of animal units according to kinds of animal	Number of heads per 100 ha of farmed land	Number of big animal units per 100 ha of farmed land	Number of animal units per 100 ha of farming population
I. HORSES	34	44.2	7.6	6.7	8.7	9.8
horses	34	44.2	x	x	x	x
II. CATTLE	497	396.55	67.8	98.1	78.3	87.9
calves up to 5 months	61	9.15	x	12.0	1.8	2.0
cows	162	113.40	x	32.0	22.4	25.1
bulls	274	274.0	x	54.1	54.1	60.8
III. SHEEP	2	0.2	0.03	0.4	0.1	0.1
sheep	2	0.2	x	x	x	x
IV. PIGS, SWINE	694	116.21	19.9	137.0	22.9	25 8
pigs up to 5 months	287	8.61	x	x	x	x
pigs	290	72.50	x	x	x	x
swine	117	35.10	x	x	x	x
V. DOMESTIC FOWL	1795	26.91	4.6	354.4	5.3	5.9
hens	1717	25.75	x	x	x	x
ducks	53	0.79	x	x	x	x
geese	12	0.18	x	x	x	x
turkeys	13	0.19	x	x	x	x
Total	x	584.07	100	x	115.3	129.5

For a survey of stock-raising production we have available the data for the production of milk, for the production of cattle and pigs sold for butchery and stock, and for the production of eggs. We do not possess data for the production of meat that was consumed at homes in the village. As these quantities are comparatively great — each

household butchers one to two pigs yearly — we cannot get an objective insight into the stock-raising production. According to the data available, the first place in the value of stock-raising production is taken by milk — with 57,3% of the total animal production. The yearly production of cattle and pigs sold for butchery amounts to 29%. The value of swine and calves sold for breeding amounts to 5,8% of the animal production. The production of eggs amounts to 7,6% (Table 12).

Table 12

Animal production

Kind of product	Number of animals	Average yield	Production	Production in grain units	% of production in grain units
A. Milk	274	1500 l	411.000 l	3.082	57.3
Meat — stock					29.1
calves	9	70 kil.	630	31	0.6
cattle	28	450	12.600	756	14.0
swine	156	1000	15.600	780	14.5
Eggs					
hens	1717	95	163 115	407	7.6
Total	x	x	x	5.056	94.0
B. Sold for stock					
calves	35	70 kil.	245	12	0.2
swine	31	80	2.480	124	2 3
cattle	7	450	3.150	189	3 5
total from A & B:	x	x	x	5.381	100

7. GROSS PRODUCTION

The gross production of the village is 15,966 grain units. Here, the plant production share is 66,3%, and the animal production share 33.7%. In fact however the share of animal production is larger, for as we have already mentioned the production of meat for home-use; has not been taken into consideration.

The total production of 15.966 grain units per 505 ha of agricultural land, or 31 grain units per 1 ha is comparatively good (Table 13).

The fact that the production of food crops occupies 36.3% of the gross production, the production of fodder crops 29% and the production from stock raising 33% indicates that the orientation of farming in Sebeborci may be determined as medium productive, vegetable, food--fodder, wheat-rye-meadow hay with dairy cattle breeding — $3 \times V_3(a_1\ wh,\ ry + f_1 mh) + A_1\ (c_1 d)\ l$.

Table 13

Gross production

Specification	Production in grain units	% in grain units	% of the group
A) Food crops	5 792	36.3	100
wheat	1 754	11.0	30.3
rye	1 294	8.1	22.3
potatoes	1 777	11.1	30.6
vegetables	224	1.4	3.9
fruit and grapes	582	3.7	10.1
other food crops	161	1.0	2.8
B) Fodder crops	4 629	29.0	100
maize	1 037	6.5	22.5
oats	274	1.7	5.9
red clover	836	5.2	18.1
meadows	2 211	13.9	47.8
other fodder crops	271	1.7	5.7
C) Industrial crops	164	1.0	100
sugar-beet	107	0.6	65.2
other industrial crops	57	0.4	34.8
Total plant production	10 585	66.3	
D) Milk	3 082	19.3	100
E) Meat	1 567	9.8	100
pork	780	4.9	49.8
beef	756	4.7	48.2
veal	31	0.2	2.0
F) Eggs	407	2.5	100
G) Sold for stock	325	2.0	100
Total animal production	5 381	33.7	
Grand total	12 966	100	100

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[3] S. Ilesic, Problemi Pomurja v geografski osvetlitvi. (The Problems of Pomurje from a geographical point of view). Svet ob Muri II — 1, Murska Sobota 1956.

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GEOGRAPHIA POLONICA 5, 1965

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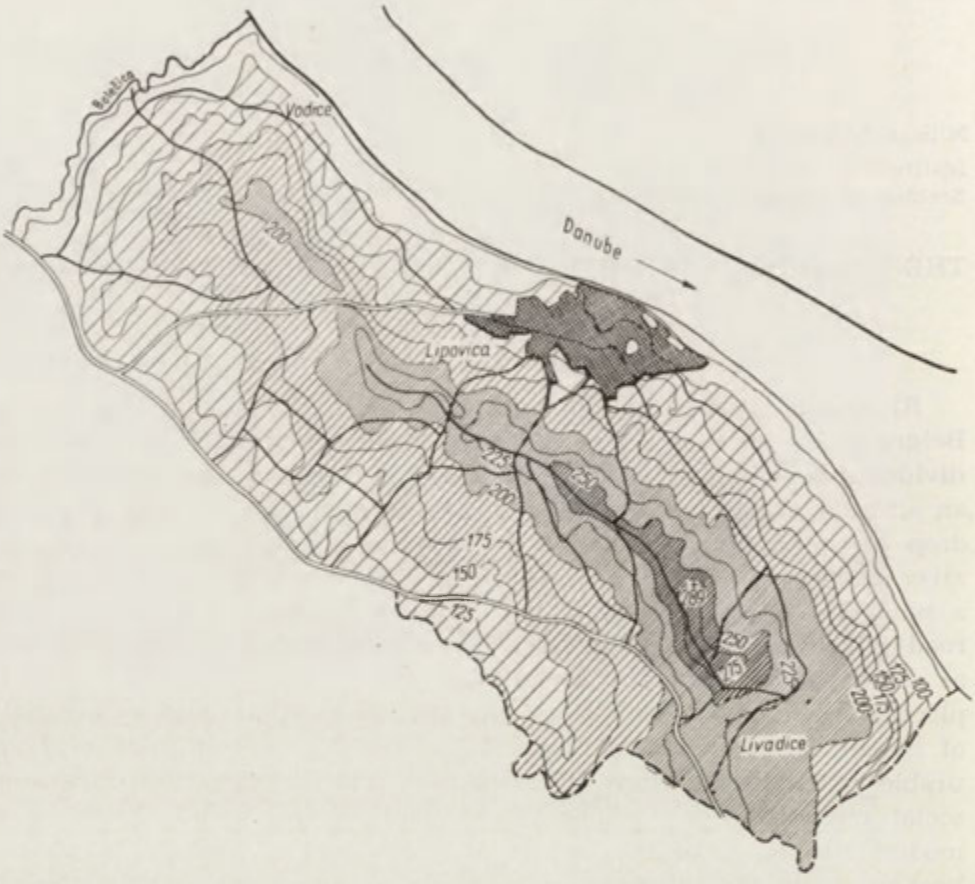
THE VILLAGE OF RITOPEK ON THE DANUBE IN THE SUBURBAN ZONE OF BELGRADE

Ritopek is situated on the right bank of the Danube, 17 km east of Belgrade. Its territory which covers an area of about 1700 ha can be divided into two parts: the one the river-side of the Danube with an altitude which varies from 80 to 288 m and the other, whose slopes drop away gradually towards the southwest into the valley of the river Bolecica (100 m.). The former gravitates towards the Danube as a navigable route and the latter toward the ancient Constantinople road which leads to Belgrade. Such a geographical situation as well as natural conditions contributed to an early human settlement of this place. In the course of its history, this site has been occupied by a variety of human settlements. Its progress and development in spite of favourable natural conditions has depended chiefly upon historical and social circumstances. Changes took place several times. From being modest hamlet, until the end of the 18th century, Ritopek gradually became under the influence of Belgrade, a prosperous agricultural settlement, in which there developed characteristic forms of suburban agriculture, particularly fruit-growing and viticulture. In the present paper, the phases of this development in the course of the last 200 years, a period for which the data is more abundant and reliable will be followed.

1. PHYSICO-GEOGRAPHICAL CONDITIONS

Ritopek lies on the contact line which follows the fault line between the Pannonian Plain in the north and the hilly region in the south. Both the Pannonian Plain and its sorround which were submerged

during the Pliocene, are covered with lacustrine sediments. On these sediments some specific relief forms have developed due to erosion. The valley side of the Danube is characterized by landslides descending in the direction of the river. Their formation is due to the influence of



Map 1 Ritopek. Hipsometry

the gradient and the structure of the soil. Because of the steep slope and the weight of loose materials (sand, alluvia, humus and loess) permeated with water, the surface soil slips on the clay substrate. This occurs chiefly when heavy rainfall and the melting of snow concide. The landslides date from different periods: some have taken place quite recently: in the latest one which occured in the same village of Ritopek in 1942, several houses had to be resited [1]. As a result, almost the whole

[1] P. S. Jovanović, Urvine u okolini Beograde (Landslides in the surroundings of Belgrade), Glasnik Srpskog geografskog drustva, V. 34, Nr 2, Beograd 1954.

of this slope which descends towards the Danube is covered on account of these slidings of superficial strata with a large number of very ancient and more recent landslides in the form of graded ramparts, hills, slopes, plateaux and small depressions between the hills.

In the other, south-western part of the area the relief has a different character. The slopes gradually decline towards the river Bolecica and its tributary. They are occasionally dissected by minor watercourses through which water flows only in spring and in autumn. In short, this part of the village territory is characterized by gently undulated relief forms.

The climate of Ritopek depends not only upon general geographical situation but also upon the local natural conditions (microrelief). The prevailing type of the climate is continental characterized by strong winters and comparatively warm summers. The distribution of precipitation has also a continental character.

Owing to a lack of climatic data on the village Ritopek itself, we may reliably use those relating to Belgrade, on account of the proximity and similar geographic situation of these two localities.

Table 1

Average monthly and yearly temperatures; meteorological station Belgrade

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Yearly average
°C	— 0,2	1,1	6,2	11,9	16,8	20,4	22,7	21,3	17,8	12,7	8,0	1,1	12,3

As can be seen from the above table, temperature maxima appears in July and temperature minima in January. The oscillations of temperature are rather important. The average temperature maximum in July amounts to 39.4°C. Consequently the difference between the warmest and the coldest day amount to 64,9° C. But these temperature extremes between the coldest and warmest days in a month and in a year are not so important for agriculture. The amount and the distribution of precipitation in the course of the summer part of the year is far more important in this area. The temperature above of 5°C at which vegetation growth can begin occurs from the beginning of March until the end of November. The growing period lasts, consequently, almost nine months. This does not mean, of course, that temperatures do not drop below 0° after and before the above mentioned dates [2].

The average latest light frost occurs on March 29th and the earliest

[2] M. Milosavljević, Temperaturni i kisni odnosi u NR Srbiji (Temperature and rain conditions in the P. R. of Serbia). Godisnjak Poljoprivredno-sumarskog fakulteta, Beograd 1948.

one on November 10th. The period without frost lasts 226 days. The extreme dates of the frost occurrence, however, are as follows: the last frost in the spring may occur between February 16th and May 3rd; the first frost of the autumn occurs sometime between October 13th and December 27th. The maximum duration of the frostless period is 291 and the minimum 180 days [3]. A highly important fact is the comparatively high temperatures in the summer part of the year. The weather in autumn is particulary warm and mild and exerts a favourable influence on the ripening of grapes and various other fruits. Among the factors which determine such a favourable climate it is necessary to point to some local influences, such as the exposed position of the slopes and the nearby water surface of the Danube. In this respect there is a difference between the slopes of Danube valley and those facing the southwest. The former are more suitable for viticulture and fruitgrowing than the latter, owing to the fact that the sun rays, reflected from the water surface of the Danube are refracted on the slopes, thus increasing the temperatures during the growing period. In addition, the influence of the Danube moderates the temperature extremes of the day and night, while the permeable soil absorbs warmth.

For the growth of various crops the distribution and amount of precipitation in the course of the growing period is also very important. The following table shows the amount and distribution of precipitation according to months.

Table 2

Average sum of monthly and yearly pricipitations in the period from 1925 to 1940
Meteorological station Belgrade

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Yearly average
°C	45,7	37,1	48,0	52,6	81,5	75,8	56,8	72,4	46,8	64,7	48,6	55,9	685,9

The average yearly total of precipitation amounts to 685,9 mm. However, there are considerable differences in precipitation between the driest and the wettest years. The maximum yearly sum of precipitation amounts to 984,4 mm and the minimum to 424 mm. However, under normal circumstances, precipitation is rather evenly distributed. The highest rainfall occurs in May and in June when moisture is most urgently needed by the plants. The average number of rainy days with precipitation varying from 5,0 to 9,9 mm is highest in May, December and March. The index of aridity is highest in September, July and August, when evaportation is strong and the amount of rainfall small.

[3] Data obtained from the Hydrometeorogical Service of the P. R. of Serbia.

In addition, at this time rains fall in the form of showers and plants are unable, owing to the rapid run off, to use considerable quantities of water, particularly on the steeper slopes. Whether there amounts of moisture is sufficient, depends on the soil structure and method of tillage as well as on the natural properties of the cultivated plants.

On the gentle slopes and plateaux, where the soil consists of clay, bituminous earth and alluvia, the crops use every drop of rain. Humidity is sufficient to make various varieties of wheat and maize thrive particularly if the tilling is well planned. On the steeper slopes of the Danube valley, where the water run off is fast, the precipitation is generally sufficient, vines and such fruits as require a high temperature and less humidity in the later part of summer and in autumn months are cultivated there. Only crops which can survive periodic droughts are cultivated on the steeper slopes where the soil is poor and the drainage more pronounced. The structure of drainage cannot be followed with any great precision since there are no rivers there except the Danube, which cannot be taken as evidence. In the area of Ritopek there are only a number of small streamlets whose beds contain water only in March when the snow melts and in November when there are heavy rainfalls. Occasionally they revive to form torrents during heavy showers in the summer. Otherwise they run dry as early as the beginning of summer. Only the springs maintain themselves particularly on those spots where the water table has been tapped owing to landslides. They are situated for the most part in the depressions between hills where water frequently forms little ponds and has to be drained off by means of channels. Such sources serve also for watering vegetable crops which as a result are generally grown in these depressions.

In the territory of Ritopek village, various soil types have developed. This mosaic is particularly obvious an the slopes facing the Danube. As has been already said, the lower parts of the sides are formed of clay and gravel mingled with very fine sand, brought by the wind from the river banks. This soil is particularly suitable for vine- and fruit--growing. The pedologic composition of the middle parts of these slopes characterized by hills and depressions formed as a consequence of landslides, is very heterogenous. In the main the hills consist of clay and deluvial deposits, covered with a layer of humus. This deep, porous and fertile soil is very well suited for vineyards and orchards. Depressions in which the basic stratum of clays and sands have been exposed are often sweepy and overgrown with marsh herbs. If drained and fertilized, they are particularly well suited for vegetable growing.

The upper parts of the Danube slopes are exposed to erosion and denudation, and there appear degraded brown earth and podzols. These

soils are, however, also suitable for vine growing, if additional care is paid, except in the ravines, which are now overgrown with false acacia trees and spontaneous forest vegetation.

In the south-western area of the territory of Ritopek where the slopes are more gentle, the brown earth are the predominant soil type. On this soil wheat, maize, sunflower, common vegetable sorts (particularly onion), vine and various fruits thrive.

As can be seen, the natural conditions are favourable, as regards rainfalls and pedological composition of the soil, for the growing of many plant cultures. However, these geographical advantages have not always been exploited to their fullest extent, much has depended frequently on the historic and social conditions. In some cases people grew only those plants which are most necessary without considering the geographic conditions. As a result of this only some plants were introduced, while others were suppressed or restricted to a narrow area.

2. SOCIAL AND ECONOMIC CHANGES

Thanks to its favourable geographical situation as well as to other natural conditions, this region has been inhabited since the remotest times of human history. The remains of human settlements can be traced back as far as the neolithic age. In the Roman times there existed here an important agglomeration called Tricornium. There is some evidence that at that time, i. e. during the reign of the emperor Probus, viticulture was introduced into the region. At about the time of the fall of the medieval Serbian state in 1459 this region was known as a very populated and prosperous province. Since that time, however, until the final liberation from the Turkish rule in the beginning of the 19th century, it was a continuous battleground with a population continually in flux. Under these circumstances, natural conditions could not manifest themselves in land utilization and other forms of life. Moreover, Ritopek did not differ in any degree, even in the middle of the 19th century, from the rest of the localities in Northern Serbia. Up to this time the farmers grew spring varietes of various cereals (wheat, barley, spelt, millet, buckwheat) and maize, only for domestic use. Even vine-growing did not exceed this narrow framework. Particular attention was paid to extensive stock-breeding which played some part in trade. Since the seventies of the last century, however, the agricultural structure of this locality has been gradually changing, causing hereby also a modification of the geographical landscape. In this evolution from extensive stock-breeding to a more intensive form, Ritopek has made

the greatest and swiftest progress [4]. It might be of some interest to follow the particular phases of this evolution.

Until about the end of the 19th century one could clearly distinguish, in the territory of Ritopek, two agricultural areas: the first one used for crop farming and viticulture an the second one destined for stock-breeding and forestry; they were separeted from each other by a fence. The area of crop farming and viticulture was situated in the immediate vicinity of the village on the Danube bank and the other one, for stock breeding and forestry, on upper parts of the valley slopes (Lipar hill) and across the small ridge in south-west. In the narrow crop farming area there were fields, vineyards, little orchards and meadows. The fields in which wheat and maize were rotated, lay chiefly in the localities of Oglovci and Vodice where at present are found the strongest concentration of vineyards and orchards. Cereals were grown only in quantities just sufficient to provide the inhabitants with necessary food. The vineyards occupied at that time the most favourable situations, where cereals could not thrive (Plavince, Srednjejke, Babin Potok). Their surface area was comparatively small in comparison with the present vineyards. Only such sorts of grapes were grown as can be used for making wine. The latter was produced not only to meet local requirements but quantities were left over for sale. The producers transported it on their horses to Belgrade where each individual had his particular customer-innkeeper. However, this trade was of a very limited volume.

Fruits played an even less important part in the domestic husbandry. Various sorts of plum were grown in small separate plantations or as individual trees along fields and in the form of hedges. Other kinds of fruit (the so-called vineyard peaches and various sorts of wild, non-grafted cherries) were scattered sporadically in vineyards and along the edges of fields.

The area under forests and pastures — one of them on the Lipar hill above the village and the other across the small ridge, were overgrown with oak-and lime-tree forests, checkered with grazing grounds. These areas were the commonage of the village. Stock-breeders used to build their summer cottages and pigsties there. In addition to this, cattle were led every day from the village to pasture in the forest, where the animals could move and graze freely. The number of heads as well as the variety of cattle reared reflected the conditions and

[4] M. Lutovac, Prigradska poljoprivreda okoline Beograda (Suburban economy of the surroundings of Beograd), Zbornik Radova Geografskog Instituta „Jovan Cvijić", Nr 18, Beograd 1962.

requirements of the time. Statistical data show that the number of heads of cattle reared was considerably grater in proportion to the number of inhabitants than it is today. Almost each family possessed a horse, used in threshing and as a pack-animal. In cattle-breeding oxen predominated used chiefly for ploughing and drawing purposes. Sheep were particularly numerous and they provided the inhabitants of the village with milk and wool, the latter being used at that time for manufacturing all kinds of garments and bed-clothes. Each house possessed a large number of pigs, even for sale. They were fattened chiefly with acorns.

Along with the numerical increase of the population and the expansion of the market there occured also some changes in the agricultural structure and in the volume of production. This has become increasingly apparent since the end of the last century, and particularly since 1920 when the rapid development of Belgrade began. In the eighties of the 19th century *Phylloxera* destroyed the vineyards. It was a heavy blow for the economic equilibrium of this locality, for vineyards formed the chief item in the pecuniary budget of each household. A provisional solution of these difficulties was found in the growing of wheat which had already become an article of trade. However, as in most cases plots which are suitable for wine-growing are unsuitable for the growing of maize and wheat, the vineyards were allowed to lie idle. The loss of those productive surfaces was compensated by enabling areas which had been until then under forests and pastures be converted to crop farming. As a result the whole area under forests and pastures, consisting of 380 ha of ground, was divided, in 1892, among all tax-payers and quickly transformed in fields. After having satisfied the most urgent needs of the population in this way, they undertook to restore the vineyards. At first the new vineyards were planted only on their ancient sites but gradually they were extended to areas which had formerly been used for crop farming (Vodice, Oglavak). The planting of former crop farming surfaces, which were very well suited to viticulture, with vine, cannot be explained only by the fact that new areas had to be found for fields, but also by an increase of the importance of viticulture in the general economy of the village. The pastures and forests in the localities of Lipovica and Gornji Plavinac have been transformed into vineyards up to the very top of the small ridge. In this way the two areas have become differentiated: the first area destined to viticulture and situated on the slopes above the Danube and the second area used for crop farming, across the ridge. In the wine-growing area there remained, however a few fields sown with wheat. This does not mean, of course, that they are not fit to be used for vineyards. The reason

has to be looked for elsewhere. The proprietors of these fields usually have a property too large to be transformed entirely into vineyards and orchards.

Along with the development of viticulture, the increasing importance of fruit-growing gave Ritopek a new economic function. This process was influenced by the rapid increase of the population of Belgrade which demanded more fruit. They began first to grow the kinds of fruit which do not suffer long distance transport, for instance cherries, apricots and peaches. The basis of this production was provided by the comparatively large number of wild cherry-trees which had been grafted. Later followed the introduction of new fruit varieties from distant nurseries. However, as almost the whole area was occupied by vine plantations, the space necessary for fruit-growing could be found only in vineyards, i. e. first of all around them and later even inside them. This blending has gone so far that it is nowadays quite impossible to separate the vineyard from the orchard. Each vineyard contains as many fruit trees as would be otherwise planted in a pure stand. It is due to the tendency of the farmer to make the most of the space available, but it is also influenced to a considerable degree, by the favourable situation, for almost all sites are exposed to the sun from its rising to its setting, so that grapes can ripen even under the fruit-trees. Such vines bear, of course, less fruit and only of inferior quality, being used only for domestic consumption. The grape-vines situated in clear open spaces between fruit-trees bear a normal fruit of excellent quality. However even if we take into account that vines growing under the fruit-trees bear only about 30 kg of grapes, the farmers find their account in growing cherry-trees, as the yearly yield of each cherry-tree amounted to 150 kg on an average. The same applies also to pear-trees and particularly to peach-trees whose spiky leaves allow the passage of the sunshine through the top of the tree. The apricot is the only fruit tree which is to be met with even in pure stands. Such apricot plantations occupy, as a rule, the well-protected situations.

However, when the slopes along the Danube had been completly filled up with vineyards and orchards, they spread across the small ridge into the area used until then for crop farming. Though this part of the village territory has not the same conditions for fruit- and wine--growing as the area situated along the Danube, where all crops ripen 15 days earlier, it is still favourable. In addition to maize and spring cereals, grape-vine and various fruits also thrive there. The first vineyards and orchards in this part of the village territory were planted by those farmers who did not possess sufficient land in the area along the Danube; they were followed by others who wanted to extend their

fruit- and wine-growing areas. But the fruit-growing which developed here is of another type. The fruit-trees are grown in pure stands, the vineyards separately from the orchards. Besides, instead of apricot--trees, which are susceptible to climatic changes, also pear — and plum--trees are chiefly grown. But the largest portions of the area are occupied by fields under wheat, maize, chives, onions, clover etc. However, these surfaces are being constantly reduced in favour of vineyards and orchards.

On account of the changes of agricultural structure and of the parcelling out of property the inhabitants of Ritopek had to look for new agricultural areas which would meet their requirements in wheat and fodder. It is of particular importance to small proprietors whose number is constantly increasing on account of stratification. The following Table presents a picture of the land ownership, such as it was in 1948:

Table 3

Categories of land property in hectares[5]

ha	0,05–0,50	0,51–1	1–2	2–3	3–5	5–8	8–10	10–15	15–20	20–30	Total
Number of holdings	6	20	41	64	81	65	27	13	5	2	324

Population possessing under 1 ha of land are not farmers but practice other occupations

The Law on Agrarian Reform of 1953 limited the property to 10 hectares. The plots obtained in this way were distributed among those who had the least properties. It could not, of course, meet all requirements of such a household. Thanks to the geographical situation of Ritopek, the households which own little land can supplement this deficiency from land on the left bank of the Danube. They have already bought there in the territory of the village Ivanovo, over 200 ha of arable land on which they chiefly grow maize and fodder plants. In addition to that, there are in Ritopek itself some individuals, who, possessing more land than they can cultivate, readily sell this surplus. In this way, the medium sized property increases from 3 to 5 ha which is completely sufficient to meet all the requirements of a household. A family of five members can, of course, live quite well even on a property of 2 ha, provided that grape vine and fruit-trees are grown on it.

[5] Statistika poljeprivrede za 1948 (Agricultural statistics for the year 1948) series II, Nr. 29. Published by Statistical Bureau of the P. R. of Serbia (Statisticki ured NR Srbije).

As can be seen, the economic foundations of Ritopek have change both with regard to cultivated surfaces and with regard to the structure of cultivated plants. At first, the area along the Danube was quite sufficient to meet all the requirements of crop farming, viticulture and fruit-growing, while the other area situated across the little ridge was reserved for pastures, i. e. for stock breeding. In the course of the second phase when fruit-growing and viticulture developed, the fields, forests and pastures across the ridge were transformed into a crop farming area. However, this area has been recently transformed also into a fruit-growing and vine growing surface and the new surfaces for crop farming are being acquired on the left bank of the Danube. These three areas complement one another from the economic poinf of view, so that Ritopek constitutes nowadays a completely formed economic whole.

The agricultural structure of Ritopek and its economical potential is to be seen from statistical data and from the results obtained by means of direct investigations on the terrain.

Table 4

Structure of agricultural surfaces

Specification	ha	%
arable land	about 1028	61.97
permanent crops	458	27.60
meadows	11	0.67
pastures	24	1.44
forests	115	6.94
unproductive land	23	1.38
Total about	1659 *	100.00

* Data from Cadastral register.

In the above Table some 200 ha of arable lands, belonging to Ritopek on the left bank of the Danube, on the territory of the village Ivanovo, were not taken into account, nor the farmsteads surface of the village. In addition to that, changes are of such daily occurence that even the cadastral register is unable to follow them. This applies particularly to fruit-growing which is continually expanding at the expense of crop farming surfaces.

According to the above statistical data almost all of the territory of Ritopek is being used for agricultural purposes. Arable lands occupy two thirds of the land and perennial crops (vineyards and orchards) one third. Meadows and pastures are reduced to a very narrow area and they are usually connected with swampy and erosive surface. Forests,

Table 5

Cultivable land and its utilization 1961

	ha	Arable lands	% of cultivable soil	Of the group in question
	1034		1535.0	
I. Arable lands		100.0	67.3	
A. Exhaustive crops	391	37.8	25.4	100.0
wheat	390	37.7	25.4	99.7
rye	1	0.0	0.0	0.3
B. Intensifying crops	613	59.3	39.9	100.0
maize for grain (with interculti-vated beans)	466	45.0	x	76.0
green fodder maize	9	0.8	x	1.4
barley	3	0.2	x	0.5
oats	8	0.7	x	1.3
Vegetables:	127	12.3	8.2	20.7
potatoes	48	4.6	x	7.8
tomatoes	5	0.4	x	0.8
onions	20	1.9	x	3.3
small seed onions	30	2.8	x	4.9
garlic	3	0.2	x	0.5
snap beans	5	0.4	x	0.8
peas	2	0.2	x	0.3
cabbage	1	0.1	x	0.2
sweet paprika	1	0.1	x	0.2
melons	10	0.9	x	1.6
sunflower	2	0.2	x	0.3
C. Structure forming crops	30	2.9	1.9	100.0
lucerne	30	x	x	100.0
II. Perennial crops	466	x	30.3	100.0
young orchards	112	x	7.2	24.0
vineyards	346	x	22.5	74.2
strawberries	8	x	0.5	1.7
III. Permanent grasslands	35	x	2.2	100.0
meadows approximately	11	x	0.7	31.4
pasture approximately	24	x	1.5	68.6
Total farmed land	1535.0	x	100.0	x
Total crops	1834*		x	x

* According to the data of the Statistical Institute of the People's Committee of the City of Belgrade for 1961.

natural or artificial (false acacia plantations) occupy landslides and gullies. However, though the crop farming surfaces are larger than those under perennial crops, the latter have a greater importance in the economy of Ritopek on account of their intensity and productivity.

3. PRESENT-DAY LAND UTILIZATION

a. Arable Land

Among the extractive crops the first place is occupied by wheat. With maize, which it usually alternates with in the rotation of crops, it occupies a half of the whole cultivable surface of Ritopek. In former times it was grown for sale, while maize was cultivated for domestic use. At present, however, wheat is exclusively grown in order to provide food to the population of Ritopek. In addition to wheat, in Ritopek are grown small quantities of oats, barley and rye. All these crops are used chiefly as fodder plants, particularly to feed horses.

Among the intensifying crops maize predominates which is chiefly used for feeding pigs and other domestic animals and fowl. Beans and gourds are regularly intercropped. Larger surfaces are sown with various vegetables as onion and chive for seed. for they do not require any

phot. W. Jankowski

Fig. 1. Ritopek — upper side. Wheat and maize arable fields

phot. W. Jankowski

Fig. 2. Ritopek — upper side. Arable fields. Maize with onions intercultivated in the foreground

phot. W. Jankowski

Fig. 3. Ritopek — upper side. Seed onions with maize intercultivated. Maize fields on both sides

Map 2. The village of Ritopek. Land utilization map

irrigation. In the production of the latter Ritopek competes now with vegetable growing villages in the surroundings of Belgrade. The yield per 1 ha reaches 100 q. If we take into consideration that the price paid for 1 kg of chive seed varies from 100 to 300 dinars, which depends upon the yield, the profit realized is very great. Other kinds of vegetables are chiefly grown for domestic use, but there remains also a surplus for the market. In contrast with chive and onion which are grown in areas under fields, other kinds of vegetable are chiefly connected with the depressions between the hills where there is a possibility of irrigation.

Of the structure forming crops lucerne is the only representative. It is grown exclusively by those households which possess cattle. Nevertheless, there is strong tendency to increase the surface under fodder plants to the detriment of those under wheat and maize.

Considering the proportions of various crops the orientation in the utilization of arable lands in Ritopek may be determined as the maize with wheat one ($E_2wh\ I_3mz$).

b. Perennial Crops

As it was previously said, fruit-growing and viticulture have the greatest importance in the economy of Ritopek. It is easy to grasp the structure of the orchards and vineyards, but it is impossible to establish the exact number of individual kinds of fruit trees. It is due to this fact that statistics depend upon the information of individuals who are not always willing to tell the inquirer everything. According tu such a statistical enumeration there were at Ritopek in 1961 the following kinds of fruit-trees (Table 6).

Table 6

Aproximative number of fruit trees*

Kind of fruit-tree	Number of trees	Number of trees yielding fruit
Cherries	25.000	22.500
Apricots	23.000	21.100
Peaches	12.000	10.000
Pears	5.000	5.000
Quinces	2.500	2.000
Plums	1.500	1.500
Walnuts	800	650
Apples	500	350
Mahaleb cherries	250*	250

* According to the data of the Statistical Institute of the People's Committee of the City of Belgrade for 1961.

phot. J. Kostrowicki

Fig. 4. Ritopek — upper side of the village land. Apricot orchard with wheat intercultivated

According to some unofficial statements the number of cherries trees alone amounts to 50.000. At any rate, we may presume that the actual number of trees exceeds the one quoted in the above list. Ritopek has undoubtedly the most cherry-trees per 1 sq. km in Yugoslavia. This is due to the large yield which again are a result of the favourable climate and the careful cultivation of fruit-trees in vineyards. Cherry-trees yielding each year from 150 to 300 kg of fruit are not at all an uncommon occurrence. According to their economic significance, apricots occupy the second place. They are to be found chiefly on sheltered spots on the bank of the Danube as well as in the courtyards round the house. They are grown in pure stands and they yield an abundant crop even on such soils as are not regularly hoed. In vineyards are increasingly planted and grown pear trees, bearing delicate fruit almost each year. Great attention has recently been paid also to peach-trees which are planted chiefly in the crop farming area, in pure stands. They grow also some other kinds of fruit for this variety affords safety. When several kinds of fruit-trees are grown simultaneously, this insures that always some will bear fruit.

Although fruit-growing has been given recently preference over viticulture, the latter is, nevertheless, of a great importance in the

economy of Ritopek. It is due to the influence of two factors: natural conditions and proximity of the market. The vineyards occupy at present 346 ha (about 2.422.000 vinestocks). They extend over the whole bank od the Danube. The vine begins to spread in the same way as the fruit-trees, across the small ridge and to the south-western slopes. The most frequent grape variety is „smederevka", combining the properties of both table- and wine-grapes. In addition to it, they introduce alsc some other choice sorts of dessert-grapes (hamburg, afus-ali etc.) in wine-growing areas along the Danube (Babin Potok, Dolnji Plavinci) the grapes begin to ripen as early as in August. From that time till the end of November there is a continuous vintage. Almost the whole quantity of grapes are usually sold. Only grapes of poorer quality produced by vines under the fruit-trees, remain for making wine, but even the wine obtained in such a way is good and palatable. In short, all other branches of the economy are subordinated to fruit-growing and viticulture. This is quite comprehensible if we take into account that their yield is greater than that of other branches. Even the poorest household possesses at least 0,5 ha under fruit-trees and vineyards

phot. M. Lutovac

Fig. 5. Two sides of the Danube. The Ritopek southern side — apricot orchards on the slopes of Šumadia hills; the northern side—poplar łęg woods and large flat Voivodina plain

phot. J. Kostrowicki

Fig. 6. Down the Danube side. Apricots and vines intercultivated
The Danube in the background

and the richer ones up to 4—5 ha. There are some people who have planted the whole of their small property of 2 ha with fruit-trees and grape-vines. Such households buy some arable land on the left bank of the Danube, just enough to meet their needs in wheat and fodder.

c. Meadows and Pastures

In the course of a century from 1866 until today, the meadows and pastures have been reduced to very small surfaces. Natural meadows are limited to 11 hectares. They are situated, for the most part, on swampy terrains or on surfaces which area, for different reasons, only temporarily under meadows.

The surfaces occupied by pastures are also quite insignificant, amounting hardly to 24 ha. They are scattered all over the territory of the village: in forests, on lands lying idle and along more important country roads.

d. Forests

Of the vast forests that, at the end of the 19th century, stretched over large areas there remain but 115 ha. However, these present forests

are, for the most part, artificially planted owing to the need for wood and protection against the erosion. With a view to extending the vineyards area, natural forests which consisted of oak- and lime-trees, were relentlessly cleared. Erosion began to develop rapidly on such surfaces and because of this false acacia-trees were planted. Natural forests has also been replaced, here and there, by acacia-trees which grow rapidly and whose wood is used, among other things, also for vine-sticks. In addition they have planted white poplar-trees along the Danube, under the village to serve as a protection against wind and dust from the river banks.

Natural forests, particularly those composed of oak- and lime-trees, have been preserved in the south-eastern parts of the Danube slope, in ravines which are exposed to erosion. The forests are now paid great attention on account of erosion, as well as on account of the needs for wood. The trees serve for fuel, for vineprops and in some cases they use also dry leaves for fodder. The trees are rarely cut clear off unless they are thinned or replaced by young ones.

4. Crop Production

We have previously emphasized that the statistical data frequently does not coincide with the results obtained by direct investigations carried out on the terrain. The differences are particularly important in the cases of vineyards and orchards. According to the official statistics the average grape yield per one vinestock varies between 0.25 and 0.50 kg. However, the same yield, according to direct investigations, amounts to 0.80—1.0 kg on an average. The same difference refers, to a certain degree, also to the fruits. Other crops which are immediately followed by the statistical agent may correspond approximatively to reality. We shall go by the official data, taking those from the year 1961, as its yields can be considered as average.

Table 7 shows that some crops have a comparatively small yield in spite of favourable natural conditions. It is due to the fact that the farmers pay most attention to viticulture, fruit-growing and growing of some vegetables (such as, for instance chive seed) which have considerable yields. Fields on which wheat and maize are usually grown, are dressed with manure only every fifth year. Fertilizers have not been used at all until recently. In short, one has impression that wheat and maize growing are only an accessory occupation. On the one hand, one sees a very advanced agriculture and on the other a rather backward one. In order to achieve also good results in arable crops

Plant production in 1961 * Table 7

Specification	Yield per ha in q	Crop in q	Production in grain units	% of plant production	% of group production
I. Food crops			26142.5	63.57	100.0
a. Grains	x	x	7035.0	17.11	26.91
wheat	18	7020	7020.0	17.07	26.85
rye	15	15	15.0	0.04	0.06
b. leguminous plants	x	x	552.0	1.34	2.11
beans (intercultivated)	1	460	552.0	1.34	2.11
c. vegetables	x	x	1829.7	4.45	7.00
early potatoes	50	1300	325.0	0.79	1.24
late potatoes	20	440	110.0	0.27	0.42
tomatoes	30	150	22.5	0.05	0.09
onion	50	1000	300.0	0.73	1.15
small seed onion	100	3000	900.0	2.19	3.44
garlic	20	60	18.0	0.04	0.07
snap beans	10	50	15,0	0.04	0,06
peas	3	6	7.2	0.02	0.03
cabbage	50	50	7.5	0.02	0.03
paprika	15	15	4.5	0.01	0.02
melons	40	400	120.0	0.29	0.46
d. Fruits	x	x	16725.8	40.67	63.98
cherries	190	7524	3385.8	8.23	12.95
apricots	318	11607	5803.5	14.11	22.20
peaches	89	1700	850.0	2.07	3.25
pears	171	1351	675.5	1.64	2.58
quinces	100	400	160.0	0.39	0.61
plums	187	449	224.5	0.55	0.86
walnuts	74.5	96.85	19.4	0.05	0.07
apples	102	81.6	40.8	0.10	0.16
mahaleb cherries	62.5	25	11.3	0.03	0.04
grapes	35	10990	5495.0	13.36	21.02
strawberries	10	80	60.0	0.15	0.23
II. Fodder crops			4934.9	36.32	100.0
a. grains	x	x	11306	27.49	75.70
maize	24	11184	11184	27.20	74.83
barley	14	42	42.0	0.10	0.28
oats	10	80	80.0	0.19	0.54
b. succulent foods			639.9	1.56	4.28
maize for green forage	10	90	9.9	0.02	0.07
pumpkins (intercultivated)	9	3150	630.0	1.53	4.22
c. rough forage			2941.0	7.15	19.69
lucerne	30	900	450,0	1,09	3,01
wheat straw	25	10050	1005.0	2.44	6.73
Maize husks	30	13980	1398.0	3.40	9.36
meadow hay	20	220	88.0	0.21	0.59
d. pasture	10	240	48.0	0.12	0.32
III. Industrial plants			44.0	0.11	100.0
sunflower	11	22	44.0	0.11	100.0
Total			41121.4	100.0	x

* According to the data of the Statistical Institute of the People's Committee of the City of Belgrade for 1961.

agricultural cooperatives have taken the necessary measures to secure the application of modern methods in the cultivation of those soils which are intended for wheat and maize growing. The so-called „agrarian minimum" comprises at Ritopek 260 ha of arable land, their proprietors being bound to till them according to agrotechnical prescriptions. They are supported therein by the cooperative (ploughing, seeds of quality, fertilizers). These as well as other analogous measures show visible results. Quantities of fertilizers used have increased from 100 (in 1960) to 600 q (in 1962). The plots cultivated in this way are already giving yields of 30 q of wheat per 1 ha on an average. In addition to this, the influence of chemicals used in plant protection, supplied to farmers by their respective cooperatives, manifests itself in the increase of yield in orchards and vineyards.

5. LIVESTOCK BREEDING AND ANIMAL PRODUCTION

Along with the transformation of pastures, meadows and forests into vineyards and orchards, stock breeding has gradually lost its former basis. It has adapted itself, as to the number of heads, kinds and quality of livestock, to new conditions and needs. The following data show, to a certain extent, these changes of stock breeding [6]:

Table 8

Year	Horses	Cattle	Pigs	Sheep	Bee-hives
1860	68	538	670	1.349	54
1905	142	232	391	1.257	64
1961	345	77	1.179	296	135

As can be seen, the number of sheep shows a decrease. Sheep are raised now only in those households with large families. Sheep are of a domestic race; they give 2—3 kg of wool and about 70 l of milk yearly. The number of oxen has decreased in the same way. They disappeared being replaced by the horse as a more suitable animal for drawing carts and for ploughing. The present number of this category of livestock consists exclusively of cows which are raised for milking, for manure and for calving. The breed is a crossbred of domestic and Simental races; they reach the weight of 500 kg and produce about 2.000 l of milk.

[6] Drzavopis Srbije (Statistical Gazetteer of Serbia), vol. IV, Beograd 1871, Statistika Srbije za 1900 g. (Statistics of Serbia for the year 1900).

The number of horses, pigs and poultry, however, has increased. This increase was influenced both by the change of agricultural structure and the market. Along with the development of the economy and the intensification of connections between the village and the market, there increased also rapidly the number of horses. Each family needed at least one horse. Horse-breeding was paid a great deal of attention: good horse breeds such as „Nonius", „Lipizzaner" and their crossbreds, were raised. However, since the use of horse-drawn vehicles has been recently prohibited in Belgrade, the number of horses began to decrease rapidly. Cooperative tractors replace more and more horses in the tilling of soil and motor-cars and trucks in the transport of goods. (There are already some 50 motor-cars with trailers at Ritopek). Their owners are individual farmers who convey their fruits and vegetables to Belgrade (markets on them). The present function of horses consists in ploughing and tilling the soil (60 p.c.) and in maintaining communications between the village and scattered plots in village agricultural areas (transport of dung, crops etc.). The number of cows has been increased quite recently to the detriment of horses. They are raised chiefly, as we already mentioned, for milking, dung and calving.

The decrease in the number of sheep and the increase of maize production has resulted in the numerical increase of pigs. They are raised at present, more or less, by every household. Eeach family keeps at least one pig, weighing from 150 to 300 kg, for slaughtering. Many households raise pigs also for sale. Particular attention is paid to the raising of piglets, which obtain very good prices at the market of Belgrade. There are many different pig breeds, but the most frequent one is the local race called „Moravka" and its crossbreeds with the Yorkshire breed. When they are well fattened, they reach a weight of 300 kg.

The number of poultry shows also a constant increase, rather for domestic needs than for those of the market. It is impossible to establish the exact number of poultry, among other tings because of fowl plague. However, it may be reckoned that each household possesses at least 20 hens. In the poultry-yard there are to be met with different sorts of hens. No particular sort, bred according to a plan, prevails among them. Those houses which are situated on the bank of the Danube, raise also geese and ducks. Pigs and poultry form the principal basis of the diet of the inhabitants of Ritopek for want of dairy products. The alimentary products are complimented by the fish which the fisherman of the village Ivanovo, situated on the opposite bank of the Danube bring every morning to the Ritopek bank of the Danube. In general live stock-breeding is also subordinated to viticulture and

fruit-growing. The following Table 9 presents the structure of stock-breeding and the number of individual kinds of livestock:

Table 9

Livestock breeding

Specification	Number of heads	Total of big animal units	% in big heads animal units	Number of heads per 100 ha of arable land	Number of big animal units per 100 ha of arable land
draft-horses	293*	551.6		19.3	21.3
foals	52	36.4			
Total horses	345	588.0	54.3	33.7	25.5
cows	68	68.0			
heifers	5	3.5			
calves	4	0.5			
Total horned cattle	77	72.0	10.1	5.1	4.7
sows, boars	99	29.7			
pigs	441	110.2			
young pigs	691	69.1			
Total pigs	1179	209.0	29.3	77.5	13.7
sheep under 1 year of age	265	26.5			
lambs	31	1.6			
Total sheep	296	28.1	3.9	19.5	1.8
Goats	38	3.0	0.4	2.5	0.2
hens	4158	12.5			
ducks	158	0.6			
geese	144	0.9			
turkeys	14	0.1			
Total poultry	4484	714.2	100.0	x	46.9

* Census of Agricultural Households for 1960 (data obtained from Statistical Institute of the People's Committee of the City of Belgrade)

As can be concluded from the above Table, stock-breeding with the except of horse-breeding, has been neglected owing to the rapid development of viticulture and fruit-growing. Under the new conditions which prevail to-day, there have occurred, in this branch of economy, some changes. The attention formerly paid to the horses is now being paid to the breeding of milch cows, pigs and fowl. This can be seen from the number, care and selection of breeds. It is due not only to the influence of the market but also to the increasing needs of stock breeding products in the village itself. Cows, whose breeding was limited to only 36 households, are rapidly replacing horses. It does not mean,

of course, that horses are going to disappear completely. They will be held for some time by more well-to-do households in order to carry out the tasks of interior transport, ploughing and transporting manure. But 40 p.c. of all ploughing in the village is already being carried out with cooperative tractors instead of with horses.

Animal production Table 10

Specification	Quantity of productive stock	Yield 1, kg	Production	Production in grain units	% of animal production	% given group
Milk total litres	x	x	178.800	1351	14.7	100.0
cow milk	63	2000	136.000	1020	11.1	75.5
sheep milk	250	80	20.000	160	1.7	11.9
goat milk	38	600	22.800	171	1.9	12.6
Meat total (kg live weight)	x	x	106.094	5415	58.8	100.0
calves	50	70	3.500	210	2.3	3.9
pigs	441	200	88.200	4410	47.9	81.4
piglets	691	10	6.910	345	3.7	6.4
lambs	250	12	3.000	180	2.0	3.3
chickens	4484	1	4.484	270	2.9	5.0
Wool	270	2	540	216	2.4	100
Eggs	4884	180	879.120	2198	23.9	100
Honey	135	4	540	22	0.2	100
Grand Total	x	x	x	9202	100.0	x

It is difficult to form an idea about the importance of products of stock breeding for want of statistical data on this subject, particularly on meat. Nevertheless, the Table 10, drawn up on the base fo an inquiry, will present an approximate picture.

As surplus products of stock breeding the farmers put on the market calves, lambs, a large number of young pigs and a part of poultry and eggs. Pigs and milk, however, are used to meet producers' own requirements.

5. GROSS PRODUCTION

Many branches of agriculture are represented at Ritopek. Table 11 presents approximately their mutual relations and their respective importance.

The share of plant production in the economy of Ritopek exceeds

Gross production and its principal elements Table 11

Specification	Grain units	% gross agricultural production	% branch production	% given group production
I. Crop production	41121.0	81.7	100.0	
1. Food crops	26142.5	51.9	63.6	100.0
a. Grains	7587.0	15.1	18.4	29.0
wheat	7020.0	13.9	17.1	26.8
rye	15.0	0.1	0.0	0.1
leguminous plants	552.0	1.1	1.3	2.1
b. Vegetables	1829.7	3.6	4.4	7.0
c. Fruits	16725.8	33.2	40.7	64.0
cherries	3385.8	6.7	8.2	12.9
apricots	5803.5	11.5	14.1	22.2
peaches	850.0		2.1	3.2
pears	675.5		1.6	2.6
quinces	160.0		0.4	0.6
plums	224.5		0.5	0.9
walnuts	19.4		0.0	0.1
apples	40.8		0.1	0.2
mahaleb cherries	11.3		0.0	0.0
grapes	5495.0	10.9	13.4	21.0
strawberries	60.0		0.1	0.2
2. Fodder crops	14934.9	29.7	36.3	100.0
maize	11184.0	22.2	27.2	74.9
barley	42.0		0.1	0.3
oats	80.0		0.2	0.5
fodder maize	9.9		0.0	0.1
pumpkins	630.0		1.5	4.2
lucerne	450.0		1.1	3.0
wheat straw	1005.0		2.4	6.7
maize husks	1398.0	2.8	3.4	9.4
meadow hay	88.0		0.2	0.6
pasturage	48.0		0.1	0.3
3. Industrial plants, sunflower	44.0	0.1	0.1	100.0
II. Animal production	9202.0	18.3	100.0	x
Milk	1351.0	2.7	14.7	100.0
cow milk	1020.0	2.0	11.1	75.5
sheep milk	160.0	0.3	1.7	11.8
goat milk	171.0	0.4	1.9	12.7
Meat	5415.0	10.8	58.8	100.0
veal	210.0		2.3	3.9
pork	4410.0	8.8	47.9	81.4
piglets	345.0		3.7	6.4
lamb	180.0		2.0	3.3
chickens	270.0		2.9	5.0
Sheep wool	216.0	0.4	2.3	100.0
Eggs	2198.0	4.4	23.9	100.0
Honey	22.0	0.0	0.2	100.0
Total about	50323.0	100.0	x	x
Per 1 ha of agricultural land	33.3			

4/5 of the total production, while animal production participates in it with less then 1/5. In addition, 2/3 of the plant production is constituated by food crops (fruits, grapes, vegetables and wheat). Among fodder plants maize is the prevalent crop making up 2/3 of the branch production) *. There is also a manifest tendency to enlarge areas under orchards and vineyards to the detriment of wheat and maize growing. The farmers follow with a keen interest the demand of the market and adapt their production of fruits to it. They take great care to select such sorts of fruits as are of the best quality and ripen at different times, so that there are always supplies for the market. The fruit growers were, until recently, oriented exclusively to the market of Belgrade. Nowadays, however, they sell their products in all the important towns of Yugoslavia. Besides, considerable quantities of fruits and grapes are sold through the intermediary of the purchase station of the Agricultural Cooperative. The latter, being an intermediary between producers and consumers, buys regularly every day all kinds of fruits, grapes and vegetables taken daily to Belgrade and to other markets. Only those quantities which are sold through the intermediary of the Agricultural Cooperative can be followed with certainty. In the course of the last two years they amounted to:

Table 12

Quantities in quintals

Year	Cherries	Mahaleb cherries	Grapes	Apricots	Peaches	Strawberries
1960	1920	10	2490	810	210	60
1961	1540	10	3180	2730	20	80

The Agricultural Cooperative carries out not only a part of the trading, but helps the farmers also in some other respects, such as: ploughing, acquisition of fertilizers, seeds and chemicals for plant protection etc. As a consequence of these as well as of some other influences there has developed new fruit-growing and new viticulture. In those areas, where these cultures had not been grown before, there appear now fruit plantations where different fruit-trees are grown in pure stands. However, former planted orchards and vineyards will remain mixed for some time. This refers particularly to such households as

* Taking into account the proportions of various elements of the gross agricultural production, the orientation of farming in the village of Ritopek may be determined as a productive, vegetable, food with fodder, apricot-grape with maize one. — $3 \times V_3 (a_2at, v + f_1mz)$. (Editor's comment).

possess little land and wish to utilize this space for several different crops. Finally, there arises also the problem of labour of which there is a shortage at present and which has to be brought from other regions, particularly in the season when vineyards are hoed or when the cherries are gathered. This deficiency is constantly increasing for the number of children in a family is often limited to two, and even these children do not want to stay in the country in spite of very favourable economic conditions. The number of houses increased while the number of inhabitants remained unchanged or even decreased as shown in the table 12.

Table 13

1948		1953		1961	
House-holds	Inhabitants	House-holds	Inhabitants	House-holds	Inhabitants
376	1393	406	1980	467	1954

They are attracted more and more by schools, crafts and factories in Belgrade. If this process continues, the Agricultural Cooperative will undoubtedly take upon itself the further development of this, otherwise rather advanced economy of fruit-growing and viticulture. The cooperative already possesses about 40 ha of consolidated terrains at Lozovik where a new orchards has been planted.

6. SETTLEMENT

As was previously said, Ritopek was mentioned under the name of Tricornium as early as in Roman times. This ancient settlement was situated in the locality called Seliste near the Danube [7]. The present day village lies not far from this place between two cone-shaped eminences which serve as a protection from landslides. The road leading to the Danube forms the axis of the village. From this main street wander tortuous lanes along which are aligned houses surrounded by vast farm yards. Three centres can be distinguished in the village, ranged in tiers along the main road. In the middle of the village there is a little square with the village hall, inn, church, cooperative shop and bakery. The

[7] Rista T. Nikolić, Okolina Beograda (Surroundings of Beograd) Naselja Srpskih Zemalja, V. 2. Beograd 1903.

phot. J. Kostrowicki

Fig. 7. Village street. Old and new houses

phot. J. Kostrowicki

Fig. 8. A new house

second centre is situated on the terrace around the eight grade elementary school and the third one lies near the Danube harbour where there are cooperative stores and purchase station.

The aspect of settlement changed along with economic progress. In former times, when the economy was still backward, the houses were one-storey buildings, made of plastered timberwork. There were no great differences between the houses of the rich farmers and the houses of the poor ones. These anomalies can be explained, among other things, by the tendency to increase the landed property to ensure a reasonable standard of living. When it became possible, after fruit-growing had developed, to realize greater incomes from smaller plots, the house itself underwent important changes. Money, easily earned, was no more invested in land, the possession of which had been restricted to 10 ha, but rather in the construction of better houses and in the improvement of standards of living. Since 1945 many nice modern houses have been built. The farmers compete in building the houses in the same way as they do in producing better sorts of fruits and grapes. The country

phot. J. Kostrowicki

Fig. 9. The Danube embordered with poplar łęg forest. A pool and a cooperative house

phot. D. Kowalczyk

Fig. 10. Taking water from the Danube

phot. J. Kostrowicki

Fig. 11. Fishing boats on the Danube

houses are equipped with the same furniture and the same appliances as those in the town. Almost every family possesses a wireless set. The newly constructed road which connects Ritopek with Belgrad caused also some changes in communication between the town and the village. The construction of the road as well as the development of economy resulted in the acquiring over 50 motor cars by the farmers from Ritopek. In brief, under the influence of the market and of better communication, the village has become more and more urbanized.

GEOGRAPHIA POLONICA 5, 1965

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THE CADASTRIAN COMMUNE OF TREBIJOVI IN THE KARSTLAND OF HERCEGOVINA

The cadastrian commune of Trebijovi lies in the South-East of Hercegovina, amidst the dry Karst land in the hinterland of the Adriatic sea. Its territory is on a tableland, which extends from North-West to South-East inside the Dinaric mountain range between the lower situated Trebinjsko polje and Ljubomirsko polje. The basin which is about 650 above sea-level, is to the South-West and the North-East surrounded by steep mountains reaching from 750 to 800 m above sea-level. In the East the territory is closed in by the Karst summit Leotar (1229 m above sea-level). The petty settlements on that tableland have poor traffic connections with the nearby local centres; mostly just steep, stony paths for small scale transport on horse-back. The nearby centre of Trebinje can be reached by foot in two hours. The farming is passive and hardly meets the needs of the population; the only minor income is from stock-breeding and from the selling of wood. On the territory of the cadastrian parish of Trebijovi there are three small settlements: Trebijovi (110 inhabitants), Grkavci (42 inhabitants), and Parojska njiva (26 inhabitants). Owing to the economic passivity this is an old region of depopulation. Since the World War II, the industry in Trebinje has been calling away most of the active working people.

1. NATURAL CONDITIONS

The whole territory of the cadastrian commune of Trebijovi consists of Karstian cretaceous lime-stone. On the lime-stone numerous Karst forms have developed, which are of varied value for farming economy. The body of the commune territory is represented by the extended,

karstian uvala running in the Dinaric line. Its bottom is not even but it is broken up into numerous karst holes and ridges between them. In the South-East near the settlement Trebijovi and in the North-East near the little settlement Grkavci two little plains have come into being through the alluviation of sandy soil. On the bottom of the karst holes there are deposits of fertile terra rossa. The alluvia are covered with half-sandy red-brownish soil. The rest of the territory is all stony, mostly bare; only clefts and fissures are filled with soil.

The territory in question is in the transitional area between the mediterranean and continental climatic zones. The effects of the climate are modified by the sea-level. We possess no meteorological data for this region. To illustrate the situation, here are the data of the nearby meteorological stations.

Table 1

Temperature in Trebinje and Bileca areas for the period 1900—1918

Localities	Temperatures in °C												
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Bileca	1.8	3.4	5.8	10.1	14.9	18.5	21.5	21.8	17.2	12.8	7.2	4.7	11.6
Trebinje	4.9	6.1	8.7	12.2	17.0	20.8	23.7	23.6	19.5	15.1	10.2	7.6	14.1

The influence of the Medditerranean climate is increased particularly during summer, when the long-term dry, anti-cyclonic weather sets in. The effects of high temperature is particularly harmful in these Karst regions, because it increases the torridness and decreases the effect of the scattered precipitation which coming in showers, quickly evaporates and passes through the ground. As this very often happens during the vegetation season, it ruins crops in the field as well as grass vegetation. The continental influence makes itself felt during winter with cool north-east winds, which bring into this region short-termed snow-falls. As regards precipitation, we observe that in this region the Mediterranean influence, with minima in summer months and high points during the winter period. The windiness likewise varies between the warm and the cool halves of the year. In winter the north-east winds are strong, but they cease in spring and cause no frost in the

Table 2

Localities	Precipitation in mm											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Trebinje	179	150	164	134	95	96	45	40	99	204	206	203
Bileča	114	152	164	136	115	86	65	36	97	181	196	171

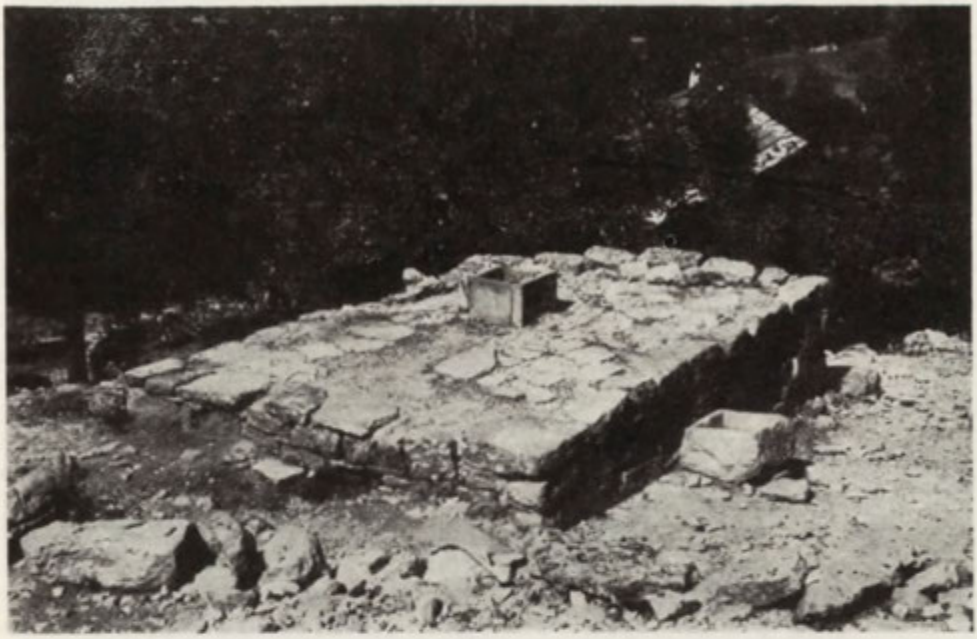


Fig. 1. A stony reservoir used for gathering rain-water

vegetation season. The North-West wind comes at times usually once in two years bringing hail, with it.

The climate favours the growth of tobacco, the dryness at the time of ripening being particularly important. The long-termed dryness prevents any after crops.

As the surface is a Karst one, no permanent running waters are found here. During the autumn rains the torrent near Trebijovi is full of water, but it quickly loses itself in the depression of Blato. Peasants for their needs gather rain-water in little reservoirs, which are in the longer dry period likewise liable to dry aut. At such times water has to be bought on horseback from the Trebišnjica river which is two-hours distant.

2. SETTLEMENT AND OWNERSHIP RELATIONS

On the Karst land of the cadastrian commune of Trebijovi, which comprises 2034 hectares of land, there are three little settlements. In the South-Eastern part there is Trebijovi, in the North-East Grkavci and in the West Parojska njiva. The settlements are composed of smaller groups of one-storeyed, stone-built houses. Most of them have two

Fig. 2. A peasant farmstead

rooms, poorly furnished, with the old, open type of fire-place. Near the houses there are numerous small farm buildings. The settlements are situated on the stony border of Karst holes between the surfaces of cultivated land.

In all three settlements there are 44 dwelling-houses, but owing to emigration of some families only 33 of them are occupied. The abandoned houses are used now as farm buildings. Each household has several farm buildings, a stable for cattle and sheep, a pig sty, and a building where hay is kept. As the village is in the process of decay, all those buildings are in bad condition, partly abondoned and partly changing their economic function.

The number of population has decreased during the present century. At the end of the 19th century those three settlements had 281 inhabitants, in 1953 just 199 and in 1961 — 178. The number of population fell within a period of sixty-odd years by 37%. In the post-war years some families emigrated to Vojvodina; a large part of the younger population has migrated in all post-war years over to Trebinje and other industrial centres of Bosnia and Hercegovina. Only the population of over fifty years old and the young children stay at home. A large part of the population have left their homes for good. Eight of the active

Fig. 3. A typical farmstead with a roundish barn-floor, on which animals are used to thrash the grain

Fig. 4. A stony sheep and goats cot, thatched

workers employed at Trebinje go back home every week. They are either those who want to help their families on Sundays with the work on the little farm, or those that could not get a flat for their family in the town.

Table 3

The size in hectares of land categories according to the social and ownership groups

Social and ownership categories		Arable field	Meadow	Pasture	Wood-land	Built-up area	Total
3 — 5	ha	4.25	0.37	12.82	0.08	0.18	17.70
	%	24.0	2.1	72.5	0.4	1.0	100 %
5 — 8	ha	3.25	0.23	15.70	—	0.14	19.32
	%	16.7	1.2	81.3	—	0.8	100 %
8 — 10	ha	4.25	0.30	19.16	1.57	0.26	25.54
	%	16.6	1.2	75.3	6.1	1.0	100 %
above 10	ha	37.70	5.46	564.52	49.36	3.59	660.63
	%	5.7	0.8	85.4	7.5	0.60	100 %
Total	ha	49.45	6.36	612.20	51.01	4.17	723.19
	%	6.8	0.9	84.7	7.0	0.6	100 %
Landholders outside of Trebijovi	ha	1.50	0.14	21.41	0.37	0.03	23.45
	%	6.4	0.6	91.3	1.6	0.1	100 %
State property	ha	7.93	0.76	315.94	956.58	6.22	1 287.43
	%	0.6	0.06	24.5	74.3	0.54	100 %
Total	ha	58.88	7.23	949.55	1 007.96	10.42	2 034.07
	%	2.8	0.3	46.7	49.7	0.5	100 %

Table 4

The size of land holdings according to the social and the ownership categories

Localities	Social and ownership categories	3—5	5—8	8—10	Above 10	Total
Trebijovi	ha, a	14.03	19.31	25.54	660.51	719.39
	%	2.5	2.6	3.6	91.3	100 %

The number of land holdings according to the social and the ownership categories

Localities	Social and ownership categories	3—5	5—8	8—10	Above 10	Total
Trebijovi	number	4	3	3	25	35
	%	11.4	8.6	8.6	71.4	100 %

Fig. 5. A typical karst packroad with a stone fence

The peasant holdings of those settlements comprise 723 hectares or 35.5% of the total land surface. Most of the land — 1827 ha or 63.4% is state-owned. This is mainly shrubbery forest or stony pastures. The major part of those areas is used by the peasants as pastures. The state is concerned with the regulation of the forest. A very small part of the land — 23 ha or 1.1% is the property of various land-owners from the neighbouring cadastrian communes (Table 3). The distribution of land seems for those peasant holdings very favourable.

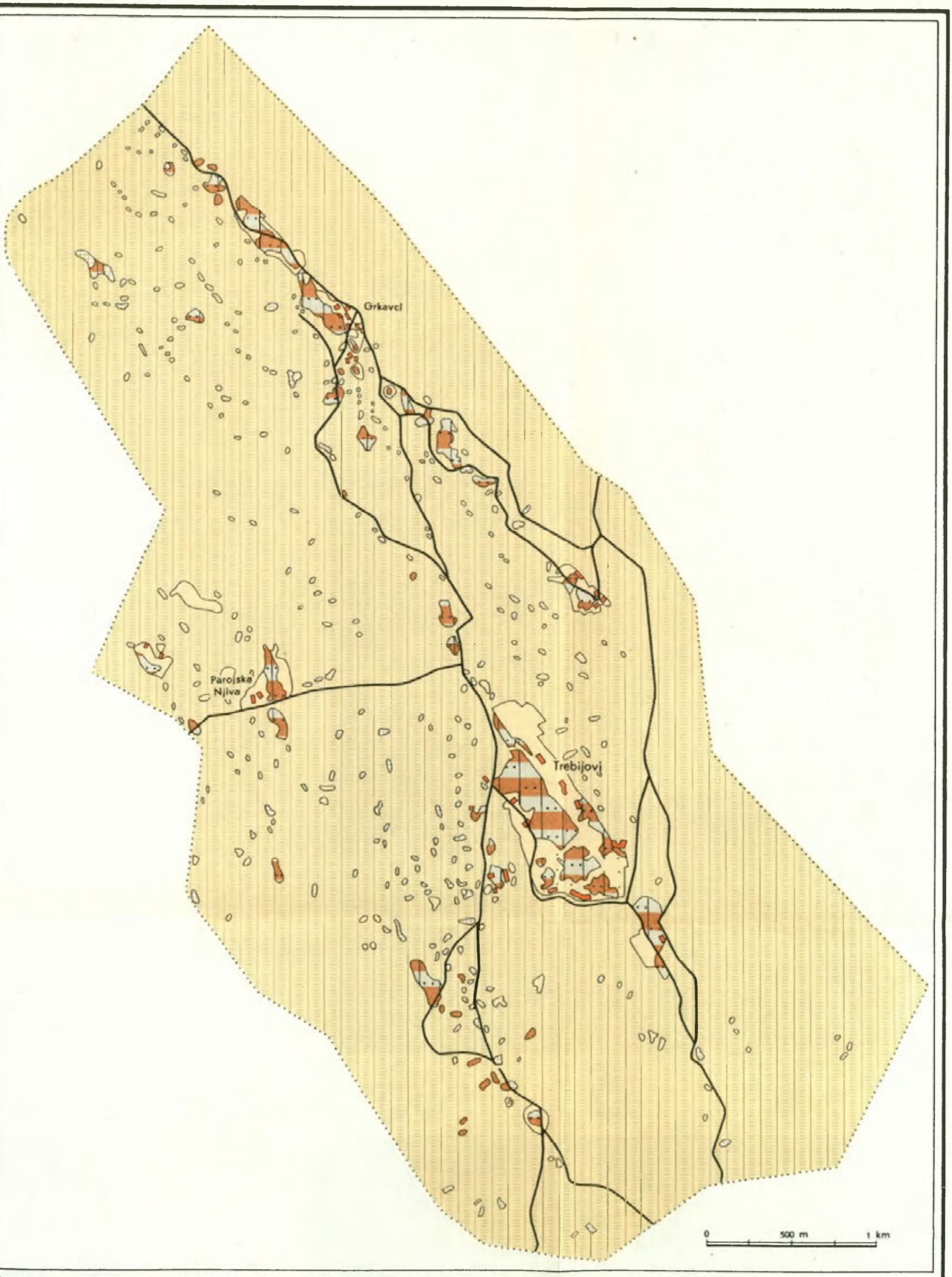
71% of the landowners possess more than 10 ha of land and they have in their hands 32.6% of the total land of the commune, or 91% of all private land. The remaining 29% of land-owners. whose property is between 3—10 ha possess 2.9% of the total land, or 8.7% of all private land (Table 4).

3. LAND UTILIZATION

A more accurate picture of the land distribution can be obtained by studying the proportions between the land for the whole of the settlements and the individual categories of possessions. Practically half (49.7%) of the total land of the commune is covered with degraded

Fig. 6. The fields of Trebijovi — the largest complex of cultivated land in the village territory

Fig. 7. Arable surfaces located in Karst holes amidst the Karst forest and pasture



Map 1. The commune of Trebijovi. Land utilization map

sub-mediterranean forest. Within private possession the forest occupies only 7%. The second place is taken by bad, Karst pasture with xerophilous shrubs — 949 ha or 46.7% of the total land of the commune. Two thirds of that pasture are owned by peasants, one third is state-owned. The basis of the farming are the broken tiny plots of tilled land, which occupy 65 hectares or 3.1% of the total land. Most of the tilled land is in the hands of the peasants; here 49 hectares are arable land and 6 hectares meadows, state-owned are 8.5 ha of tilled surfaces. Most of that land is not tilled very well, or even remains untilled. Each peasant holding has about 1 hactare of field surfaces; it is only in pastures and forest that the bigger estates outdo the smaller ones.

a. Arable Land

Of the total of 723 ha of the village land only 6.8% is taken by the arable fields. The fields are scattered in the Karst uvalas and holes, and are extremely varied in shape and size. Much of the jointly tilled land is around the village. The biggest complex is Trebijovsko polje, which is broken up into numerous plots of all possible shapes and sizes; among the fields one very often comes across live rock. As the fields are slightly descending from south towards north, the fields are arranged in terraces. This manner of utilization of the fields protects the soil ground from washing out. A more intensive washing out is a feature of the south-eastern part of Trebijovsko polje, that explains why the fields in that part have very gravelly soil. A better-quality and deeper soil covers the northern part. The complexes of fields near Parojska njiva and near Grkavci are smaller and more washed out.

The type of agriculture has changed in Trebijovi commune within the present century. Before the occupation of Bosnia and Hercegovina

Table 5

Average number of land plots per 1 landholder according to the social and the ownership categories

The social and ownership categories	Arable fields	Meadows	Pasture	Forest	Waste land built-up area	Total
3 — 5	15.7	2	18.0	0.5	2.9	38.4
4 — 8	15.0	1	21.0	—	3.0	40.0
8 — 10	24.6	2	30.6	2.3	5.3	64.3
above 10	23.4	3	29.0	2.6	4.8	63.0
Total	21.9	2.6	27.2	2.0	4.5	58.5

by Austrian Empire in 1878, all the settlements had a pronounced stock-raising character, with developed transhumance between settlements and summer pastures in Montenegro. With the occupation, the border between Montenegro and Austria put a stop to the summer pasturage in Montenegro. The population had to look for new possibilities of getting a livelihood by extending the field surfaces over to the more distant Karst holes.

Table 6

The average size of land plots per 1 landholder according to the social and the ownership categories

The social and the ownership categories	Fields	Meadows	Pasture	Forest	Waste land built-up area	Total
3 — 5	0.5	0.4	0.14	0.4	0.1	0.9
5 — 8	0.7	0.8	0.25	—	0.2	0.16
8 — 10	0 6	0.5	0.21	0.22	0.2	0.13
above 10	0.6	0.7	0.78	0.75	0.3	0.42
Total	0.6	0.7	0.64	0.68	0.3	0.35

However after World War II, we can observe an increased abandoning of the cultivation of fields both in the more distant surroundings as on the poorer grounds in vicinity. The fields are extremely small and widely scattered across the village surface. Peasants have on the average 58.5 plots of land, out of which there are 22 arable field plots. The average size of a field plot is 6 ares (Tables 5, 6).

The technique of land tillage is very poor. All the work is done by hand; though ploughing is done by oxen and, the stable-dung is brought to the fields on horseback and the products are brought home on horseback as well. The unfavourable Karst relief prevents any mechanized way of cultivation. As the stock is during the whole year all day in the pasture, there is a shortage of stable-dung for manuring. Only the more requiring crops are given manure, mostly vegetables and potatoes, but not cereals or maize. In the field the two-field system is practiced. The complexes of fields are divided into two groups where the crops alternate in a two-year cycle, without fallow. Half of the field complexes is sown with cereals, the other half with maize and potatoes. This system of rotation is denoted by the local people as „white-green".

22 hectares or 37.9% of the field surfaces are sown with extractive crops (Table 7). Among them first comes wheat, taking up 63.7% of the surface sown with extractive crops. Barley is another important crop

in this group, it takes up 18.3% of the surface sown with extractive crops.

Table 7

Utilization of farmed land

Land categories and crops	ha, a	% field surf.	% sown. land	% farming surf	% from groups
I. Field surfaces	58.0	100	x	5.9	x
A) Extractive crops	22.0	37.9	53.7	2.3	100
wheat	14.0	24.1	34.1	1.5	63.7
rye	1.0	1.7	2.4	0.1	4.5
barley	4.0	6.9	9.8	0.4	18.2
oats	1.0	1.7	2.4	0.1	4.5
meslin	2.0	3.5	4.9	0.2	9 1
B) Intensifying crops	17.0	29.3	41.4	1.7	100
maize	8.0	13.9	19.5	0.8	47.0
potatoes	5.0	8.5	12.2	0.5	29.4
cabbage	1.0	1.7	2.4	0.1	5.9
fodder beetroot, carrots	2.0	3.5	4.9	0.2	11.8
tobacco	1.0	1.7	2.4	0.1	5.9
C) Structure forming crops	2.0	3.5	4.9	0.2	100
other fodder crops	2.0	3.5	4.9	0.2	100
D) Unsown land	17.0	29.3	x	1.7	100
II. Permanent grassland	930.0	x	x	94.1	100
meadow	7.0	x	x	0.7	0.8
pasture	923.0	x	x	93.4	99.2
Total	988.0	x	x	100	x

Among the intensifying crops, which occupy 17 ha or 29.3% of field surfaces maize and potatoes are to be mentioned. Maize takes 47% and potatoes take 29% of the surface sown with intensive crops. The cultivation of structure forming crops is very limited, they are sown on as small an area as 2 hectares altogether. Although in the more dry years peasants are liable to be short of fodder, the production of fodder crops does not increase. Before World War II, when there was a lot of man power in the village, plenty of domestic animals and stable dung, the growing of tobacco was of considerable economic importance. Natural conditions: warm summers, deep soil, and so on were very favourable for this crop. At present, the tobacco occupies only 1 ha of the fields, mostly in Karst holes.

The vegetables are produced in shady Karst holes for home-use only (potatoes and cabbage). According to the share taken by the individual crops, the orientation in the utilization of arable land may be determined as a wheat-maize one $E_3wh + I_3mz$. Owing to bad

natural conditions, repeated drynesses and bad soil, and owing to the primitive technique and insufficient manuring the yields per ha are extraordinarily low and everywhere below the average yields in Bosnia and Hercegovina, and Yugoslavia. The yield per ha of wheat is 9.1 q (Bosnia and Hercegovina — 26 q) of potatoes 36 q (— 79 q), of maize 5.1 q (— 14.4 q), and of tobacco 8.7 q (Bosnia and Hercegovina — 10.2 q).

The size of uncultivated arable land is growing rapidly in this region; in 1960 it amounted to 17 ha or one third of the tilled land. Cultivation is given up above all in Karst holes that are not within a short distance from the village. The abandoned fields are partly used as pastures and partly overgrown by shrubbery.

b. Perennial Crops

Perennial crops cannot be grown here because of the dryness and shallowness of soil; only occasionally one comes across individual cherry-trees, mehaleb-cherries, and apple-trees. Walnut-trees, found around the houses, thrive well. Outside their houses the peasants grow some vines, which ripens late but nevertheless well.

c. Permanent Grassland

There are few meadows in this region, in the whole of the Commune only 7 ha or 0.3%. Each peasant holding has only very small patches of it, so that they can not get sufficient winter fodder from it. The lots are small and they are scattered among the field complexes in the vicinity of the settlement. Grass on the field terraces is used likewise as source of fodder. As stock can not graze here, these patches are carefully mown. Grassland surfaces are mown once a year only. In winter the stock is given oak leaves, which are gathered from the oak branches and twigs. which have been cut from oak-trees and later dried in the farmyard.

Nearly half of the total land surface — 949 ha or 46.7% — is taken by the dry Karstic rough pastures, called kamenjari. Here, amidst incompact Karst land with its xerophilous shrubbery, dry grass grows in smaller bunches. Such poor pastures are suitable only for sheep and goats. Better grass grows only in Karst holes, where the field has been changed into a meadow or pasture.

d. The forest

Practically half of the total of the commune territory is covered with sub-mediterranean forest. This is not a forest in the normal sense of the word but degraded forest, sometimes called šikara or ši-

Fig. 8. Karstic pasture, called „kamenjar"

b l j a k. Šikaras are composed of various, mostly termophilous plants: various species of mediterranean oaks (*Quercus pubescens, Q. cerris, Q. conferta, Q. macedonica*), the black ash-tree (*Fraxinus ornus*), white hornbeam (*Carpinus orientalis*). The largest are the oak-šikaras, which are mostly on degraded ground. Here the pubescent oak (*Quercus pubescens*) preponderates. On the worst kind of stony ground and on the dry southern slopes, the black ash-tree is mostly found. The sub-mediterranean š i b l j a k s are of a more uniform compositions. They are composed mostly of xerophilous shrubs (*Paliurus aculeatus*).

The forest is varied in thickness; at some places it is too thick for animals to graze in. Most of it, however, has only scattered shrubbery with poor quality grass, where the cattle grazes. Oak trees proper are more sporadic, and are found mostly around the settlements, though in some places in the fields too.

The rare 2—3 m high forest is utilized by the peasants to prepare fire-wood, which they transport on horseback to Trebinje for sale.

4. PLANT PRODUCTION

The unfavourable natural conditions on the dry Karst ground are also felt in the extraordinarily low plant productivity. The strenous

Table 8

Plant production

Crops	ha	Yield in q/ha	Crop in q	Grain unit	Production in grain units	% of plant production	% from I, II, III
I. Food crops	35.0	x	x	x	285.2	29.1	100.0
wheat	14.0	9.1	127.4	1.0	127.4	13.0	44.7
rye	1.0	10.2	10.2	1.0	10.2	1.0	3.4
meslin	2.0	7.6	15.2	1.0	15.2	1.6	5.5
potatoes	5.0	36.4	182.0	0.25	45.5	4.6	15.8
vegetables	1.0	62.0	62.0	0.15	9.3	0.9	3.1
maize	8.0	5.1	40.8	1.0	40.8	4.2	14.4
barley	4.0	9.2	36.8	1.0	36.8	3.8	13.1
II. Fodder crops	935.0	x	x	x	678.1	69.1	100.0
oats	1.0	7.2	7.2	1.0	7.2	0.7	1.0
fodder beetroot, carrots	2.0	62.8	125.6	0.1	12.6	1.3	1.9
other fodder crops	2.0	42.5	85.0	0.1	8.5	0.9	1.3
hay	7.0	14.5	101.5	0.4	40.6	4.1	5.9
pasture	923.0	2.2	2030.6	0.3	609.2	62.1	89.9
III. Industrial crops	1.0	x	x	x	17.4	1.8	100.0
tobacco	1.0	8.7	8.7	2.0	17.4	1.8	100.0
Total	971.0	x	x	x	980.7	100.0	x

manual work in the fields makes for only a very low production. The total worth of the vegetal production amounts to only 980 grain units, or 1.01 grain unit per ha of farming land. Per 1 ha of field surface there come 5.9 grain units, for meadows 5.7, for pasture only 0.6 grain unit. These low numbers are very expressive of the agricultural passivity and bad profitability on the Karst ground.

About 70% of the plant production comes in from the fodder crops. This high percentage is accounted for by the pastures, which give in spite of the poor yield per 1 ha (2.2 q) 609 grain units or 62% of plant production. The pastures give about 90% of the production of fodder. Fodder crops in the fields represent only a very modest share of the plant production. All food crops comprise 29% of the total plant production. Here, the first place is taken by wheat (13% of the total production, and 45% of the food crops production). A marked place in this group is taken as well by the potatoes (15.8%), as well as maize (14.4%) and barley (13.1%) which must be considered in this region as food crops. The once relatively high production of tobacco has come down to a modest share of 1.8% in the total plant production (Table 8).

5. LIVESTOCK BREEDING AND ANIMAL PRODUCTION

The modest natural conditions form a basis for extensive stock raising, which represents in these regions the most important economic activity. The changes in the political-geographic situation in the course of time have likewise affected the role of that activity at times. The peasants from that region had their summer pastures in Gacko and in Ravno in the continental interior in the West of Montenegro. They used to take during the dry periods in summer their sheep and cattle there. The journey took them three days; they left for the summer pastures in May and returned as late as in October. Before the Austrian occupation they used to take to the summer pastures over 2100 goats, 1200 of sheep, and more than 400 heads of cattle; only a smaller part of live stock remained at home. After the annexation of Bosnia and Hercegovina, those pastures came to belong to Montenegro and so there were no more pasturage for the population of Trebijovi.

The chief element of live-stock breeding was always sheep and goats, because the Karst land is most suitable for small stock. After

Table 9

Livestock breeding

Kind of animals	Number	Total number in big animal units	Percentage of big animal units	Number of animals per 100 ha of farmed surface	Number of animal units per 100 ha farmed surface	Number of animal units per 100 ha farm population
I. Horses, donkeys	45	50.7	17.4	4.6	5.1	36.2
horses	35	45.5	x	x	x	x
foals	2	1.2	x	x	x	x
donkeys	8	4.0	x	x	x	x
II. Cattle	198	168.0	57.8	20.0	17.0	120.0
calves up to 5 months	28	4.2	1.5	2.8	0.4	3.0
bull-calves	52	36.4	12.5	5.3	3.7	26.0
cows	71	71.0	24.4	7.2	7.2	50.7
oxen	47	56.4	19.4	4.7	5.7	40.3
III. Sheep, goats	649	56.0	19.3	65.7	5.7	40.0
sheep	467	46.7	x	x	x	x
lambs	176	8.8	x	x	x	x
goats	6	0.5	x	x	x	x
IV. Pigs, swine	78	13.8	4.7	7.9	1.4	9.9
pigs up to 5 months	26	0.8				
pigs	52	13.0				
V. Domestic fowl	154	2.3	0.8	15.6	0.2	1.6
Total	1124	290.8	100		29.4	207.7

World War II, the breeding of goats was legally prohibited, which gave a blow to the peasant economy there and at the same time fostered the emigration of the population. The consequence of the emigration is a continuous falling in the number of cattle and sheep. The number of cattle is 198 heads, which is 57.8 big animal units. Among cattle, cows are predominat. The number of goats and sheep has fallen to 649 heads or 19.3% animal units. The number of horses — 45 — has remained unchanged. A horse is in these Karst regions a basis for every land holding and it is used above all for the transport on horseback — of dung to the fields, of products home; and it is the chief means of transporting the selling goods to Trebinje. The breeding of pigs is of smaller significance. Pigs are bred mainly for home-use. Domestic fowl likewise plays no important role (Table 9).

Goats and cows were kept chiefly for milk; sheep for milk and wool. To-day the production of milk from sheep and cows hardly meets the domestic needs, so the selling of milk products is regressing. Sheep has preserved its greater importance due to wool. Only older sheep and goats are sold for butchery. The domestic breed of cows prevails here: small cows, weighing up to 230 kg, slow in getting mature. It gives yearly up to 800 l of milk. Sheep are also of a domestic breed, weighing up to 28 kilos, and giving yearly up to 40 l of milk and 0.8 kg of wool. The horse of this region belongs to the Oriental group, to a small and perservering kind, adapted to horseback transportation on the stony Karst land. The total area has 290 animal units. 29.4 animal units come per 100 ha of farming surface, of that number 17 heads of cattle

Table 10

Animal production

Kind of product	Number of animals	Average yield	Production	Production in grain units	% in grain units
Milk				513.0	55.6
cow's milk	71	800 l	56.800 l	426.0	46.2
sheep's milk	272	40 l	10.880 l	87.0	9.4
Meat					
pigs	52	100 kg	5.200 kg	260.0	28.1
Wool	467	0.8 kg	374 kg	149.4	16.2
Total				922.5	100

Animal production is similarly to the crop production low and amounts to 922 corn units. As we do not possess data concerning the production of beef, we find the share of the animal production

below the plant one. If we had complete data, we should certainly see in this region the stock raising production to be above the plant one. Half of the stock raising production gives milk — 513 grain units. Meat gives only 28.2% of the stock raising production. But it must be taken into consideration that it is only pork that has been taken into account here (Table 10).

6. GROSS PRODUCTION

The cadastrian commune of Trebijovi is with its extraordinarily low production of 1903 grain units an example of the passive farming economy, which does not even meets the requirements of self-sufficiency. The pains taken by the farming population do not pay and so depopulation is a regular phenomenon. The young active people have

Table 11

Gross production

Plan production	Production in grain units	% in grain units	% of the group
A) Food crops	285.2	15.0	100
wheat	127.4	6.7	44.7
potatoes	45.5	2.4	15.9
vegetables	9.3	0.5	3.3
other food crops	25.4	1.3	8.9
maize	40.8	2.2	14.3
barley	36.8	1.9	12.9
B) Fodder crops	678.1	35.6	100
fodder beetroot, carrots	12.6	0.7	1.9
meadows hay	40.6	2.1	6.0
pasture	609.2	32.0	89.8
other fodder crops	15.7	0.8	2.3
C) Industrial crops	17.4	0.9	100
tobacco	17.4	0.9	100
Total	980.7	51.5	
Animal production			
D) Milk	513.04	26.9	100
cow's milk	426.0	22.3	83.0
sheep's milk	87.04	4.5	17.0
E) Meat	260.0	13.7	100
pork	260.0	13.7	100
F) Wool	149.44	7.9	100
Total	922.48	48.5	
Grand total	1 903.2	100	

no prospect and so they emigrate; it is only the old population that remains at home. The animal production with 48.5%, owing to the incomplete date, stays behind the plant production, which gives 51.5% of the total production. The bad natural conditions offer in this region no possibilities for the improvement of either stock raising production or plant production (Table 11).

The incompleteness of data concerning the animal production not only lowers the amount of gross production and that of agricultural productivity but also is deforming the mutual proportions between various branches of farm economy and in result gives a wrong idea as to the farming orientation in the village under study. In the area where arable fields occupy but a tiny portion of the total farmed land, and the majority consists of little productive rough pastures grazed by sheep and cattle the prevalance of plant production over animal, and dairy cattle orientation in animal production does not correspond with any real situation.

In this case even rough estimates of lacking part of animal production seem to be better than nothing.

Based on the supposed rotation of animals in herd, estimated production of beef, veal and mutton stock amounts to about 690 grain units. It raises total production of meat stock to about 950 grain units. It gives in result 1) the increase of total agricultural production to about 2600 grain units, 2) the priority to animal production (over 62%) over vegetable one (about 38%), 3) the meat stock prevalence (59%) over milk production (about 38%). In summary the agricultural productivity of Trebijovi estimated about 3 grain units on 1 ha of agricultural land remains very low, the farming orientation of Trebijovi commune may be determined as very low productive, animal, meat, beef-mutton with, fodder, pasture one $1 \times V_1\ (f\,ps) + A_3\,(c_1 db)\,ms$ (Editor's Comment).

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[2] Podatki o izrabital in stanju kmetijskega gospodarstva zbrani z anketiranjem in kartiranjem na terenu. (Information concerning land utilization and the state of farming economy collected through questionnaries and mapping on place).

GEOGRAPHIA POLONICA 5, 1965

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BARSKO POLJE — ON THE ADRIATIC SEA COAST OF MONTENEGRO

The research at Barsko Polje was carried out by a team of the Institute of Geography, Polish Academy of Sciences [1] in July, 1962.

All the information that had been acquired through observation, from interviews with the local population and from official sources provided a basis for W. Jankowski to prepare a land utilization map. As regards analysis of the natural conditions this paper is based in part on material provided by M. Sušić, who has also contributed the necessary statistical data. With all the data available D. Kowalczyk prepared tables and a part of the text whereas J. Kostrowicki was responsible for the final draft of this paper.

With regard to the investigated areas determining the boundaries of the particular villages offered particular difficulties for their lands are inter-mingled and, besides, some villages have pasture land up in the mountains which is outside Barsko Polje and therefore could not be taken into account. For these reasons the outer boundaries of the area under examination only partly coincide with the boundaries of particular villages. Also the boundaries of the villages within the Barsko Polje area have been determined only approximately. The northern part of Barsko Polje situated beyond Željeznica stream could not be included within the scope of research because of the limited duration of team's stay.

Barsko Polje (the basin of Bar) is situated in the southern part of Montenegro republic, on the Adriatic sea coast. It forms a small

[1] Consisting of: J. Kostrowicki, R. Szczęsny, D. Kowalczyk and W. Jankowski; M. Sušič from the Institute of Geography of the Belgrade University, also participated in the research.

depression surrounded to the east and the north by the Rumija mountain range (the highest peak is 1593 m. above sea level). North of Barsko Polje the mountains reach the sea coast. Finally, there is a low Volujica ridge closing Barsko Polje from the south-west. It is only to the west that the basin is open to the sea, or precisely to a small bay called Barska Luka.

Barsko Polje territory is crossed by a highway linking Bar and Ulcinj situated farther to the south on the Albanian border with other localities of Yugoslavia's Adriatic sea coast and with Montenegro's capital — Titograd.

Stari Bar (Old Bar) situated on mountain slopes some 5 km from the sea coast is the historical centre of Barsko Polje known already in ancient times as Antibarum; it was a Roman colony on the border of the Roman provinces of Dalmatia and Illyria, inhabited in the main by Illyrians.

Throughout the span of its recorded history the settlement was passed from hand to hand belonging consecutively to the Byzantine Empire, the Principality of Zeta, a medieval Serbian state, Venice (Antivari) and finally Turkey. It was only in 1878 that Barsko Polje was annexed to Montenegro and in 1919 along with whole of Montenegro it became part of united Yugoslavia.

Over its long history Bar has performed various functions being a political centre, a religious centre (the seat of Bishopric) and a military centre. To the latter function of Bar the ruins of a powerful stronghold looming over the town at an altitude of 230 m above sea level, which obviously dominated the entire Barsko Polje area, as well as the road running along Adriatic sea coast, bear witness.

Rural settlement had prospered around Bar since a very early time, at first taking in only the mountain slopes up to 560 m above sea level and avoiding the lower down soaked plains which were exposed to constant flooding by mountain torrents which usually left the bottom of the basin strewn with vast amounts of rock debris. The first water project initiated was the construction of the Rene canal which was followed by clearing of the forest and bush thicket covering this area.

Much closer links between Bar and the rest of Montenegro were established with the construction in 1910 of a narrow-gauged railway line connecting the port of Bar (Novi Bar) on the sea coast with Virpazar farther inland on the lake of Skadar.

The most spectacular development of the area in question did not come about until after the 2nd World War. In 1947, a railway line was built to connect Bar with Titograd through Virpazar. Then in 1953 the construction of a sea port in Novi Bar was started and it is designed

to become first a primary port of Montenegro and later, after Titograd--Belgrade railway line is completed, a primary port for the entire south of Yugoslavia.

The Barsko Polje region has also great prospects for development as a major jump off point for tourism, although on account of its stony beaches, it cannot hope to become a recreation centre of major importance. For this purpose, much better endowed are the neighbouring localities of Ulcinj, Sutomore, Petrovac and Budva with their fine, sandy beaches.

1. NATURAL CONDITIONS

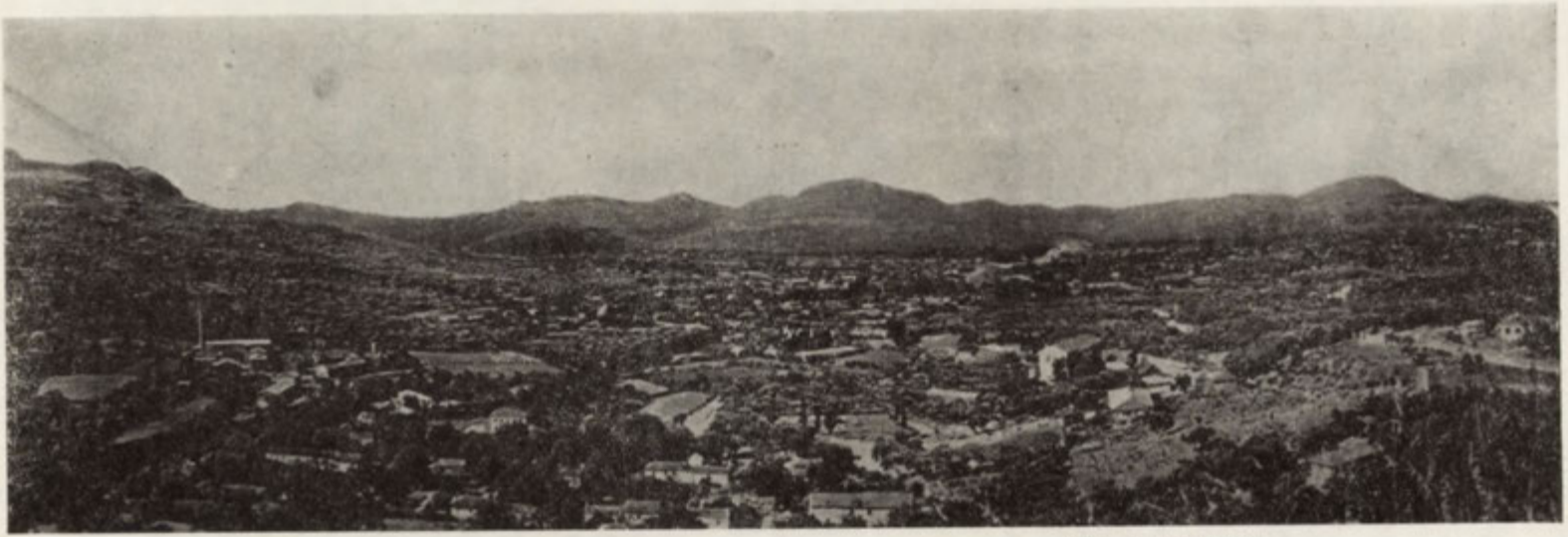
From the point of view of land relief and geological structure the following zones can be singled out in the area under examination:

1. The lowest and most extensive is the bottom zone of Barsko Polje presenting an almost flat terrain covered with alluvia (sands and gravel). The depression is a product of tectonic processes followed and shaped by abrasion processes, erosion and finally the accumulative operation of river waters carrying down from the mountains vast quantities of rock material. On such a foundation there have developed a variety of sandy-clayey soils, small patches of gravel soils, and here and there, chiefly in old river meanders, there occur bog soils. They are mostly light soils, highly permeable, and with but poor capacity to retain water.

At one time the region was overgrown with thick tree-bush vegetation, the remnants of which have survived here and there along streams. At present cultivated land, meadows, pastures and farms occupy a greater part of the region.

2. The second zone includes the lower sections of the mountain slopes which surround the bottom of the depression in a wide belt to the north and east. The region is built up of sandstone, slate and flysh marls of the Eocene period and, higher up, rocks of the Oligocene period, reaching up to 400—420 m. above sea level. The relief of this area is characterised by a number of deep incisions eroded by permanent or periodic mountain torrents. The products of flysh disintegration have turned into a soil which in spite of its shallowness and skeleton character is relatively fertile and preserves moisture well; it ranges in colour from grey to grey-brown depending on the nature of the flysh parent rock underneath. These soils belong to the best in the region under examination (1—3 bonitation class).

Above the flysh sediment line one finds triassic limestones and dolomites which in less steep spots have produced here and there (Velem-



phot. J. Kostrowicki

Fig. 1. Barsko Polje. Panoramic view from the old fortress ruins to the south-west. The Volujica ridge in the background. The new oil mill plant on the left

phot. D. Kowalczyk

Fig. 2. Barsko Polje. The lower part of the Polje overlooking the Barska Luka (Bay of Bar). Volujica ridge in the background

busi) patches of soil of the terra rossa type utilized mainly for growing maize, wheat and vegetables. The more steep sections of the mountains are overgrown with scanty herbaceous vegetation, whereas the less steep sections which are still not cultivated are covered with more or less dense secondary mediterranean vegetation of the garrigue type known here as šibljak. The differences in geological structure bear closely on land utilization, for the region is noted for its perennial plantations, mostly olive groves which occur in close association with flysh substratum. Olive groves are grown also on limestone foundation however, in that case yield of olive trees is much lower. To prevent further erosion the slopes are terraced. In this zone also located are almost all of the older settlements along with their surrounding orchards and gardens. On the other hand, arable land and permanent grasslands are much more rare in this area because the shrubby vegetation covering the steeper slopes or local culminations is so thick that they are rendered hardly fit for grazing purposes.

Volujica peninsula forms a unit apart, formed of limestone and dolomites as well, overgrown with fairly lush grass vegetation and scanty shrubs. Protecting the port against high waves the peninsula exerts also an influence upon the local climate of Barsko Polje.

Generally speaking Barsko Polje area is located in the mediterranean climatic zone. Summers are very hot and dry, Springs and Autumns are warm and wet, Winters mild and also wet. The region under examination is cut across by the isotherm of January — + 8°C, July — + 26°C and average annual temperatures oscillate around about + 16°C. Annual rainfall rate is up to 1200 mm and up to 1000 mm in the coastal belt. Two rainfall maxima are observed, the Autumn one taking place in October, November and December and the Spring one running from March through April to May. Rainfall maximum and the chief dry period fall in June, July and August whereas Winter minimum is noted in January and February.

These general climatic conditions are distorted by the specific location and land relief of Barsko Polje. Acting as a container of warmth and moisture the sea tempers climatic extremes through exchange of masses of air and raises the humidity of the basin. Particularly important and advantageous for vegetation is the resulting protection against excessive radiation in winter-time which again results in the

phot. J. Kostrowicki

Fig. 3. Stari Bar. A view from the walls of the old fortress to the west. Olive groves covering the gentle slopes. Volujica, Novi Bar, Topolica and Barska Luka in the background

phot. W. Jankowski

Fig. 4. Barsko Polje. Topolica experiment station. The Rumija range in the background

phot. W. Jankowski

Fig. 5. Barsko Polje. A view from the Lovrenac cemetery to the west. An olive tree in the foreground, Biskupija buildings in the background

fact that the physiological activity of most of the plants is not stopped for the winter. The surrounding mountain peaks and ridges influence the local climate of Barsko Polje as well. Rumija ridge embracing the valley from east and north gives and adequate protection against the cold and dry winter winds (bora) blowing from down the continent. Banking and condensating the masses of warm and moist air blown in Spring and Autumn by the southern and southwestern winds (youg) prevailing at this time, the ridge supplies the valley with water by means of downgrade streams. At the same period Volujica ridge screening the valley from the southwestern direction increases considerably the total amount of rainfall over Barsko Polje itself.

Despite considerable rainfall high temperatures and resulting high evaporation make water supply quite a problem of this area.

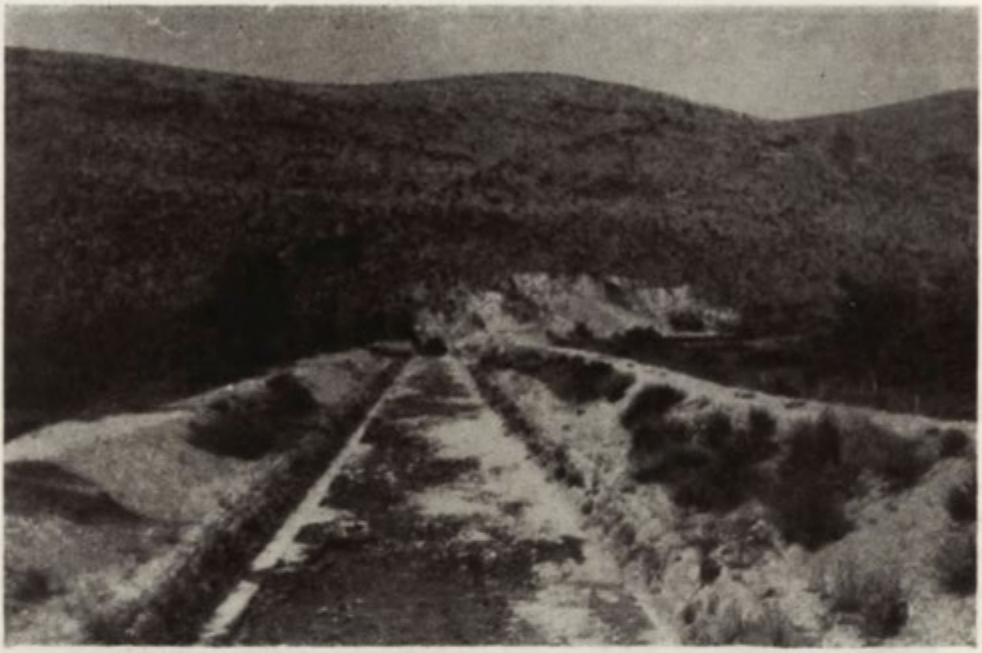
First of all, the major water supply sources in the area under examination are the mountain streams running down Rumija ridge, such as Żeljeznica, Bunar with Vruca, Zaljevski Potok and a number of others which are fed on the way from many springs gushing out from the stream beds or close to them. Their output is considerable and since the streams collect water from the surrounding mountains — water level in the streams is highly variable. During high level periods the streams flood out causing considerable damage especially acute in the bottom zone of Barsko Polje. On the other hand, the streams may almost completely disappear during drought periods.

As was mentioned earlier there is a long tradition of efforts being made to bring the water problem well under control. Most of the streams have been built up and controlled, their water being utilized for manual irrigation of fields. The installation used for this purpose, however, calls for modernisation. Recently water control works are being carried out on a much larger scale. The projects have been extended to control water upstream, on the mountain slope sections and, at the same time, downstream sections on the plain have been canalized. Among others, has been canalized and controlled the downstream section of the Bunar stream. Construction of a channel was also started to take excess of water down to the sea directly through a tunnel drilled in Volujica ridge. To prevent water from sinking in the stream bottom during low water periods, and to enable its use for irrigation purposes — the streams are directed to canals with water-tight bottoms. Plans have been worked out also to construct sheltered canals with a view to protect water against evaporation.

The other major source of water is ground water. The level ranges from 0.5 to 4.5 m in the valley bottom zone and this accounts for the

phot. J. Kostrowicki

Fig. 6. Stari Bar. A canal taking water from the Bunar stream to irrigated fields



phot. J. Kostrowicki

Fig. 7. Canalised Bunar. The tunnel through Volujica ridge conducting away the excess water in the background

fact that in places where there is but poor water outlet local swamps develop. The water table varies greatly during the year. In the Summer when the evaporation rate is considerable and when, at the same time, vegetation requires large quantities of water, the level drops down. It is clear, therefore, that this source of water exploited since times immemorial by numerous wells often fails at the time of greatest demand for water.

This is why in the use of both ground and stream waters even more stress has been laid in the last few years on artificial irrigation. While only 268 ha were irrigated in 1960, this area grew up to 1318 ha in 1962.

Speaking in general terms it can be stated that natural conditions of Barsko Polje area are rather favourable for man's work and the shortcomings that exist can be easily overcome with a certain amount of outlay. Especially favourable is the local climate which, thanks to the hervy sunshine and high temperatures, makes it possible to cultivate a variety of useful plants. At the same time any shortage of water during the vegetation season can be successfully alleviated on the spot through the existing reserves.

2. POPULATION AND AGRARIAN STRUCTURE

The area under this study embraces a number of settlements grouped in 8 administrative units (Table 1). There are two small urban settlements, firstly the ancient Stari Bar (1800 inhabitants) located at the foothills, the administrative centre of Barsko Polje and secondly Novi Bar (2200 inhabitants)) on the sea coast constantly expanding and steadily swallowing up the neighbouring rural settlements. Then there is the coastal village of Burtaiši (of over 750 inhabitants) which being partly urbanised is gradually being integrated with Novi Bar. Out of the 5 remaining rural administrative units fields, of three villages (Bjelisi Polje — 1350 inhabitants, Tomba-Čeluga and Zaljevo-Podi, each having about 800 inhabitants) are located in part on the mountain slopes and in part the valley bottom. Fields of the fourth village (Bartula — about 300 inhabitants) are situated partly in the Vruca stream valley and partly on the adjacent mountain slopes while the fields of the last, small village of Velembusi (about 120 inhabitants) are all placed relatively high up on mountain slopes exposed to the south-west.

Table 1

Number of Householdings

Towns and villages	Farmers		Part time farmers		Non farmers		Altogether	
	Number	%	Number	%	Number	%	Number	%
1. Novi Bar *	9	1.4	19	3.0	602	95.6	630	100
2. Stari Bar *	16	3.7	99	22.9	317	73.4	432	100
3. Bartula	17	25.7	31	47.0	18	27.3	66	100
4. Bjeliši-Polje	38	10.0	169	44.5	173	45.5	380	100
5. Burtaiši	17	8.0	90	42.7	104	49.3	211	100
6. Velembusi	12	46.2	14	53.8	—	—	26	100
7. Tomba-Čeluga	49	25.5	86	44.8	57	29.7	192	100
8. Zaljevo-Podi	79	42.9	85	46.2	20	10.9	184	100
Towns	25	2.3	118	11.1	919	86.6	1062	
Villages	212	20.0	475	44.8	372	35.2	1059	
Altogether	237	11.3	593	27.9	1291	60.8	2121	

* Town

In those villages, too. a good proportion of the population (Table 2) is employed outside agriculture, mostly at Novi Bar (on building, railway, port, services, local industry) and even outside the area under examination. A considerable part of the population in these villages

Population — Table 2

Specification	Number of inhabitants									Estimated number of employed in agriculture	Estimated agricultural population	Agricultural pupulation per 100 ha agricult land	Density of total population per 1 sq km*
	Altogether	Males	%	Females	%	Active	%	Inactive	%				
1. Novi Bar	2184	1072	49.1	1112	50.9	884	40.5	1300	59.5	28	64	108	2041
2. Stari Bar	1803	852	47.2	951	52.7	611	33.9	1192	66.1	115	274	311	1767
3. Bartula	298	139	46.6	159	53.4	110	36.9	188	63.1	54	146	265	370
4. Bjeliši-Polje	1351	666	49.3	685	50.7	538	39.8	813	60.2	207	439	248	617
5. Burtaiši	757	382	50.5	375	49.5	308	40.7	449	59.3	107	215	255	782
6. Velembusi	117	57	48.7	60	51.3	41	35.0	76	65.0	30	74	194	307
7. Tomba-Čeluga	795	386	48.5	409	51.5	283	35.6	512	64.4	135	382	234	429
8. Zaljevo-Podi	862	423	49.1	439	50.9	297	34.4	565	65.6	196	569	175	215
Total	8167	3977	48.7	4190	51.3	3072	37.6	5095	62.4				
Towns	3987	1924	48.2	2063	51.8	1495	37.5	2492	62.5				
Villages	4180	2053	49.1	2127	50.9	1577	37.7	2603	62.3				

* Built up area non included

Size of land holdings in hectares — Table 3

Towns and villages	Total number of house holders	Total number of land holders	Percent of house holders having land	0.00—0.05	%	0.06—0.5	%	0.6—1.0	%	1.01—2.0	%	2.01—3.0	%	3.01—5.0	%	5.01—8.0	%	8.01—10.0	%	Unknown	%
1. Novi Bar *	630	28	4.4	1	3.6	13	46.4	6	21.5	3	10.7	3	10.7	—	—	—	—	—	—	2	7.1
2. Stari Bar *	432	167	38.6	66	39.5	64	38.3	24	14.4	11	6.6	1	0.6	1	0.6	—	—	—	—	—	—
3. Bartula	66	48	72.7	6	12.6	22	46.3	8	16.7	8	16.7	1	2.0	1	2.0	1	2.0	1	2.0	—	—
4. Bjeliši Polje	380	233	61.4	15	6.4	140	60.1	54	23.2	16	6.9	6	2.9	—	—	—	—	1	0.5	—	—
5. Burtaiši	211	105	49.8	1	0.9	39	37.1	34	32.4	24	22.8	3	2.9	1	0.9	3	2.9	—	—	—	—
6. Velembusi	26	26	100.0	—	—	13	50.0	6	23.1	2	7.7	2	7.7	1	3.8	—	—	—	—	2	7.7
7. Tomba-Čeluga	192	154	80.3	4	2.6	65	42.2	50	32.4	21	13.6	4	2.6	7	4.5	1	0.7	1	0.7	1	0.7
8. Zaljevo-Podi	184	168	91.4	1	0.6	47	28.0	58	34.6	36	21.5	14	8.4	7	4.2	4	2.1	—	—	1	0.6

* Town

does not own any land at all (Tables 1, 2) while a large proportion of inhabitants (40—50%) combine agricultural and non-agricultural occupations. A considerable melting away of population has left farms mostly in the charge of old people while the younger ones moved for good to Bar, Budva and so on. Only the village of Zaljevo has retained its typically rural character situated somewhat farther away from Novi Bar, and also the small mountain village of Velembusi; in both of these almost half of households rely exclusively on work in agriculture.

An overwhelming proportion of the land in the region under examination is cultivated in the form of small peasant family farms. In all the villages over 80% are farms of up to 2 ha of land (Table 3). In some villages their share soars up to 90% and even exceeds 95% (Stari Bar — 98.8%, Bjelisi Polje — 96.6%). It is only at Novi Bar, Velembusi and Zaljevo-Podi that subdivision of land is less striking since farms with more than 2 ha of land constitute more than 10% of the total. However, there too, only few farms exceed an area of 5 ha (Bartula — 2, Tomba-Čeluga — 2, Burtaisi — 4 and Zaljevo-Podi — 4). As a rule there are no farms over 10 ha in size. As a result, average size of farms in the area under this study range from 0.5 ha (Stari Bar) to 1.9 ha (Zaljevo-Podi) and 2.1 ha (Novi Bar).

In spite of their small size the fields of particular farms consist, as a rule, of several plots (usually 5—10) which are scattered not only all

Table 4

Locality	Form of utilization	Class of land	Size in ha	Income in dinars	
				Total	From 1 ha
1. Velembusi	home and farmstead	—	0.0350		
2. „	perennial crops	2	1.23	72.570	59.812
„	mainly olives				
3. „	perennial crops				
„	olives, fig trees	3	0.49	19.600	40.000
4. „	olives	2	0.94	55.460	59.000
5. „	rough pasture	6	0.1	210	2.100
6. Orasova *	olives	1	0.46	31.740	69.000
7. „	arable land, chiefly maize	7	0.20	1.600	8 000
8. „	„	7	0.18	1.440	8.000
9. „	„	7	0.05	280	5.600
10. „	forest (mainly brush oak)	5	2.11	1.477	7.000
11. „	„	5	0.40	280	700
12. Stari Bar	old buildings	—	0.0025	—	—
Total		x	6.19	184.777	29850,8

* out of area under study.

Land

Specification	Individual Farming									
	Novi Bar		Stari Bar		Bartula		Bjeliši Polje		Burtaiši	
	Area in ha	%	Area in ha	%	Area in ha	%	Area in ha	%	Area in ha	%
1. Arable land	15	14.0	14	14.7	13	16.2	90	41.8	31	31.6
therein:										
fallow	—	—	—	—	—	—	4	1.8	—	—
2. Perennial crops	8	7.5	49	48.0	24	30.0	35	16.2	28	28.6
therein:										
fruit cultures	8	7.5	47	46.0	24	30.0	35	16.2	28	28.6
vineyards	—	—	2	2.0	—	—	—	—	—	—
3. Permanent grasslands	36	33.6	23	22.5	18	22.5	50	23.4	25	25.5
therein:										
meadows	11	10.1	5	4.9	4	5.0	27	12.6	11	11.2
pastures	25	23.4	18	17.6	14	17.5	23	10.7	14	14.3
4. Unsown land	—	—	1	1.0	—	—	1	0.4	—	—
Total agricultural land	59	55.1	87	86.0	55	68.8	176	81.8	84	85.7
5. Woodlands	26	24.3	12	11.9	11	13.8	17	7.9	9	9.3
6. Marshes	—	—	—	—	1	1.2	1	0.4	2	2.0
7. Unproductive land	22	20.6	2	2.1	13	16.2	21	9.8	3	3.0
	107	100.0	101	100.0	80	100.0	215	100.0	98	100.0

over the farmer's home village but are located also in other villages, frequently outside the area embraced by this study. As a rule, farms have several plots of arable land, several plots of perennial crops, several plots of permanent grassland and so on, which are located outside farmstead.

As an example one may quote a farm in the village of Velembusi, relatively large by the local standards, which according to tax index for 1962 consisted of the following 12 plots (Table 4) [2].

Apart from private farms in the area in question there is also a Topolica mediterranean cultures' experiment station at Novi Bar which occupies some 102 ha and further on in this study the station will be considered as a separate farming unit. In addition, there is a small stretch of cooperative land at Stari Bar (13 ha — of which 7 ha orchard, 1 ha pasture land and 5 ha forest). On account of its size this land is studied jointly with that belonging to Stari Bar farmers.

[2] Information obtained by D. Kowalczyk, from interviews.

Table 5

Uses

Individual Farming						State owned		Cooperative owned		Total investigated area	
Velembusi		Tomba —Celuga		Zaljevo —Podi		Novi Bar— Topolica		Stari Bar			
Area in ha	%	Area in ha	%	Area in ha	%	Area in ha	%	Area in ha	%	Area in ha	%
19	50.0	73	40.5	121	30.0	45	39.6	—	—	421.0	31.1
1	2.6	—	—	6	1.5	9	7.8	—	—	20.0	—
9	23.6	55	28.6	68	16.9	38	32.8	7	53.8	321.0	23.7
9	23.6	46	24.9	55	13.6	33	28.4	7	53.8	292.0	
—	—	7	3.8	13	3.2	5	4.4	—	—	27.0	
9	23.6	34	18.4	134	33.2	14	12.1	1	7.7	344.0	25.4
—	—	13	7.0	15	3.7	6	5.2	—	—	92.0	
9	23.6	21	11.4	119	29.5	8	6.9	1	7.7	251.0	
1	2.6	1	0.5	2	0.5	4	3.4	—	—	10.0	0.7
38	100.0	163	88.0	325	80.6	101	87.9	8	61.5	1096	80.9
—	—	13	7.0	53	13.2	—	—	5	38.5	145	10.7
—	—	4	2.2	9	2.2	—	—	—	—	17	1.2
—	—	5	2.8	16	4.0	14	12.1	—	—	96	7.2
38	100.0	185	100.0	403	100.0	115	100.0	13	100.0	1354	100.0

3. LAND UTILIZATION

Absence of a clear cut line between the various forms of land utilization is a characteristic of the area covered by this study and, also, of the mediterranean countries at large. Different categories of agricultural land are seen to be intermingled with each other. Fruit trees and bushes are grown on arable lands, various useful herbaceous plants are inter-cultivated with perennial crops; meadows and pasture-land are overgrown with shrubs while forest land, usually almost totally degraded, is utilized to a larger or smaller extent as pasture. Therefore, statistical data regarding the particular kind of agricultural land uses is of relative value only. It is deemed correct also that as regards perennial crops it refers to the number of trees and bushes rather than to the actual area on which the various species are cultivated.

It is curious how the historical record of Barsko Polje is reflected in the plants which are cultivated within this area. The oldest element seems to be olive trees which have been cultivated here ever since

antiquity [3]. The early feudal period saw the introduction into this region of stone fruits. Vineyards that had been prospering ever since antique times disappeared during Turkish rule for religious reasons to be restored only recently. At that time vineyards were supplanted by tobacco plantations which also have disappeared subsequently. A relatively new phenomenon closely linked with the interwar period are citrus trees whose plantations expand from year to year.

About 80% of land in the region concerned is utilized agriculturally (Table 5), and this percentage has but slight territorial variations. In the main it soars over 80—90% and in Novi Bar only it may drop down to 35%, and at Bartula down to 69% of the total land. At Velembusi, on the other hand, the total land situated in the area under examination is utilized agriculturally. The remaining land is represented by forests (11.5% on an average), or unproductive land, mainly that taken for building on.

Arable lands (Table 5) absorbing 30—50% of the total lands and over 38% of agricultural land are relatively prevalent among the latter. They are grouped mainly in the basin bottom and less frequently on the gentle slopes of the mountains forming a kind of platform (Bartula, Velembusi). Throughout area under study perennial crops occupy on an average about one fourth of agricultural land, their share, however, varies considerably, starting with 13.7% (Novi Bar) and becoming 43.8% (Bartula) and 56.3% (Stari Bar). In the latter two cases the share of perennial crops prevails over that of arable land.

Permanent grasslands absorb about one third of the total agricultural land and in majority of units examined their share ranges from 20 to 30% of the agricultural land. It is only at Novi Bar (50%) and Zaljevo-Podi (40.2%) that these figures are exceeded while at Topolica the share of grassland drops down below 14%. There is also some land in the area concerned, that is left fallow (the statistical category terms it as „not sown areas"). It is mostly deserted poor land which belong to individuals employed outside agriculture.

a. Arable Land

The way of utilization of arable land is rather primitive for fields are cultivated with hoe or wooden plow and wooden harrow. Oxen are the dominant draft animals but cows are also used for draft purposes.

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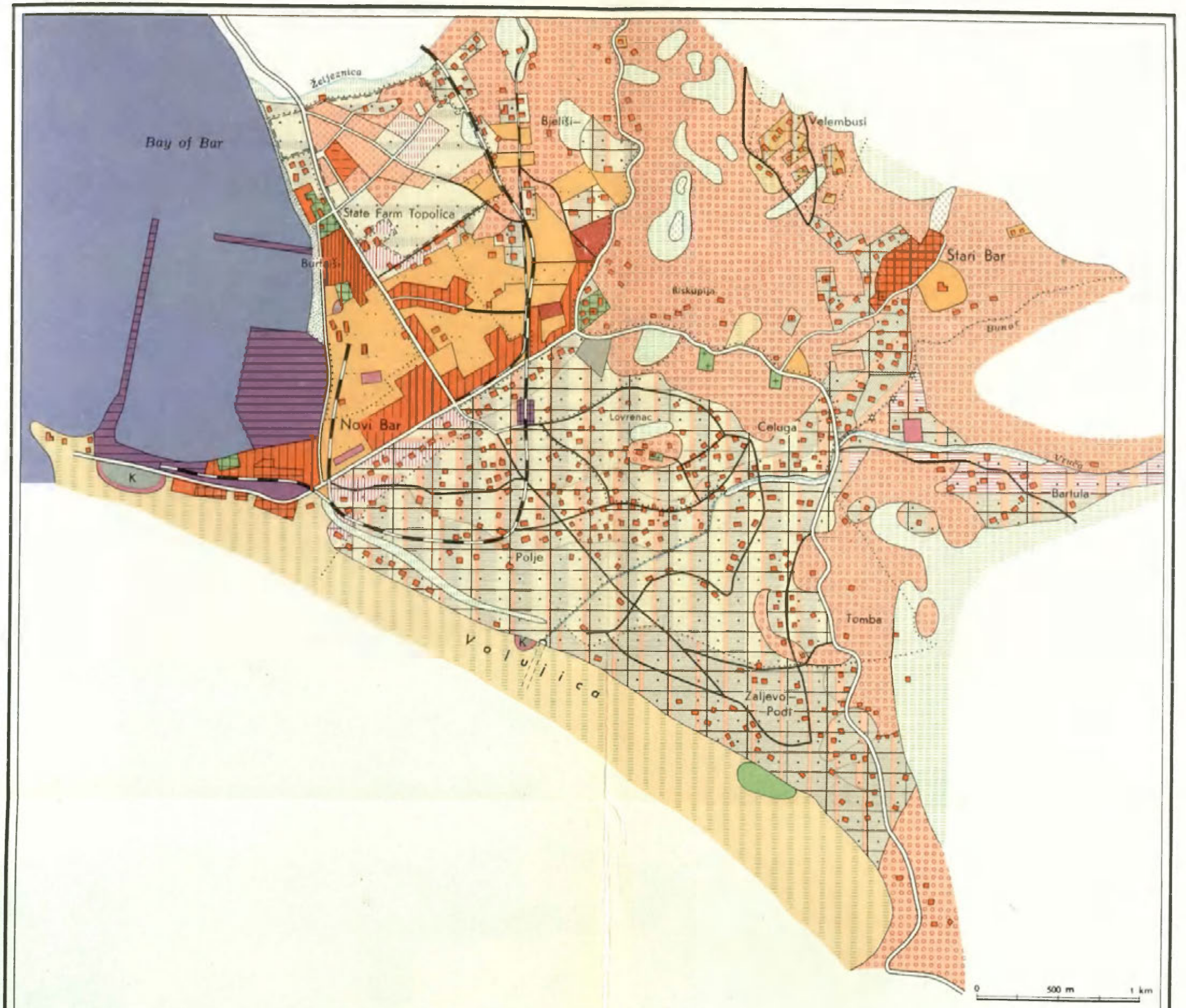
[3] M. Lutovac, Maslina u crnogorskom primoriu. Arhiv. za polioprivredne nauke i tehniku, No. 3, Beograd 1947.



Map 1. Barsko Polje. Land utilization map

A big livestock population accounts for extensive organic manuring. Manure is used chiefly for the maize crop (about 30 t per hectare) and for vegetables. Oftentimes manure is transported into the fields by pack animals (donkeys, mules). The prevalent crop rotation is either two year with sequence 1. maize +, 2. wheat or 1. maize +, 2. lucerne or it has a gardening character where fields are manured every year without any particular rotation. Seed sowing is performed by hand. The grain crop is harvested by means of sickle or, less frequently, by means of scythe, whereas maize — by hand. Threshing is performed either with flails or by animals treading down at a special round and paved course by the barn, surrounded with a low wall.

Maize and lucerne prevail among crops (Table 6). Exhaustive crops are not cultivated very much. In this group belongs wheat which is mostly of the low-yield local breed although, at the same time, some quantities of higher yielding Italian wheat are also sown (Novi Bar Topolica). At Zaljevo rye is also cultivated while oats may be occasionally seen at higher up Velembusi, At Bjelisi Polje millet is apparently dominant. Yields are very poor and they amounted to 11—15 q of wheat per 1 ha (Italian wheat reached 25 q per 1 ha), 9 q of rye per 1 ha, 10 q of barley, 11 q of oats and 12 q of millet. Lowest yields were

phot. J. Kostrowicki

Fig. 8. Barsko Polje. A bottom land, Tomba-Celuga. A harrow draught by one ox and one cow

Agricultural

Specification	Individual							
	Novi Bar				Stari Bar			
	Area in ha	%			Area in ha	%		
		Agricult land	Sown land	Given group		Agricult land	Sown land	Given group
I. Arable lands	15.0	25.4	53.8	—	14.0	16.0	100.0	—
A. Extractive crops	2.0	—	7.2	100.0	1.0	—	7.1	100.0
wheat	2.0	—	7.2	100.0	1.0	—	7.1	100.0
rye	—	—	—	—	—	—	—	—
barley	—	—	—	—	—	—	—	—
oats	—	—	—	—	—	—	—	—
millet	—	—	—	—	—	—	—	—
B. Intensifying crops	16.9	—	60.5	100.0	11.0	—	78.6	100.0
maize grain	3.0	—	10.7	17.8	7.0	—	50.0	63.6
maize green	—	—	—	—	—	—	—	—
vegetables	11.9	—	42.6	70.4	4.0	—	28.6	36.4
mangolds	—	—	—	—	—	—	—	—
sunflower	2.0	—	7.2	11.8	—	—	—	—
tobacco	—	—	—	—	—	—	—	—
flax	—	—	—	—	—	—	—	—
C. Structure forming	9.0	—	32.3	100.0	2.0	—	14.3	100.0
lucerne	6.0	—	21.5	66.7	1.0	—	7.1	50.0
clover	2.0	—	7.2	22.3	1.0	—	7.1	50.0
fodder mixtures	1.0	—	3.6	11.0	—	—	—	—
Sown area	27.9	—	100.0	—	14.0	—	100.0	—
D. Fallows	—	—	—	—	—	—	—	—
II. Perennial crops	8.1	13.7	x	100.0	49.0	56.3	x	100.0
fruit cultures	8.0	—	x	98.7	47.0	—	x	95.9
vineyards	—	—	—	—	2.0	—	x	4.1
strawberries	0.1	—	x	1.3	—	—	—	—
III. Permanent grassland	36.0	60.9	x	100.0	23.0	26.4	x	100.0
meadow	11.0	—	x	30.5	5.0	—	x	21.7
pasture	25.0	—	x	69.5	18.0	—	x	78.3
IV. Waste land	—	—	—	—	1.0	1.2	x	—
Total	59.1	100.0	x	x	87.0	100.0	x	x

recorded at Velembusi. Yields vary within limits of 100% depending on the amount of rainfall.

Maize grown for seed, mostly of the local breeds (yields of between 9 and 16 q per 1 ha) prevails among the intensifying crops. At the same time higher yielding hybrid maize (24 to 27 q per 1 ha) is cultivated in some villages, especially at Bjeliši Polje and Tomba-Čeluga. Should

Table 6a

Land Utilization

Individual											
Bartula				Bjelisi Polje				Burtaisi			
Area in ha	%			Area in ha	%			Area in ha	%		
	Agricult land	Sown land	Given group		Agricult land	Sown land	Given group		Agricult land	Sown land	Given group
13.0	23.6	65.7	—	90.0	51.0	97.2	—	31.0	36.9	86.3	—
2.0	—	9.9	100.0	6.0	—	6.5	100.0	2.0	—	5.6	100.0
2.0	—	9.9	100.0	1.0	—	1.1	16.7	2.0	—	5.6	100.0
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	5.0	—	5.4	83.3	—	—	—	—
14.8	—	74.7	100.0	48.6	—	52.5	100.0	20.9	—	58.2	100.0
6.0	—	30.3	40.5	27.0	—	29.1	55.6	13.0	—	36.2	62.2
—	—	—	—	—	—	—	—	—	—	—	—
7.8	—	39.3	52.7	18.6	—	20.1	38.2	6.9	—	19.2	33.0
1.0	—	5.1	6.8	3.0	—	3.3	6.2	1.0	—	2.8	4.8
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
55.2	—	—	—	—	—	—	—	—	—	—	—
13.0	—	15.4	100.0	38.0	—	41.0	100.0	13.0	—	36.2	100.0
1.0	—	5.2	33.3	30.0	—	32.4	78.9	11.0	—	30.6	84.6
2.0	—	10.2	66.7	8.0	—	8.6	21.1	1.0	—	2.8	7.7
—	—	—	—	—	—	—	—	1.0	—	2.8	7.7
19.8	—	100.0	—	92.6	—	100.0	—	35.9	—	100.0	—
—	—	—	—	4.0	—	—	—	—	—	—	—
24.2	43.8	x	100.0	35.4	20.1	x	100.0	28.0	33.3	x	100.0
24.0	—	x	99.1	35.0	—	x	98.8	28.0	—	x	100.0
—	—	—	—	—	—	—	—	—	—	—	—
0.2	—	x	0.9	0.4	—	x	1.2	—	—	—	—
18.0	32.6	x	100.0	50.0	28.3	x	100.0	25.0	29.8	x	100.0
4.0	—	x	22.3	27.0	—	x	54.0	11.0	—	x	44.0
14.0	—	x	77.7	23.0	—	x	46.0	14.0	—	x	56.0
—	—	—	—	1.0	0.5	x	100.0	—	—	—	—
—	100.0	x	x	176.4	100.0	x	x	84.0	100.0	x	x

maize crop be wasted as a result of drought it is sown once again but destined for green crop. Usually maize takes something like 30 to 40% of the total area sown. At Stari Bar this proportion is different for maize takes half the total area sown, at Zaljevo Polje it occupies over 40% while very little maize is cultivated at Novi Bar (17.8%), at Velembusi (11.7%) and at Topolica (16.7%) only for green crop.

A fairly high position among crops is occupied by vegetables among which prominent (22%) are potatoes included in that category (of yields ranging from 66 to 89 q per 1 ha). Potatoes are followed by tomatoes, water-melons, musk-melons, cabbage and cauliflowers (each providing about 11%) and finally by beans, carrots, green peas, paprika, onions, pumpkins, cucumbers, garlic, eggplants and others.

Agricultural

Specification	Individual							
	Velembusi				Tomba — Celuga			
	Area in ha	%			Area in ha	%		
		Agricult land	Sown land	Given group		Agricult land	Sown land	Given group
I. Arable lands	19.0	50.0	105.5	—	73.0	44.7	100.3	
A. Extractive crops	5.0	—	27.8	100.0	1.0	—	1.4	100.0
wheat	3.0	—	16.7	60.0	1.0	—	1.4	100.0
rye	—	—	—	—	—	—	—	—
barley	—	—	—	—	—	—	—	—
oats	2.0	—	11.0	40.0	—	—	—	—
millet	—	—	—	—	—	—	—	—
B. Intensifying crops	4.0	—	22.2	100.0	37.8	—	51.9	100.0
maize grain	3.0	—	11.7	75.0	29.0	—	39.8	76.7
maize green	—	—	—	—	—	—	—	—
vegetables	1.0	—	—	25.0	5.8	—	7.9	15.3
mangolds	—	—	—	—	2.0	—	—	5.3
sunflower	—	—	—	—	—	—	—	—
tobacco	—	—	—	—	1.0	—	—	2.7
flax	—	—	—	—	—	—	—	—
C. Structure forming crops	9.0	—	50.0	100.0	34.0	—	46.7	100.0
lucerne	2.0	—	11.1	22.2	31.0	—	42.6	91.2
clover	7.0	—	38.9	77.8	3.0	—	4.1	8.8
fodder mixtures	—	—	—	—	—	—	—	—
Sown area	18.0	—	100.0	—	72.8	—	100.0	—
D. Fallows	1.0	—	—	—	0.2	—	—	—
II. Perennial crops	9.0	23.7	x	100.0	55.0	33.8	x	100.0
fruit cultures	9.0	—	x	100.0	46.0	—	x	83.6
vineyards	—	—	—	—	7.0	—	x	12.7
strawberries	—	—	—	—	2.0	—	x	3.7
III. Permanent grassland	9.0	23.7	x	100.0	34.0	20.9	x	100.0
meadow	—	—	—	—	13.0	—	x	38.2
pastures	9.0	—	x	100.0	21.0	—	x	61.8
IV. Waste land	1.0	2.6	x	100.0	1.0	0.6	x	100.0
Total	38.0	100.0	x	x	163.0	100.0	x	x

The scale of vegetable growing is not uniform. The most extensive vegetable growing is found on the sea-coast plain (at Novi Bar, Bjelisi Polje, Burtaisi) and also at Stari Bar and Bartula while it is far less popular at such localities like Zaljevo-Podi, Tomba-Čeluga and Velembusi which are more distant from urban centres. The structure of vegetable crops does not differ very much throughout the villages

Table 6b

Land Utilization

Individual				State — owned				Total investigated area			
Zaljevo — Podi				Novi Bar — Topolica							
Area in ha	%			Area in ha	%			Area in ha	%		
	Agricult land	Sown land	Given group		Agricult land	Sown land	Given group		Agricult land	Sown laud	Given group
121.0	32.7	98.2		45.0	44.5	125.0		421.0	40.5	95.6	
23.0	—	18.7	100.0	2.0	—	5.6	100.0	44.0	—	10.0	100.0
13.0	—	10.6	56.6	1.0	—	2.8	50.0	26.00	—	5.9	59.0
8.0	—	6.5	34.8	—	—	—	—	8.0	—	—	18.3
1.0	—	—	4.3	1.0	—	2.8	50.0	2.0	—	—	4.5
1.0	—	—	4.3	—	—	—	—	3.0	—	—	6.8
—	—	—	—	—	—	—	—	5.0	—	—	11.4
76.2	—	61.8	100.0	11.0	—	30.6	100.0	241.2	—	54.8	100.0
54.0	—	43.8	70.9	—	—	—	—	142.0	—	32.2	58.9
1.0	—	—	1.3	6.0	—	16.7	54.5	7.0	—	—	2.9
16.7	—	13.6	22.0	3.0	—	8.3	27.3	75.7	—	17.2	31.4
1.0	—	—	1.3	2.0	—	5.6	18.2	10.0	—	—	4.2
2.0	—	—	2.6	—	—	—	—	4.0	—	—	1.6
0.5	—	—	0.6	—	—	—	—	1.5	—	—	0.6
1.0	—	—	1.3	—	—	—	—	1.0	—	—	0.4
24.0	—	19.5	100.0	23.0	—	63.8	100.0	155.0	—	35.2	100.0
19.0	—	15.4	79.2	19.0	—	52.8	82.6	120.0	—	27.2	77.4
4.0	—	—	16.7	1.0	—	2.8	4.3	29.0	—	6.6	18.7
1.0	—	—	4.1	3.0	—	8.2	13.1	6.0	—	—	3.9
123.2	—	100.0	—	36.0	—	100.0	—	440.2	—	100.0	—
6.0	—	—	—	9.0	—	—	—	20.0	—	—	—
68.3	21.0	x	100.0	38.0	37.6	x	100.0	322.0	28.5	x	100.0
55.0	—	x	80.5	33.0	—	x	86.8	292.0	—	x	90.7
13.0	—	x	19.0	5.0	—	x	13.2	27.0	—	x	8.4
0.3	—	x	0.5	—	—	—	—	3.0	—	x	0.9
134.0	41.2	x	100.0	14.0	13.9	x	100.0	343.0	30.2	x	100.0
15.0	—	x	11.2	6.0	—	x	42.9	92.0	—	x	26.8
119.0	—	x	88.8	8.0	—	x	57.1	251.0	—	x	73.2
2.0	0.6	x	100.0	4.0	4.0	x	100.0	10.0	0.8	x	100.0
325.0	100.0	x	x	101.0	100.0	x	x	1096.0	100.0	x	x

concerned. Of the more important crops only musk-melons and water-melons are not grown everywhere. The most important of these crops are at Bjelisi Polje, Burtaisi, Zaljevo-Podi and Bartula.

Of the other intensifying crops some fodder beets are grown everywhere in the area, sunflowers are grown only at Novi Bar, Zaljevo and Tomba and small quantities of flax and tobacco were seen at Zaljevo.

A major role among structure forming crops is played by lucerne which takes almost 80% of the entire area under this category. Lucerne output reported is something like 40 to 50 q of hay per 1 ha. On higher altitude fields clover is also grown and in such villages as Velembusi and Bartula it even prevails over lucerne; some mixed fodder crops are also sown there.

An analysis of the proportion of crops grown on arable fields in this area reveals the following orientations of arable land utilization:

1. Vegetable orientations — predominantly vegetable with lucerne (I_4vgS_2lc) one at Novi Bar and vegetable-maize one at Bartula (I_4vg,mz).

2. Predominantly maize orientation at Stari Bar and Zaljevo-Podi (I_4mz).

3. Maize-lucerne orientations at the villages of Burtaisi (I_3mzS_2lc) — Bjelisi Polje and Tomba-Čeluga (I_3mzS_3lc).

4. Lucerne orientation with maize at the Topolica experiment station (I_2mzS_4lc).

5. Clover orientation with wheat and maize at Velembusi (E_1wh I_1mzS_3cv).

Generally speaking maize-lucerne orientations prevail and they are strikingly dominant over the bottom sections of the Barsko Polje basin. With altitude lucerne is supplanted by clover. On the fields of Novi Bar, which is an urban centre, vegetables come to play a dominant role and also at Bartula, here the reasons accounting for that being less obvious. Excepting Velembusi and the experiment station at Topolica arable land utilization throughout the area is intensive, the evidence of which is the high proportion of intensifying crops grown.

b. Perennial Crops

Among perennial crops the largest area is covered by olive trees and the estimates put the number of olive trees (Table 7) in this region at some 35 000. They are cultivated in groves, mostly separately from other perennial crops. They are to be found, first of all, on terraced slopes inclined southward, westward and even northward. Terrace ridges are protected with stones. It is only terraces (carma) nearby settlements

phot. J. Kostrowicki

Fig. 9. Barsko Polje. Tomba. An olive grove used simultaneously as pasture

phot. J. Kostrowicki

Fig. 10. Barsko Polje. Tomba — An olive grove

Fruit

Towns and villages	Oranges and mandarins			Persimmons			Figs		
	Number of trees	Percentage of productive trees	Yield per 1 tree	Number of trees	Percentage of productive trees	Yield per 1 tree	Number of trees	Percentage of productive trees	Yield per 1 tree
1. Novi Bar	921	64.2	8	418	75.8	11	566	56.9	20
1a. Topolica	7948	44.8	8	169	85.8	15	500	63.8	23
2. Stari Bar	712	41.3	6	86	39.5	10	570	64.2	24
3. Bartula	712	70.5	7	192	87.0	10	346	76.0	26
4. Bjeliši Polje	1911	38.2	8	216	63.9	15	2415	75.1	18
5. Burtaiši	776	59.0	7	139	72.7	14	960	72.2	18
6. Tomba-Čeluga	2662	45.8	9	270	91.9	16	2272	74.3	27
7. Velembuši	30	56.7	5	18	50.0	7	197	91.9	24
8. Zaljevo-Podi	2033	33.4	10	312	84.6	16	1924	78.4	31
Total	17705	45.5	x	1820	78.2	x	9740	72.9	x

Fruit

Town and villages	Apples			Pears			Plums			Cherries		
	Number of trees	Percentage of productive trees	Yield per 1 tree	Number of trees	Percentage of productive trees	Yield per 1 tree	Number of trees	Percentage of productive trees	Yield per 1 tree	Number of trees	Percentage of productive trees	Yield per 1 tree
1. Novi Bar	99	52.5	8	113	50.4	20	317	41.9	18	57	19.3	26
1a. Topolica	2	100.0	15	—	—	—	—	—	—	—	—	—
2. Stari Bar	55	36.4	10	178	56.7	25	179	54.2	20	71	25.3	28
3. Bartula	44	79.5	10	87	80.5	25	12	91.7	25	36	86.1	35
4. Bjeliši Polje	349	51.9	6	402	64.7	18	850	66.8	16	190	57.4	20
5. Burtaiši	92	44.6	6	179	72.6	20	104	58.7	16	68	66.2	22
6. Tomba — Čeluga	458	57.4	12	744	61.3	13	407	72.7	25	334	47.0	35
7. Velembusi	3	100.0	14	19	94.7	16	4	100.0	24	12	100.0	38
8. Zaljevo-Podi	161	53.4	15	435	55.9	24	99	76.8	26	270	54.1	40
Total	1263	54.5	x	2157	61.9	x	1972	63.2	x	938	56.3	x

Table 7

culture

Quinces			Pomegranates			Almonds			Grape-vines			Olives		
Number of trees	Percentage of productive trees	Yield per 1 tree	Number of trees	Percentage of productive trees	Yield per 1 tree	Number of trees	Percentage of productive trees	Yield per 1 tree	Number of trees	Percentage of productive trees	Yield per 1 tree	Number of trees	Percentage of productive trees	Yield per 1 tree
140	78.6	16	1129	44.8	18	14	85.7	7	15349	86.9	0.8	696	96.7	12
25	100.0	34	16	68.7	34	106	71.7	11	9463	75.2	1.5	1349	37.1	16
113	92.0	25	2816	48.0	24	140	94.3	9	2337	62.9	0.8	10014	97.4	20
82	87.8	24	1411	74.6	21	69	59.4	10	890	96.6	0.8	4115	94.4	14
114	85.1	20	490	49.2	14	19	36.8	6	35027	24.6	0.5	2193	93.6	12
107	83.2	18	360	80.6	14	14	64.3	7	4183	93.7	0.5	3372	99.5	11
240	79.2	30	1916	89.4	32	160	55.6	10	6915	83.0	1.2	5128	98.4	24
74	48.6	22	430	72.6	10	163	87.1	12	1232	98.4	1.4	1651	99.0	11
214	88.8	37	3415	76.5	43	214	92.1	14	8000	89.7	1.2	7820	94.4	23
1109	82.3	x	11983	67.5	x	899	78.4	x	83396	59.3	x	36338	94.3	x

Table 7a

culture

Sour cherries			Peaches			Walnuts			Apricots			Lemons		
Number of trees	Percentage of productive trees	Yield per 1 tree	Number of trees	Percentage of productive trees	Yield per 1 tree	Number of trees	Percentage of productive trees	Yield per 1 tree	Number of trees	Percentage of productive trees	Yield per 1 tree	Number of trees	Percentage of productive trees	Yield per 1 tree
78	62.8	24	80	38.7	12	44	34.1	31	34	35.3	14	102	84.3	6
—	—	—	3	100.0	21	28	100.0	38	—	—	—	200	60.0	6
81	37.0	31	74	48.6	15	14	57.1	41	19	47.4	7	47	63.8	6
41	68.3	31	14	42.9	18	21	95.2	43	19	84.2	18	19	73.7	5
332	59.0	30	247	55.5	17	53	75.5	37	143	73.4	12	74	66.2	6
52	63.5	34	87	50.6	15	24	54.2	36	31	58.1	10	41	70.7	6
415	63.1	27	463	53.8	18	101	50.5	43	184	68.5	18	97	44.3	5
5	100.0	35	5	100.0	11	—	—	—	6	66.7	6	—	—	—
141	65.2	36	143	75.5	25	62	80.6	46	115	78.3	23	140	77.1	8
1145	60.2	x	1116	55.5	x	347	64.3	x	551	69.0	x	720	66.5	x

phot. J. Kostrowicki

Fig. 11. Stari Bar. An old olive water mill. On both sides terrace protecting walls. The olive trees on the right side, the fig tree on the left one

that are manured, ridged up and utilized for growing other herbaceous plants, mostly vegetables. Terraces placed higher up or farther away from villages are overgrown with grass and sometimes — shrubs. They are not cultivated but utilized as grazing grounds.

Trees several hundred years old predominate and only a small proportion (about 6%) is represented by young unproductive trees. It is only at Stari Bar, Bartula and Zaljevo that several hundred young trees are reported, there too, however, their share does not exceed more than several percent of the total. Only in Topolica young olive groves predominate. This state of affairs is indicative of lack of tendency for development of this aspect of local farming. Olives yield is on an-average 11 to 24 kg of fruit per one tree. One olive tree is capable of producing on an average some 10 kg of olive oil while 100 kg of olives give 10 to 20 kg of olive oil. Largest olive tree groves are found at Stari Bar, Bartula, Tomba, Zaljevo while smaller areas of olive tree plantations are at Novi Bar, Bjelisi Polje and at Burtaisi.

Fruit trees and bushes are most frequently cultivated around farmhouses and only sometimes do they stretch up to low placed terraces and boundaries of arable fields. A dozen or so species of fruit trees

and bushes are intercultivated but mainly pomegranates and figs followed by orange and mandarin trees. In much smaller numbers are cultivated pear, plum, apple, cherries, peach, persimmon, quince and also almond, apricot, and walnut trees. There are also some numbers of mulberry trees, overlooked by statistics, whose fruit are used for the manufacture of brandy (rakija). A considerable part, often half of the total number of citrus trees are young trees, which points to a trend for development of those plantations. At Bartula, Burtaisi and Novi Bar, however, the productive trees constitute more than half of the total number of citrus trees there. Small scale vineyards are also encountered among trees and shrubs of several villages. Biggest vineyards, however, are at Zaljevo-Podi, Tomba-Čeluga and Stari Bar. Vegetables, maize, wheat and lucerne are intercultivated with the trees.

A special part is played by the experiment station at Topolica which specialises in citrus tree and vine cultivation. Orange and lemon tree plantations are divided into plots which are surrounded with belts of trees for wind protection. The plantations have tendency to expand at the cost of olive tree groves. Young trees constitute a high proportion

phot. J. Kostrowicki

Fig. 12. Barsko Polje. A bottom part. A narrow thorough going path with pomegranate and other shrub hedges separating it from fields on both sides

relatively, which means trees that either do not produce fruit or produce it in small quantities. There are also local citrus tree nurseries and some fig and persimmon trees cultivated. The land is irrigated through a system of special canals.

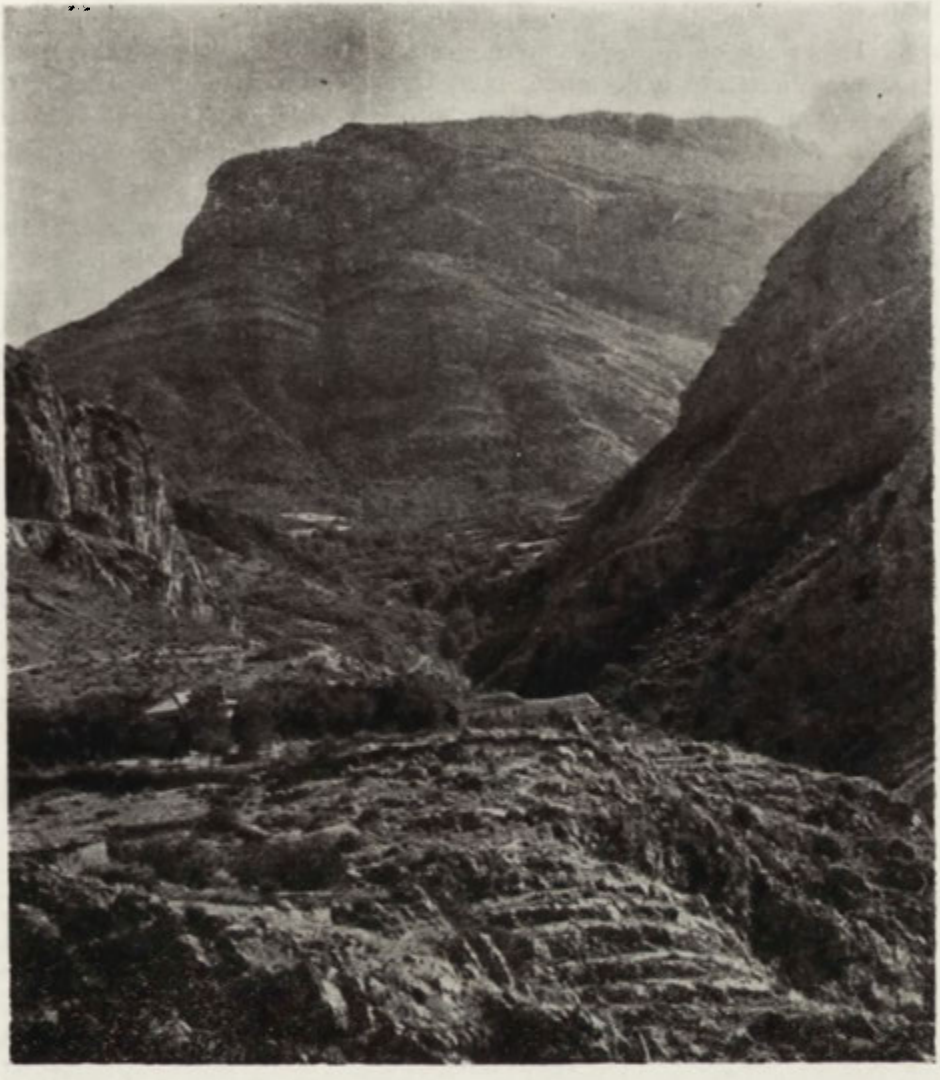
As regards yields per one tree the differences are quite considerable ones (Table 7). Greatest yield per tree is recorded with cherry trees (20—40 kg) then sour cherries (24—36 kg), pomegranates (10—40 kg), quinces (16—37 kg) and figs (18—31 kg) and also walnut trees (31—46 kg). A rather meagre crop is harvested from lemon trees (5—8 kg), orange trees (5—10 kg). almond trees (7—14 kg) and apple trees (6—15 kg). One grape vine yields from 0.5 to 1.5 kg of grapes.

From an analysis of the differences in size of crops obtained from different kinds of perennial crops in different places of the region, there emerges a striking regularity. The lowest yields of all are usually harvested at Bjelisi Polje and Burtaisi. As regards citrus fruits, peaches and apricots the poorest crop is usually obtained at Velembusi where the local climate does not really agree with those termophilous species. Zaljevo Podi scores by far the highest crop of almost all fruits. Of the Central European species, in particular apples, sweet and sour cherries, as well as almonds — its specialty — the record goes to Velembusi. Relatively high crops are obtained at Tomba-Čeluga and on the experiment station at Topolica.

c. Permanent Grasslands and Woodlands

There are two main types of permanent grassland observed in the region under examination. The first is encountered along the valley's bottom and on marshy and gravel land. These grasslands are mainly inundated meadows or marshy meadows, especially in places where there is stagnant water present. In places nearer to the sea coast there appear certain admixture of halophytes which points to salty ground. Particularly large stretches of meadows are to be found at Novi Bar, Bjelisi Polje, and Topolica. In recent times quite sizeable sections of them have been marked up for building sites.

Rough pasture land is the other type of permanent grasslands. Overgrown with shrubs to some extent the rough pastureland either appears above the line of olive groves, on the hill tops, or on rocky ground and more steep slopes among the groves. The pasture land represents secondary shrubby associations (šibljak) which is an outcome of the destruction of the oak forests that at onetime grew along the foothills, or of beach forests which grew higher up. Anyway, statistics regard those lands as forest areas. The grounds surrounding ruins of the ancient



phot. J. Kostrowicki

Fig. 13. Barsko Polje. The upper part of the Bunar stream valley. Rugged limestone rocks forming the upper part of the Rumija foothills. All is covered by scarce macchia and grass vegetation used as pasture for sheep

stronghold at Stari Bar are also utilized for grazing. So also are the small stretches of arable land left idle. Some villages have their pastures up in the mountains, in the grounds of other administrative units.

Shrub vegetation is much more sparse on the Volujica shoulder where on account of its northern inclination and soil conditions there are

no olive trees and the grassy rough pastures reach the very foot of the ridge. The yield of the permanent grassland is very low in the region under examination. It does not exceed 4 q of hay from 1 ha of meadows and 2 q from 1 ha of pastures. The only exception to this rule are the improved meadows of Topolica which yield a little better crops (12 q of hay per 1 ha).

The only truly forest area preserved is a small oak forest at the foot of Volujica on the grounds belonging to Zaljevo. It is indicative of the character of forests which once were a feature of the lower parts of mountain slopes. Remnants of the former flooded ("łęg") forests have also been preserved here and there along stream beds and the old river bed of Bunar on the valley bottom in the form of more or less thick poplar-willow brushwood with tamarisk, and so on.

d. Unproductive Land

Statistically, unproductive land in the region under examination consists of small patches of marshlands, stony grounds formed from river alluvia and, in higher altitudes, of rocks and steeper slopes to which only extremely meagre vegetation manages to cling. Finally, in this group belong the grounds destined for building up which are quite extensive, particularly at Novi Bar. Almost all of these types of unproductive land are actually utilized for grazing of sheep and even cattle.

e. Settlement

One comes across a number of settlement units in the Barsko Polje region examined, which have different forms of buildings and layout. It will be recalled that there are two minor urban settlements — the old local market and administrative centre of Stari Bar, and Novi Bar, a town of specialized functions, which is expanding along with the development of port construction and port operations. However relatively stabilized are the functions and the scale of the first settlement, the other is in a full swing of expansion encroaching upon the neighbouring rural settlements or just urbanizing them. Cartographic sources indicate that the tiny and ancient port settlement at Novi Bar or just Bar, occupied at first a small area at the foot of the Volujica ridge on the base of the promontory over Barska Luka bay, south and west of the old mouth of the Bunar. It was tightly built up with merchant and fishermen's cottages. It was divided from Stari Bar by a swampy basin which, as was mentioned earlier, was settled relatively late.

Along with the expansion of railway transport functions and of the

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Fig. 14. Bartula. A village road with walls separating in from house yards and orchards on both sides. An old farm house on the left, an irrigation canal on the right

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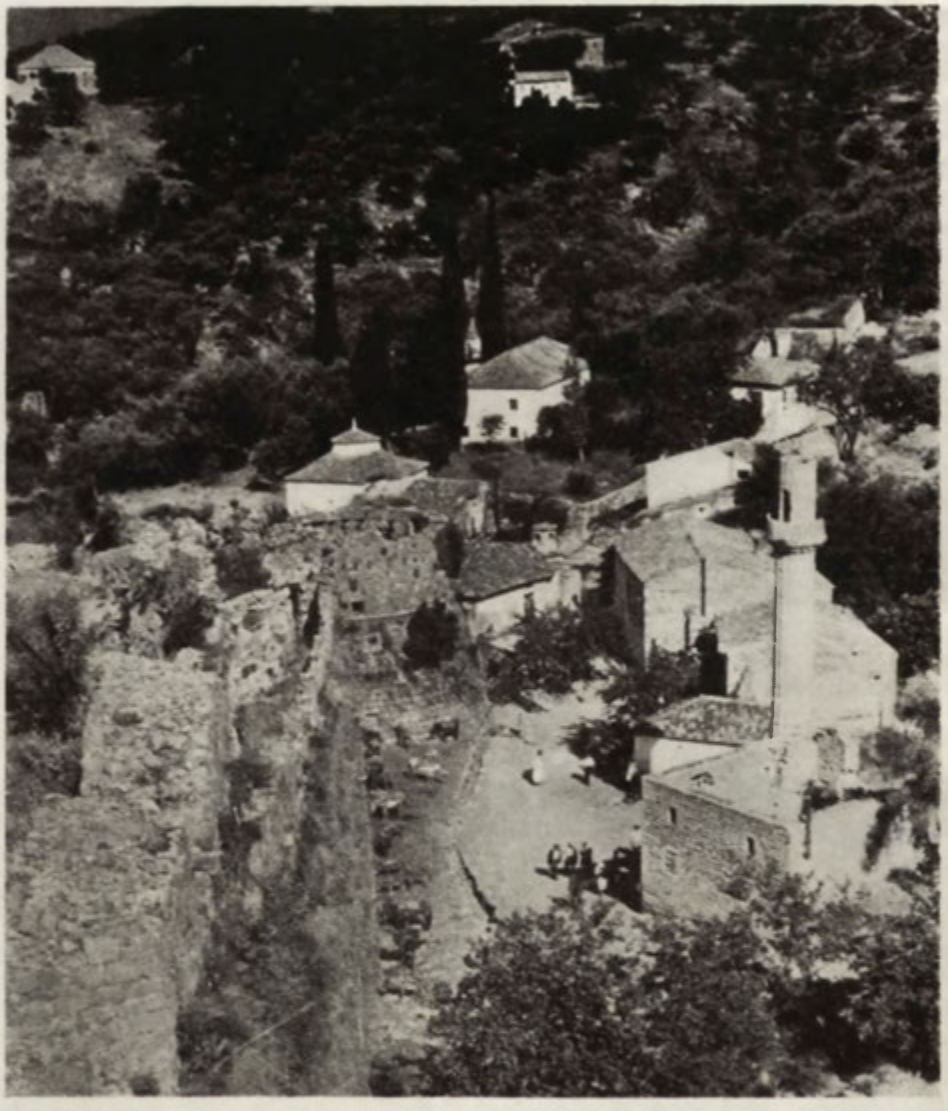
Fig. 15. Bartula. A farm yard and farm buildings



phot. J. Kostrowicki

Fig 16. Stari Bar down from the walls of the old fortress. Mounting and pack animals attending their owners along the wall. A minaret to the right. Cypress trees and olive groves in the background

port facilities the city of Bar was greatly enhanced while the progress of land reclamation made it possible for Bar extend its area north-eastward along the railway line down to the formerly soaked Polje plain. In this process the village of Popovići was the first

to be absorbed by Bar where the main railway station was located, and secondly it was the turn of Topolica, the former royal domaine where Montenegro's last king Nicholas (Nikola) had his palace built. In the same way Novi Bar grounds surrounded and absorbed the fisherman village of Burtaiši which now constitutes functionally an integral part of Novi Bar. In the very centre of this area, between old Bar, Popovici and Burtaiši, not far from the former mouth of the Bunar, the new port is under construction which is bound to become in future a consolidating centre for the new town. The urbanisation drive has also affected the adjoining territories of the nearby villages of Bijelašici or Bjelisi, Polje, Lovrenac, Biskupija and so on.

At the time this study was being made at Novi Bar the town did not represent yet a clear cut urban centre. It was composed first of the old centre at the foot of Volujica with its compact construction of small 1—2 storey houses with 3 to 5 compartments (rooms) that were fairly well furnished and equipped; secondly of one family, detached cottages scattered along the narrow-gauged railway line at the village of Popovici, belonging to non-agricultural population, erected at different times

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Fig. 17. Stari Bar. A lower part of the main street and outdoor cafeteria to the right

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Fig. 18. Stari Bar. An upper part of the main street. A Montenegran highlanderin descending from mountains with her pack donkey. A moslem woman on the left

but mostly new, built largely of brick and surrounded with small gardens. Thirdly, there was a number of multi-storeyed blocks of houses built on the grounds or on the boundary between the villages of Popovici and Burtaiši and finally, the installations of the Topolica experiment station. Numerous shops are to be found both in the old centre and in the new residential blocks. On the sea coast at Burtaiši there was also a large hotel with a restaurant. Main thoroughfares of the new urban organism are sections of old roads that linked Novi Bar: along the sea coast with Sutomore, through a pass in the Rumija range with Virpazar, with Stari Bar nad through Zaljevo with Ulcinj.

The town of Stari Bar located higher up, at the foot of Rumija mountains, has a strikingly different character. There, the built up area is rather compact along the main street which ascends the steep slope climbing up by stone stairs to the ruins of the old stronghold that overlooks the town down below. The prevalent number of buildings are rather small 1 or 2 storeyed houses built of stone or of adobe but plastered brick. The street as well as grounds by the stronghold ruins represent the main marketing area. Fairs that are held there attract not

only Barsko Polje residents but also peasants from the nearby mountain villages. This is also the place where most shops, and Orthodox Church and a mosque can be found. The whole ensemble has a historical and oriental character quite of its own.

Apart from the above the administrative unit of Stari Bar includes also a set of buildings west of it which are owned by the Orthodox Church, a bishop's palace, and a number of more distant hamlets such as Biskupija located along the road leading west from Stari Bar, such as Marovici along the road to Virpazar, and such as Menka and Turcini located east of Stari Bar and much higher up.

The other administrative units also consist of several villages or hamlets. Thus, for instance, Bartula includes a small hamlet of Rap located on the Vruća stream, below the village. Tomba-Čeluga, apart from Tomba located higher up on the slope and Čeluga which is placed at the valley's bottom, on the Bunar, embraces also the village of Lovrenac which runs along the mountain slope. The large village of Zaljevo tenaciously sticking to the mountain slope has been combined with Podi for the sake of statistics. Only the small village of Velembusi at the foot of the mountains and north-west of Stari Bar forms a seperate and independent administrative unit.

phot. J. Kostrowicki

Fig. 19. Stari Bar. A market place. Women in local costumes selling vegetables

For that matter, neither of the villages concerned constitutes a clearly marked off settlement unit. Farmsteads are scattered wide and haphazardly and the building layout is rather loose. Old residential buildings are erected mostly of stone, while the more recent ones were built of brick adobe. The oldest houses do not have chimneys and inside there is an open fireplace over which lard and meat used to be smoked and meals are cooked in kettles hanged on special hooks. There are no dividing walls or ceilings and the few items of furniture that there are used to be arranged along the four walls. The newer houses are better appointed and fairly decently furnished. A characteristic of both groups of houses are rather small windows so that it is pretty dark and cool inside. The farm houses have around them small farm buildings of a primitive nature: byres, pigsties and maize stores. Around the farm buildings there are, as a rule, gardens where are intercultivated various fruit trees and bushes, vines and also vegetables, maize and so on. The farmsteads are enclosed with high stone walls which together with shrubs form a tight screen separating the yard from the village roads.

phot. J. Kostrowicki

Fig. 20. Stari Bar. A market place. Women sitting along the main street and selling local goods

A regular phenomenon, especially at villages nearer to Novi Bar, are the fairly numerous houses of the non-agricultural population, which are also built of stone or brick, surrounded with small gardens, however, without a trace of farm buildings. Most of these houses have been built since 1945.

There are Orthodox churches or chapels in a number of villages (Tomba, Lovrenac, Biskupija) and a mosque at Zaljevo.

Until recently a number of small, water driven oil mills were functioning mainly on Bunar at Stari But auso on Zeljeznica, Zaljevski potok and so on. They have been put of operation now owing to construction of a large and modern oil mill at the hamlet of Rap between Bartula and Stari Bar. At Novi Bar there are operating metal and wood working work-shops. A quarry has been developed in Novi Bar on the slope of Volujica, which produces facing stone for Titograd. At the time of making this research the following port installations were under construction: a wharf which extended on to the buried part of the bay, two breakwaters, 4 cranes, etc.

A mention is also due about several parks, particularly those enclosing the former royal palace at Topolica, and about cemeteries one of which, situated by the road from Novi Bar to Stari Bar, is a cemetary of partisans who lost their lives during the 2nd World War.

4. CROP PRODUCTION

Industrial raw materials constitute the bulk of plant production in the majority of the units examined in this survey (Table 8). Top on this list are olives which despite rather low yields are a dominant element in the plant production of Stari Bar, Velembusi and Bartula and are also the major crop of Zaljevo-Podi, Tomba-Čeluga, and Burtaiši. It is only in the Novi Bar area that food crops relatively predominate, chiefly vegetables, potatoes, and fruits whereas at Bjelisi Polje and Topolica fodder crops, mainly lucerne and maize are prevalent.

As a matter of fact fruit crops everywhere are an important element of plant production and they are either dominant or prevalent in the group of food crops. As far as quantity is concerned in this group prevail either pomegranates (Stari Bar, Bartula), pomegranates and figs (Tomba, Zaljevo), figs (Bjelisi Polje), figs and plums (Burtaiši), almonds and figs (Velembusi), or grapes (Novi Bar) and oranges (Topolica).

Next in importance of food crops are root crops and vegetables. Their share in total food products ranges from about 9% (Tomba) and 11% (Velembusi and Topolica) to over 40% (Novi Bar, Bjelisi Polje) and the prevalent crop in this case are either potatoes (Novi Bar, Stari

Gross

Specification	Novi Bar				%				
	Area in ha or heads	Yield per ha in q	Crops in q	Production in grain units	Gross production	Branch production	Group production	Area in ha or heads	Yield per ha in q
I. Crop production	x	x	x	930.6	64.0	100.0		x	x
A. Food crops	x	x	x	444.3	30.6	47.7	100.0	x	x
a. Grains	2.0	x	39.0	39.0	2.68	4.2	8.8	1.0	x
wheat	2.0	x	39.0	39.0	x	x	8.8	1.0	x
italian	1.0	25.0	25.0	25.0	x	2.7	5.6	—	—
local	1.0	14.0	14.0	14.0	x	x	3.2	1.0	11.0
rye	—	—	—	—	—	—	—	—	—
millet	—	—	—	—	—	—	—	—	—
b. Roots and vegetables	11.9	x	x	188.1	12.9	20.2	42.3	3.0	x
potatoes	2.5	86.0	215.0	53.8	x	5.8	12.1	1.0	66.0
beans	0.5	12.0	6.0	7.2	x	x	1.6	0.3	8.0
cabbage and cauliflowers	1.0	80.0	80.0	12.0	x	1.3	2.7	0.5	64.0
onion	0.6	50.0	30.0	9.0	x	x	2.0	—	—
garlic	0.4	45.0	18.0	5.4	x	x	1.2	—	—
beans (intercultivated)	1.0	8.0	8.0	9.6	x	x	2.2	—	—
tomatoes	2.0	110.0	220.0	33.3	x	3.6	7.5	0.2	84.0
paprika	0.7	60.0	42.0	12.6	x	1.3	2.8	—	—
peas	0.6	18.0	10.8	3.2	x	x	0.7	0.2	16.0
cucumber	0.7	43.0	30.1	7.5	x	x	1.7	—	—
melons and watermelons	0.5	120.0	60.0	18.0	x	1.9	4.1	—	—
carrots	0.4	100.0	40.0	6.0	x	x	1.3	0.4	97.0
pumpkins (intercult.)	0.5	120.0	60.0	6.0	x	x	1.3	0.4	89.0
other	0.5	45.0	22.5	4.5	x	x	1.0	1.0	45.0
c. Fruits	x	x	x	217.2	14.9	23.3	48.9	x	x
apples	x	x	4.2	2.1	x	x	0.5	x	x
pears	x	x	11.4	5.7	x	x	1.3	x	x
plums	x	x	20.0	10.0	x	1.2	2.2	x	x
cherries	x	x	3.0	1.5	x	x	0.2	x	x
sour cherries	x	x	12.0	5.3	x	x	1.2	x	x
peaches	x	x	4.0	2.0	x	x	0.4	x	x
walnuts	x	x	4.6	9.2	x	x	2.1	x	x
apricots	x	x	1.7	0.8	x	x	0.2	x	x
lemons	x	x	5.2	2.6	x	x	0.6	x	x
oranges and mandarins	x	x	47.3	23.6	x	2.5	5.3	x	x
persimmons	x	x	34.9	15.5	x	1.7	3.5	x	x
figs	x	x	64.4	38.6	x	4.1	8.7	x	x
quinces	x	x	17.6	8.8	x	x	2.0	x	x
pomegranates	x	x	91.1	36.4	x	3.9	8.2	x	x
almonds	x	x	0.8	1.6	x	x	0.3	x	x
grapes	x	x	106.6	53.3	x	5.7	12.0	x	x
strawberries	0.1	3.0	0.3	0.2	x	x	0.0	—	—
B. Fodder crops	x	x	x	308.8	21.2	33.2	100.0	x	x
a) Grains	3.0	x	x	55.0	3.8	5.9	17.8	x	x
maize	3.0	x	x	55.0	x	x	17.8	7.9	9.0

Table 8

Production

Stari Bar					Bartula						
		%							%		
Crops in q	Production in grain units	Gross production	Branch production	Group production	Area in ha or heads	Yield per ha in q	Crops in q	Production in grain units	Gross production	Branch production	Group production
x	3181.8	77.8	100.0		x	x	x	1177.9	64.0	100.0	
x	288.9	7.1	9.1	100.0	x	x	x	405.5	22.0	34.4	100.0
11.0	11.0	0.3	0.3	3.8	2.0	x	26.0	26.0	1.4	2.2	6.4
11.0	11.0	x	0.3	3.8	2.0	x	26.0	26.0	1.0	2.2	6.4
—	—	—	—	—	—	—	—	—	—	—	—
11.0	11.0	x	0.3	3.8	2.0	13.0	26.0	26.0	1.0	2.2	6.4
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
x	46.1	1.1	1.4	16.0	8.1	x	x	129.1	7.0	11.0	31.8
66.0	16.5	x	0.5	5.7	1.0	80.0	80.0	20.0	x	1.7	4.9
2.4	2.9	x	0.1	1.0	1.0	10.0	10.0	12.0	x	1.0	2.9
32.0	4.8	x	0.2	1.7	1.0	82.0	82.0	12.3	x	1.0	3.0
—	—	—	—	—	0.5	43.0	21.5	6.5	x	0.5	1.6
—	—	—	—	—	0.2	41.0	8.2	2.5	x	0.2	0.6
—	—	—	—	—	0.3	6.0	1.8	2.2	x	0.2	0.5
16.8	2.5	x	0.1	0.9	0.7	103.0	72.1	10.8	x	0.9	2.4
—	—	—	—	—	0.4	60.0	24.0	7.2	x	0.6	1.8
3.2	1.0	x	—	0.3	0.5	19.0	9.5	2.9	x	0.2	0.7
—	—	—	—	—	0.4	43.0	17.2	4.3	x	0.4	1.1
—	—	—	—	—	0.9	120.0	108.0	32.4	x	2.7	8.0
38.8	5.8	x	0.2	2.0	0.6	100.0	60.0	9.0	x	0.8	2.2
35.6	3.6	x	0.1	1.2	0.6	1 6.0	9.6	7.0	x	0.6	1.7
45.0	9.0	x	0.3	3.1	—	—	—	—	—	—	—
x	231.8	5.7	7.3	80.2	x	x	x	250.4	13.6	21.2	61.8
2.0	1.0	x	0.0	0.3	x	x	4.0	2.0	x	0.2	0.5
25.3	12.6	x	0.4	4.4	x	x	18.0	9.0	x	0.8	2.2
19.4	9.7	x	0.3	3.4	x	x	3.0	1.5	x	0.1	0.4
5.0	2.3	x	0.1	0.8	x	x	11.0	5.0	x	0.4	1.2
9.3	4.2	x	0.1	1.4	x	x	9.0	4.1	x	0.3	1.0
5.4	2.7	x	0.1	0.9	x	x	1.0	0.5	x	0.0	0.1
3.3	6.6	x	0.2	2.3	x	x	9.0	18.0	x	1.5	4.4
0.6	0.3	x	0.0	0.1	x	x	3.0	1.5	x	0.1	0.4
1.8	0.9	x	0.0	0.3	x	x	0.7	3.5	x	0.3	0.9
17.6	8.8	x	0.3	3.0	x	x	35.0	17.5	x	1.5	4.3
3.4	1.5	x	0.0	0.5	x	x	17.0	7.6	x	0.6	1.9
14.6	8.8	x	0.3	3.0	x	x	68.0	40.8	2.2	3.5	10.0
26.0	13.0	x	0.4	4.5	x	x	17.0	8.5	x	0.7	2.1
324.2	129.7	3.2	4.1	44.9	x	x	221.0	88.4	4.8	7.5	21.8
11.9	23.8	x	0.7	8.2	x	x	4.0	8.0	x	0.7	2.0
11.7	5.9	x	0.2	2.0	x	x	69.0	34.5	x	2.9	8.5
—	—	—	—	—	0.2	3.0	0.6	0.5	x	0.0	0.1
x	116.4	2.8	3.6	100.0	x	x	x	174.0	9.4	14.8	100.0
x	63.0	1.5	2.0	54.1	x	x	x	72.0	3.9	6.1	41.4
63.0	63.0	1.5	2.0	54.1	6.0	12.0	72.0	72.0	3.9	6.1	41.4

Gross

Specification	Novi Bar				%				
	Area in ha or heads	Yield per ha in q	Crops in q	Production in grain units	Gross production	Branch production	Group production	Area in ha or heads	Yield per ha in q
therein:									
hybrid	1.0	25.0	25.0	25.0	x	2.7	8.1	—	—
local	2.0	15.0	30.0	30.0	x	3.2	9.7	7.0	9.0
barley	—	—	—	—	—	—	—	—	—
oats	—	—	—	—	—	—	—	—	—
b. Succulent foods	x	x	x	36.8	2.5	4.0	11.8	—	—
mangolds	1.0	220.0	220.0	22.0	x	2.4	7.1	—	—
maize	—	—	—	—	—	—	—	—	—
mangolds foliage	x	x	73.0	7.3	x	0.8	2.3	—	—
other	0.5	150.0	75.0	7.5	x	0.8	2.4	—	—
c. Rough forage	x	x	x	217.0	14.9	23.3	70.3	x	x
lucerne	6.0	49	294.0	117.6	8.1	12.6	38.1	1.0	42.0
clover	2.0	26	52.0	20.8	x	2.2	6.7	1.0	20.0
fodder mixtures	1.0	86	86.0	34.4	x	3.7	11.1	—	—
spring cereals straw	2.0	x	58.0	8.7	x	x	2.8	1.0	16.0
winter cereals straw	—	—	—	—	—	—	—	—	—
maize straw	3.0	x	82.0	12.3	x	1.3	4.0	7.0	13.0
meadow hay	11.0	4.0	44.0	13.2	x	1.4	4.3	5.0	4.0
pasture	25.0	2.0	50.0	10.0	x	1.0	3.2	18.0	2.0
C. Industrial crops	x	x	x	177.5	12.2	19.1	100.0	x	x
olives	x	x	81.0	121.5	8.3	13.1	68.5	x	x
sunflower	2.0	14.0	28.0	56.0	x	6.0	31.5	—	—
flax (straw and seeds)	—	—	—	—	—	—	—	—	—
tobacco	—	—	—	—	—	—	—	—	—
II. Animal production	x	x	x	523.5	36.0	100.0		x	x
A. Milk 1	x	x	x	181.0	12.4	34.6	100.0	x	x
cow milk 1	20	1200	24000	180.0	12.3	34.4	99.4	18	1100
sheep milk 1	2	62	124	1.0	x	0.2	0.6	230	48
B. Meat stock (kg live-weight)	x	x	x	299.3	20.6	57.2	100.0	x	x
beef	3	152	456	27.4	x	5.2	9.1	3	145
veal	12	35	420	25.2	x	4.8	8.4	11	35
pork	37	120	4440	222.0	15.3	42.4	74.2	43	96
piglets	11	10	110	5.5	x	1.0	1.8	5	10
mutton	4	16	64	3.8	x	0.7	1.3	63	20
lamb	—	—	—	—	—	—	—	167	10
poultry	234	1.1	257	15.4	x	2.9	5.2	430	1.1
C. Eggs, pieces	212	67.0	14304	35.8	2.5	6.8	100.0	391	74
D. Wool kg	9	1.0	9.0	3.6	0.2	0.7	100.0	253	1.0
E. Honey kg	5	19.0	95.0	3.8	0.2	0.7	100.0	37	21
Gross production				1454.1	100.0				
per 100 ha agriculture land				24.6					
plant				15.8					
animal				8.8					
per 1 person employed in agriculture				51.9					

Table 8a

Production

Stari Bar					Bartula						
		%							%		
Crops in q	Production in grain units	Gross production	Branch production	Group production	Area in ha or heads	Yield per ha in q	Crops in q	Production in grain units	Gross production	Branch production	Group production
—	—	—	—	—	—	—	—	—	—	—	—
63.0	63.0	1.5	2.0	54.1	6.0	12.0	72.0	72.0	3.9	6.1	41.4
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	x	x	x	30.5	1.7	2.6	17.5
—	—	—	—	—	1.0	230.0	230.0	23.0	1.2	2.0	13.2
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	1.0	x	75.0	7.5	x	x	4.3
—	—	—	—	—	—	—	—	—	—	—	—
x	53.4	1.3	1.6	45.9	x	x	x	71.5	3.9	6.1	41.1
42.0	16.8	0.4	0.5	14.4	1.0	50.0	50.0	20.0	1.1	1.7	11.5
20.0	8.0	x	0.2	6.9	2.0	24.0	48.0	19.2	1.0	1.6	11.0
—	—	—	—	—	—	—	—	—	—	—	—
16.0	2.4	x	0.1	2.1	2.0	19.0	38.0	5.7	x	0.5	3.3
—	—	—	—	—	—	—	—	—	—	—	—
91.0	13.0	0.3	0.4	11.2	6.0	18.0	108.0	16.2	0.9	1.4	9.3
20.0	6.0	x	0.2	5.2	4.0	4.0	16.0	4.8	x	x	2.8
36.0	7.2	0.2	0.2	6.2	14.0	2.0	28.0	5.6	x	x	3.2
x	2776.5	67.9	87.3	100.0	x	x	x	598.4	32.5	50.8	100.0
1851.0	2776.5	67.9	87.3	100.0	x	x	544.0	598.4	x	50.8	100.0
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
x	905.5	22.2	100.0		x	x	x	662.3	36.0	100.0	
x	236.8	5.8	26.2	100.0	x	x	x	196.7	10.7	29.7	100.0
19800	148.5	3.6	16.4	62.7	17	1300	22100	165.8	9.0	25.0	84.3
11040	88.3	2.2	9.8	37.3	69	58	3864	30.9	1.7	4.7	15.7
x	464.1	11.3	51.2	100.0	x	x	x	352.6	19.2	53.2	100.0
435	26.1	x	2.9	5.6	4	205	820	49.2	2.7	7.4	14.0
385	23.1	x	2.5	5.4	9	35	225	13.5	x	2.0	3.8
4128	206.4	5.0	22.8	44.5	37	110	4070	203.5	11.1	30.7	57.7
50	2.5	x	0.3	0.5	11	10	110	5.5	x	0.8	1.6
1260	75.6	1.8	8.3	16.3	27	20	540	32.4	x	4.9	9.2
1670	102.0	2.5	11.3	22.4	42	10	420	25.2	x	3.8	7.1
473	28.3	x	3.1	5.8	353	1.1	388	23.3	x	3.5	6.6
28934	72.3	1.8	8.0	100.0	318	81.0	25758	64.4	3.5	9.7	100.0
253	101.2	2.5	11.2	100.0	107	1.0	107	42.8	2.3	6.5	100.0
777	31.1	0.8	3.4	100.0	6	24.0	144	5.8	0.3	0.9	100.0
	4087.3							1840.2			
	46.4							33.4			
	36.1							21.4			
	10.3							12.0			
	35.5							34.1			

Gross

Specification	Bjeliši Polje				%				
	Area in ha or heads	Yield per ha in q	Crops in q	Production in grain units	Gross production	Branch production	Group production	Area in ha or heads	Yield per ha in q
I. Crop production	x	x	x	2693.4	42.5	100.0		x	x
A. Food crops	x	x	x	926.3	14.6	34.4	100.0	x	x
a. Grains	6.0	x	74.0	74.0	1.2	2.8	8.0	2.0	x
wheat	1.0	x	14.0	14.0	x	0.5	1.5	2.0	x
italian	—	—	—	—	—	—	—	—	—
local	1.0	14.0	14.0	14.0	x	0.5	1.5	2.0	14.0
rye	—	—	—	—	—	—	—	—	—
millet	5.0	12.0	60.0	60.0	x	2.2	6.5	—	—
b. Roots and vegetables	18.6	x	x	412.1	6.5	15.3	44.5	6.9	x
potatoes	3.0	84.0	252.0	63.0	x	2.3	6.8	2.0	85.0
beans	2.8	11.0	30.8	37.0	x	1.4	4.0	0.4	10.0
cabbage and cauliflowers	1.6	83.0	132.8	19.9	x	0.7	2.1	1.0	81.0
onion	0.8	48.0	38.4	11.5	x	0.4	1.2	0.2	49.0
garlic	0.4	43.0	17.2	5.2	x	0.2	0.6	0.1	43.0
beans (interculti-vated)	0.7	6.0	4.2	5.0	x	0.2	0.6	0.3	6.0
tomatoes	2.6	99.0	257.4	37.6	x	1.4	4.1	0.3	102.0
paprika	0.4	61.0	24.4	73.2	x	2.7	7.9	0.1	60.0
peas	0.7	19.0	13.3	4.0	x	0.1	0.4	0.3	18.0
cucumber	0.3	43.0	12.9	3.2	x	0.1	0.3	0.2	43.0
melons and watermelons	3.7	120.0	444.7	133.4	2.1	4.9	14.4	1.3	120.0
carrots	0.5	100.0	50.0	7.5	x	0.3	0.8	0.6	100.0
pumpkins (intercultivated)	0.6	118.0	70.8	7.1	x	0.3	0.8	—	—
other	0.5	45.0	22.5	4.5	x	0.2	0.5	0.1	45.0
c. Fruits	x	x	x	440.2	6.9	16.3	47.5	x	x
apples	x	x	11.0	5.5	x	0.2	0.6	x	x
pears	x	x	46.8	23.4	x	0.9	2.5	x	x
plums	x	x	91.0	45.5	x	1.7	4.9	x	x
cherries	x	x	22.0	9.9	x	0.4	1.1	x	x
sour cherries	x	x	57.0	25.6	x	0.9	2.8	x	x
peaches	x	x	23.3	11.6	x	0.4	1.2	x	x
walnuts	x	x	15.0	30.0	x	1.1	3.2	x	x
apricots	x	x	12.2	6.1	x	0.2	0.7	x	x
lemons	x	x	3.0	1.5	x	0.1	0.2	x	x
oranges and mandarins	x	x	58.5	29.3	x	1.1	3.2	x	x
persimmons	x	x	21.0	9.5	x	0.3	1.0	x	x
figs	x	x	326.5	195.9	3.1	7.3	21.0	x	x
quinces	x	x	19.4	9.7	x	0.4	1.0	x	x
pomegranates	x	x	33.7	13.5	x	0.5	1.5	x	x
almonds	x	x	0.4	0.8	x	0.0	0.1	x	x
grapes	x	x	43.0	21.5	x	0.8	2.3	x	x
strawberries	x	x	1.2	0.9	x	0.0	0.1	—	—
B. Foddder crops	x	x	x	1398.1	22.1	51.9	100.0	x	x
a. Grains	x	x	495.0	495.0	7.8	18.4	35.4	x	x
maize	27.0	x	495.0	495.0	7.8	18.4	35.4	13.0	x

Table 8b

Production

Burtaiši					Velembusi						
		%							%		
Crops in q	Production in grain units	Gross production	Branch production	Group production	Area in ha or heads	Yield per ha in q	Crops in q	Production in grain units	Gross production	Branch production	Group production
x	1475.5	52.4	100.0		x	x	x	520.3	63.0	100.0	
x	380.5	13.5	25.8	100.0	x	x	x	120.5	14.6	23.1	100.0
28.0	28.0	1.0	1.9	7.4	x	x	24.0	24.0	2.9	4.6	20.0
28.0	28.0	x	1.9	7.4	3.0	x	24.0	24.0	2.9	4.6	20.0
—	—	—	—	—	—	—	—	—	—	—	—
28.0	28.0	x	1.9	7.4	3.0	8.0	24.0	24.0	2.9	4.6	20.0
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
x	132.8	4.7	9.0	34.9	1.0	7	x	13.4	1.6	2.6	11.1
170.0	42.5	1.5	2.9	11.2	0.5	71.0	35.5	9.0	x	1.7	7.5
4.0	4.8	x	0.3	1.3	—	—	—	—	—	—	—
81.0	12.2	x	0.8	3.2	0.5	59.0	29.5	4.4	x	0.9	3.6
9.8	2.9	x	0.2	0.8	—	—	—	—	—	—	—
4.3	1.3	x	0.1	0.3	—	—	—	—	—	—	—
1.8	2.2	x	0.1	0.6	—	—	—	—	—	—	—
30.6	4.6	x	0.3	1.2	—	—	—	—	—	—	—
6.0	1.8	x	0.1	0.5	—	—	—	—	—	—	—
5.4	1.6	x	0.1	0.4	—	—	—	—	—	—	—
8.6	2.2	x	0.1	0.6	—	—	—	—	—	—	—
156.0	46.8	1.7	3.2	12.3	—	—	—	—	—	—	—
60.0	9.0	x	0.6	2.4	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
4.5	0.9	x	0.1	0.2	—	—	—	—	—	—	—
x	219.7	7.8	14.9	57.7	x	x	x	82.7	10.0	15.9	68.9
2.5	1.3	x	0.1	0.3	x	x	0.4	0.2	x	0.0	0.2
26.0	13.0	x	0.9	3.4	x	x	2.9	1.5	x	0.3	1.2
9.8	49.0	1.7	3.3	12.9	x	x	1.0	0.5	x	0.1	0.4
9.9	4.5	x	0.3	1.2	x	x	4.6	2.1	x	0.4	1.7
11.2	5.0	x	0.3	1.3	x	x	1.8	0.8	x	0.1	0.7
6.6	3.3	x	0.2	0.9	x	x	0.6	0.3	x	0.1	0.2
4.7	9.4	x	0.6	2.5	—	—	—	—	—	—	—
1.8	0.9	x	0.1	0.2	x	x	0.2	0.1	x	0.0	0.1
1.7	0.9	x	0.1	0.2	—	—	—	—	—	—	—
32.1	16.1	x	1.1	4.2	x	x	0.9	0.5	x	0.1	0.4
14.1	6.3	x	0.4	1.7	x	x	0.6	0.3	x	0.1	0.2
124.7	74.8	2.7	5.1	19.6	x	x	43.4	17.4	2.1	3.3	14.5
16.0	8.0	x	0.5	2.1	x	x	7.9	4.0	x	0.8	3.3
40.6	16.2	x	1.1	4.2	x	x	31.2	12.5	1.5	2.4	10.4
0.6	1.2	x	0.1	0.3	x	x	17.0	34.0	4.1	6.5	28.3
19.6	9.8	x	0.7	2.6	x	x	17.0	8.5	x	1.6	7.1
—	—	—	—	—	—	—	—	—	—	—	—
x	542.0	19.2	36.7	100.0	x	x	x	129.8	15.7	25.0	100.0
217.0	217.0	7.7	14.7	40.0	5.0	x	40.0	40.0	4.8	7.7	30.8
217.0	217.6	7.7	14.7	40.0	3.0	6.0	18.0	18.0	2.2	3.5	13.9

Gross

Specification	Bjelisi Polje				%			Gross	
	Area in ha or heads	Yield per ha in q	Crops in q	Production in grain units	Gross production	Branch production	Group production	Area in ha or heads	Yield per ha in q
therein:									
hybrid	7.0	25.0	175.0	175.0	2.8	6.5	12.5	1.0	25.0
local	20.0	16.0	320.0	320.0	5.0	11.9	22.9	12.0	16.0
barley	—	—	—	—	—	—	—	—	—
oats	—	—	—	—	—	—	—	—	—
b. Succulent foods	x	x	x	91.5	1.4	3.4	6.5	x	x
mangolds	3.0	230.0	690.0	69.0	1.1	2.6	4.9	1.0	232.0
maize	—	—	—	—	—	—	—	—	—
mangolds foliage	3.0	75.0	225.0	22.5	x	0.8	1.6	1.0	75.0
other	—	—	—	—	—	—	—	—	—
c. Rough forage	x	x	x	811.6	13.0	30.1	58.0	x	x
lucerne	30.0	48.0	1440.0	576.0	9.1	21.4	41.2	11.0	51.0
clover	8.0	25.0	200.0	80.0	x	3.0	5.7	1.0	28.0
fodder mixtures	—	—	—	—	—	—	—	1.0	84.0
spring cereals straw	6.0	16.6	100.0	15.0	x	0.6	1.1	2.0	21.0
winter cereals straw	—	—	—	—	—	—	—	—	—
maize straw	27.0	x	659.0	99.0	x	3.7	7.1	—	—
meadow hay	27.0	4.0	108.0	32.4	x	1.2	2.3	11.0	4.0
pasture	23.0	2.0	46.0	9.2	x	0.3	0.7	14.0	2.0
C. Industrial crops	x	x	x	369.0	5.8	13.7	100.0	x	x
olives	x	x	246.2	369.0	5.8	13.7	100.0	x	x
sunflower	—	—	—	—	—	—	—	—	—
flax	—	—	—	—	—	—	—	—	—
tobacco	—	—	—	—	—	—	—	—	—
II. Animal production	x	x	x	3641.2	57.5	100.0		x	x
A. Milk 1	x	x	x	1376.0	21.7	37.8	100.0	x	x
cow milk 1	148	1200	177600	1332.0	21.0	36.6	96.8	56.0	1200
sheep milk 1	100	55	5500	44.0	x	1.2	3.2	64.0	55
B. Meat stock (kg live-weight)	x	x	x	1990.3	31.4	54.7	100.0	x	x
beef	24	180	4320	249.0	3.9	6.8	12.5	8	202
veal	93	35	3255	195.0	x	5.4	9.8	33	35
pork	229	118	27022	1351.0	21.3	37.1	61.9	75	120
piglets	59	10	590	29.5	x	0.8	1.5	21	10
mutton	56	20	1120	67.2	x	1.8	3.4	22	20
lamb	44	10	440	26.4	x	0.7	1.3	42	10
poultry	1094	1.1	1203	72.2	x	2.0	3.6	423	1.1
C. Eggs, pieces	1000	63	63000	157.5	2.5	4.3	100.0	383	7.1
D. Wool kg	225	1.0	225	90.0	1.4	2.5	100.0	88	1.0
E. Honey kg	38	18	684	27.4	0.4	0.7	100.0	—	—

Gross production	6334.6
per 100 ha of agricultural land	36.0
plant	15.4
animal	20.6
per 1 person employed in agriculture	30.6

Table 8c

production

Burtaiši					Velembusi						
		%							%		
Crops in q	Production in grain units	Gross production	Branch production	Group production	Area in ha or heads	Yield per ha in q	Crops in q	Production in grain units	Gross production	Branch production	Group production
25 0	25.0	x	1.7	4.6	—	—	—	—	—	—	—
192.0	192.0	6.8	13.0	35.4	3.0	6.0	18.0	18.0	2.2	3.5	13.9
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	2.0	11.0	22.0	22.0	2.7	4.2	16.9
x	30.7	1.1	2.1	5.7	—	—	—	—	—	—	—
232.0	23.2	x	1.6	4.3	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
75.0	7.5	x	0.5	1.4	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
x	294.3	10.5	19.9	54.3	x	x	x	89.8	10.9	17.3	69.2
561.0	224.4	8.0	15.2	41.4	2.0	29.0	58.0	23.2	2.8	4.5	17.9
28.0	11.2	x	0.8	2.1	7.0	18.0	126.0	50.4	6.1	9.7	38.8
84.0	33.6	x	2.3	6.2	—	—	—	—	—	—	—
42.0	6.3	x	0.4	1.2	3.0	12.0	36.0	5.4	x	1.0	4.2
—	—	—	—	—	2.0	16.0	32.0	3.2	x	0.6	2.5
—	—	—	—	—	3.0	9.0	27.0	4.0	x	0.8	3.1
44.0	13.2	x	0.9	2.4	—	—	—	—	—	—	—
28.0	5.6	x	0.4	1.1	9.0	2.0	18.0	3.6	0.4	0.7	2.8
x	553.0	19.6	37.5	100.0	x	x	180.0	270.0	32.7	51.9	100.0
369.0	553.0	19.6	37.5	100.0	x	x	180.0	270.0	32.7	51.9	100.0
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
x	1341.5	47.6	100.0		x	x	x	305.0	37.0	100.0	
x	532.2	18.9	39.7	100.0	x	x	x	104.0	12.6	34.1	100.0
67200	504.0	17.9	37.6	94.7	12	840	10080	76.0	9.2	24.9	73.1
3520	28.2	x	2.1	5.3	88	40	3520	28.0	3.4	9.2	26.9
x	706.3	25.1	52.6	100.0	x	x	x	118.4	14.3	38.8	100.0
1616	97.0	3.4	7.2	13.7	2	98	196	11.8	1.4	3.9	10.0
1155	69.3	x	5.2	9.8	7	35	246	14.7	1.8	4.8	12.4
9000	450.0	16.0	33.5	63.7	6	100	600	30.0	3.6	9.8	25.3
210	10.5	x	0.8	1.5	—	—	—	—	—	—	—
440	26.4	x	2.0	3.7	36	20	720	43.0	5.2	14.1	36.3
420	25.2	x	1.9	3.6	52	10	520	11.0	x	3.6	9.3
465	27.9	x	2.1	4.0	120	1.1	132	7.9	x	2.6	6.7
27198	68.0	2.4	5.1	100.0	108	43	5283	13.2	1.6	4.3	100.0
88	35.0	1.2	2.6	100.0	146	1.0	146	58.4	7.1	19.1	100.0
—	—	—	—	—	13	22	286	11.0	1.3	3.7	100.0
	2817.0						825.3				
	33.5						21.7				
	17.6						13.7				
	15.9						8.0				
	26.3						27.5				

Specification	Tomba-Čeluga				%			Zaljevo			
	Area in ha or heads	Yield per ha in q	Crops in q	Production in grain units	Gross production	Branch production	Group production	Area in ha or heads	Yield per ha in q	Crops in q	Production in grain units
I. Plant production	x	x	x	4382.2	66.3	100.0		x	x	x	5895.7
A. Food crops	x	x	x	970.3	14.7	22.1	100.0	x	x	x	1351.7
a) Grains	1.0	x	15.0	15.0	0.2	0.3	1.6	21.0	x	267.0	267.0
wheat:	1.0	x	15.0	15.0	0.2	0.3	1.6	13.0	x	195.0	195.0
italian	—	—	—	—	—	—	—	—	—	—	—
local	1.0	15.0	15.0	15.0	0.2	0.3	1.6	13.0	15.0	195.0	195.0
rye	—	—	—	—	—	—	—	8.0	9.0	72.0	72.0
millet	—	—	—	—	—	—	—	—	—	—	—
b) Roots and vegetables	5.8	x	x	83.7	1.3	1.9	8.6	16.7	x	x	318.0
potatoes	3.0	63.0	189.0	47.3	x	1.1	4.9	5.0	89.0	445.0	22.3
beans	0.5	11.0	5.5	6.6	x	0.1	0.7	1.0	11.0	11.0	13.2
cabbage and cauliflowers	0.6	82.0	49.2	7.4	x	0.2	0.8	2.0	89.0	178.0	26.7
onion	—	—	—	—	—	—	—	0.2	56.0	11.2	33.6
garlic	—	—	—	—	—	—	—	0.4	46.0	18.4	55.2
beans (intercultiv.)	0.4	7.0	2.8	2.4	x	0.0	0.2	0.5	7.0	3.5	4.2
tomatoes	1.0	115.0	115.0	17.3	x	0.4	1.8	1.6	116.0	185.6	27.8
paprika	—	—	—	—	—	—	—	0.7	61.0	42.7	12.3
peas	—	—	—	—	—	—	—	0.4	20.0	8.0	2.4
cucumber	—	—	—	—	—	—	—	0.2	45.0	9.0	2.3
melons and watermelons	—	—	—	—	—	—	—	2.6	130.0	338.0	101.4
carrots	—	—	—	—	—	—	—	0.7	110.0	77.0	11.6
pumpkins (intercultivated)	—	—	—	—	—	—	—	0.3	116.0	34.8	3.5
other	0.3	45.0	13.5	2.7	x	0.1	0.3	1.1	45.0	49.0	1.0
C. Fruits	x	x	x	871 6	13.2	19.9	89.8	x	x	x	766.7
apples	x	x	32.2	16.1	x	0.4	1.7	x	x	12.9	6.5
pears	x	x	59.3	29.7	x	0.7	3.1	x	x	58.3	17.6
plums	x	x	74.0	37.0	x	0.8	3.8	x	x	19.8	9.9
cherries	x	x	54.9	24.7	x	0.6	2.5	x	x	58.4	26.3
sour cherries	x	x	70.7	31.8	x	0.7	3.3	x	x	33.1	15.0
peaches	x	x	44.8	24.4	x	0.6	2.5	x	x	27.0	13.5
walnuts	x	x	21.9	43.8	x	1.0	4.5	x	x	23.0	46.0
apricots	x	x	22.7	11.4	x	0.3	1.2	x	x	20.7	10.4
lemons	x	x	2.2	1.1	x	0.0	0.1	x	x	8.6	4.3
oranges and mandarins	x	x	109.6	54.8	x	1.2	5.6	x	x	68.0	34.0
persimmons	x	x	39.7	17.9	x	0.4	1.8	x	x	42.2	19.0
figs	x	x	455.8	274.5	4.1	6.3	28.3	x	x	467.8	280.7
quinces	x	x	57.0	28.5	x	0.6	2.9	x	x	70.3	35.2
pomegranates	x	x	547.8	219.1	3.3	5.0	22.6	x	x	1122.7	149.1
almonds	x	x	8.9	17.8	x	0.4	1.8	x	x	27.6	55.2
grapes	x	x	68.9	34.5	x	0.8	3.6	x	x	86.1	43.1
strawberries	2.0	3.0	6.0	4.5	x	0.1	0.5	0.3	4.0	1.2	0.9
B. Fooder crops	x	x	x	1567.9	23.7	35.8	100.0	x	x	x	1913.0
a) Grains	29.0	x	484.0	484.0	7.3	11.0	30.9	56.0	x	840.0	840.0
maize	29.0	x	484.0	484.0	7.3	11.0	30.9	54.0	x	819.0	819.0
therein: hybrid	6.0	27.0	162.0	162.0	2.4	3.7	10.3	1.0	24.0	24.0	24.0
local	23.0	14.0	322.0	322.0	4.9	7.3	20.5	53.0	15.0	795.0	795.0
barley	—	—	—	—	—	—	—	1.0	10.0	10.0	10.0

— Podi			Novi Bar — Topolica							Total			
	%						%				%		
Gross production	Branch production	Group production	Area in ha or heads	Yield per ha in q	Crops in q	Production in grain units	Gross production	Branch production	Group production	Production in grain units	Gross production	Branch production	Group production
64.7	100.0		x	x	x	3721.4	77.9	100.0		24284.2	63.6	100.0	
14.8	23.0	100.0	x	x	x	361.9	7.6	9.7	100.0	5549.9	14.5	22.8	100.0
2.9	4.5	19.7	x	x	x	25.0	0.5	0.7	6.9	509.0	x	2.1	9.2
x	3.3	14.4	x	x	x	25.0	0.5	0.7	6.9	377.0	x	1.5	6.8
—	—	—	x	x	x	25.0	0.5	0.7	6.9	50.0	x	x	x
x	3.3	14.4	—	—	—	—	—	—	—	327.0	x	1.3	5.9
x	1.2	5.3	—	—	—	—	—	—	—	72.0	x	x	x
—	—	—	—	—	—	—	—	—	—	60.0	x	x	x
3.5	5.4	23.5	3.0	x	x	39.7	0.8	1.1	11.0	1363.0	3.5	5.6	24.5
x	0.4	1.6	—	—	—	—	—	—	—	274.4	x	1.1	4.9
x	0.2	1.0	—	—	—	—	—	—	—	83.7	x	1.5	1.5
x	0.4	2.0	1.0	100.0	100.0	15.0	x	0.4	4.1	114.7	x	0.4	2.1
x	0.6	2.5	—	—	—	—	—	—	—	63.5	x	x	1.1
x	0.9	4.1	—	—	—	—	—	—	—	69.6	x	x	1.2
x	x	0.3	—	—	—	—	—	—	—	25.6	x	x	0.4
x	0.5	2.1	1.0	105.0	105.0	15.7	x	0.4	4.3	149.6	x	0.6	2.7
x	0.2	0.9	—	—	—	—	—	—	—	107.6	x	0.4	1.9
x	x	0.2	—	—	—	—	—	—	—	15.1	x	x	0.2
x	x	0.1	—	—	—	—	—	—	—	19.5	x	x	0.3
x	1.7	7.5	—	—	—	—	—	—	—	332.0	x	1.3	6.0
x	0.2	0.8	—	—	—	—	—	—	—	48.9	x	x	0.9
x	x	0.3	—	—	—	—	—	—	—	27.2	x	x	0.5
x	x	0.1	1.0	45.0	45.0	9.0	x	0.3	2.5	31.6	x	x	0.5
8.4	13.0	56.7				297.2	6.2	8.0	82.1	3677.5	9.6	15.1	66.2
x	x	0.5	x	x	0.3	0.15	x	0.0	0.0	34.9	x	0.1	0.6
x	0.3	1.3	—	—	—	—	—	—	—	112.5	x	0.4	2.0
x	0.2	0.7	—	—	—	—	—	—	—	163.1	x	0.6	2.9
x	0.4	1.9	—	—	—	—	—	—	—	76.3	x	0.3	1.3
x	0.3	1.1	—	—	—	—	—	—	—	91.8	x	0.4	1.6
x	0.2	0.9	x	x	0.6	0.3	x	0.0	0.1	58.6	x	0.2	1.0
x	0.8	3.4	x	x	10.6	21.3	x	0.6	5.9	184.3	x	0.7	3.3
x	0.2	0.7	—	—	—	—	—	—	—	31.5	x	0.1	0.5
x	x	0.4	x	x	7.2	3.6	x	0.1	1.0	18.4	x	x	0.3
x	0.6	2.5	x	x	284.6	142.3	3.0	3.8	39.3	326.9	0.8	1.3	6.0
x	0.3	1.4	x	x	21.8	9.7	x	0.3	2.7	87.3	x	0.3	1.5
x	4.7	20.8	x	x	73.4	44.0	0.9	1.2	12.2	975.5	2.5	4.0	17.6
x	0.6	2.6	x	x	8.5	4.3	x	0.1	1.2	120.0	x	0.4	2.2
x	2.5	11.0	x	x	3.7	1.5	x	0.0	0.4	666.4	1.7	2.7	12.0
x	0.9	4.1	x	x	8.4	16.7	x	0.4	4.6	159.1	x	0.6	2.8
x	0.7	3.2	x	x	106.7	53.4	1.1	1.4	14.7	264.5	x	1.0	4.7
x	x	0.1	—	—	—	—	—	—	—	7.0	x	x	0.1
21.0	32.4	100.0	x	x	x	3239.5	67.8	87.1	100.0	9389.5	24.6	38.6	100.0
8.9	14.2	43.9	1.0	x	21.0	21.0	0.4	0.6	0.6	2287.0	6.0	9.4	24.3
x	13.9	42.8	—	—	—	—	—	—	—	2223.0	5.8	9.1	23.6
x	0.4	1.2	—	—	—	—	—	—	—	411.0	x	1.6	4.3
x	13.5	41.5	—	—	—	—	—	—	—	1812.0	x	7.4	19.3
x	0.2	0.5	1.0	21.0	21.0	21.0	x	0.6	0.6	31.0	x	x	0.3

Specification	Tomba-Čeluga				%			Zaljevo			
	Area in ha or heads	Yield per ha in q	Crops in q	Production in grain units	Gross production	Branch production	Group production	Area in ha or heads	Yield per ha in q	Crops in q	Production in grain units
oats	—	—	—	—	—	—	—	1.0	11.0	11.0	11.0
b. Succulent foods	x	x	x	56.2	0.8	1.3	3.5	x	x	x	324.3
mangolds	2.0	211.0	422.0	42.2	x	1.0	2.7	1.0	228.0	228.0	22.8
maize mangolds foliage	—	—	—	—	—	—	—	1.0	1960.0	1960.0	294.0
other	2.0	70.0	140.0	14.0	x	0.3	0.9	1.0	75.0	75.0	7.5
c. Rough forage	—	—	—	—	—	—	—	—	—	—	—
lucerne	x	x	x	1027.7	15.6	23.6	65.9	x	x	x	748.7
clover	31.0	49.0	1519.0	607.0	9.2	13.8	38.7	19.0	49.0	931.0	372.0
fodder mixtures	3.0	24.0	720.0	288.0	4.4	6.6	18.4	4.0	26.0	104.0	42.0
spring cereals straw	—	—	—	—	—	—	—	1.0	85.0	85.0	34.0
winter cereals straw	1.0	22.0	22.0	3.3	x	0.1	0.2	13.0	22.0	286.0	43.0
maize straw	—	—	—	—	—	—	—	8.0	18.0	144.0	14.1
meadow hay	29.0	25.0	725.0	109.0	x	2.5	6.9	54.0	22.0	1188.0	178.0
pasture	13.0	3.0	39.0	12.0	x	0.3	0.8	15.0	4.0	60.0	18.0
C. Industrial crops	21.0	2.0	42.0	8.4	x	0.2	0.5	119.0	2.0	238.0	47.6
olives	x	x	x	1844.0	27.9	42.1	100.0	x	x	x	2631.0
sunflower	x	x	1210.8	1816.0	27.5	41.4	98.5	x	x	1698.3	2547.0
flax (straw and seeds)	—	—	—	—	—	—	—	2.0	14.0	28.0	56.0
tobacco	1.0	14.0	14.0	28.0	x	0.7	1.5	1.0	18.0	18.0	18.0
II. Animal production	—	—	—	—	—	—	—	0.5	10.0	5.0	10.0
A. Milk l	x	x	x	2228.4	33.7	100.0		x	x	x	3221.0
cow milk l	x	x	x	855.0	12.9	38.4	100.0	x	x	x	1365.0
sheep milk l	92	1200	110400	828.0	12.5	37.2	96.8	108	1300	140400	1053.0
B. Meat stock (kg live-weight)	61	55	3355	27.0	x	1.2	3.2	601	65	39065	312.0
beef	x	x	x	1151.4	17.4	51.6	100.0	x	x	x	1380.0
veal	15	183	2745	165.0	2.5	7.4	14.3	24	154	3696	222.0
pork	55	35	1925	116.0	1.7	5.2	10.1	67	35	2345	140.0
piglets	123	120	14760	738.0	11.2	33.1	64.2	70	130	9100	455.0
mutton	21	10	210	10.5	x	0.5	0.9	10	10	100	5.0
lamb	37	20	740	44.4	x	2.0	3.7	232	20	4640	278.0
poultry	24	10	240	14.0	x	0.6	1.0	369	10	3690	221.0
C. Eggs (pieces)	963	1.1	1059	63.5	x	2.8	5.8	897	1.1	89	59.0
D. Wool kg	876	87	58079	145.0	2.2	6.5	100.0	807	83	66981	33.0
E. Honey kg	148	1.0	148	59.0	0.9	2.6	100.0	927	1.0	927	371
	23	19	437	18.0	0.3	0.9	100.0	72	25	1800	72
Gross production				6610.6							9116.7
per 100 ha of agricultural land				40.5							28.0
plant				26.9							18.1
animal				13.6							9.9
per 1 person employed in agriculture				49.0							46.5

— Podi			Novi Bar — Topolica							Total			
%							%				%		
Gross production	Branch production	Group production	Area in ha or heads	Yield per ha in q	Crops in q	Production in grain units	Gross production	Branch production	Group production	Production in grain units	Gross production	Branch production	Group production
x	0.2	0.5	—	—	—	—	—	—	—	33.0	x	x	0.3
3.6	5.5	16.8	x	x	x	2042.6	42.7	54.9	63.0	2612.6	6.8	10.7	27.8
x	0.4	1.1	2.0	240.0	480.0	48.0	x	1.3	1.5	250.2	x	x	2.6
x	5.0	15.4	6.0	3000.0	18000.0	1980.0	41.4	53.2	61.1	2274.0	x	9.0	24.2
x	x	0.3	2.0	73.0	146.0	14.6	x	0.4	0.4	80.9	x	x	0.3
—	—	—	—	—	—	—	—	—	—	7.5	x	x	0.1
8.2	12.7	39.1	x	x	x	1175.9	24.6	31.6	36.3	4489.9	11.7	18.5	47.8
x	6.3	19.4	19.0	130.0	2470.0	988.0	20.7	26.5	30.5	2945.0	7.7	12.1	31.3
x	0.7	2.2	1.0	26.0	26.0	10.4	x	0.3	0.3	530.0	x	2.2	5.6
x	0.6	1.7	3.0	120.0	360.0	144.0	x	3.9	4.4	246.0	x	1.0	2.6
x	0.7	2.2	2.0	x	58.0	8.7	x	0.2	0.3	98.5	x	x	1.0
x	0.2	0.7	—	—	—	—	—	—	—	17.3	x	x	0.1
x	3.0	9.3	—	—	—	—	—	—	—	431.5	x	1.8	4.6
x	0.3	0.9	6	12.0	72.0	21.6	x	0.6	0.7	121.2	x	x	1.3
x	0.8	2.5	8	2.0	16.0	3.2	x	0.1	0.1	100.4	x	x	1.0
28.9	44.6	100.0	x	x	x	120.0	2.5	3.2	100.0	9339.4	24.5	38.4	100.0
27.9	43.2	96.8	x	x	8000	120.0	2.5	3.2	100.0	9171.4	24.0	37.7	98.2
x	0.9	2.1	—	—	—	—	—	—	—	112.0	x	x	1.2
x	0.3	0.7	—	—	—	—	—	—	—	46.0	x	x	0.5
x	0.2	0.4	—	—	—	—	—	—	—	10.0	x	x	0.1
35.3	100.0		x	x	x	1057.6	22.1	100.0		13886.0	36.4	100.0	
15.0	42.4	100.0	x	x	x	816.0	17.1	77.2	100.0	5662.7	14.8	40.8	100.0
11.6	32.7	77.1	34	3200	108800	816.0	17.1	77.2	100.0	5103.3	13.4	36.8	90.1
3.4	9.7	22.9	—	—	—	—	—	—	—	559.4	1.4	4.0	9.9
15.1	42.8	100.0	x	x	x	207.9	4.3	19.7	100.0	6670.3	17.5	48.0	100.0
2.4	6.9	16.1	5	420	2100	126.0	2.6	11.9	60.6	973.5	2.6	7.0	14.6
1.5	4.3	10.1	21	38	798	47.9	1.0	4.5	23.0	644.7	1.7	4.6	9.7
5.0	14.1	33.0	4	165	660	33.0	0.7	3.1	15.9	3688.9	9.6	26.5	55.3
x	0.1	3.6	—	—	—	—	—	—	—	69.0	0.2	0.5	0.1
3.0	8.6	20.1	—	—	—	—	—	—	—	570.8	1.5	4.1	8.5
2.4	6.9	16.0	—	—	—	—	—	—	—	424.8	1.1	3.0	6.3
0.6	1.8	4.3	15	1.1	16.5	1.0	x	0.1	0.5	298.5	0.8	2.1	4.5
0.3	1.0	100.0	30	119	3570	8.9	0.2	0.8	100.0	598.1	1.6	4.3	100.0
4.1	11.6	100.0	—	—	—	—	—	—	—	761.0	2.0	5.5	100.0
0.8	2.2	100.0	23	27	621	24.8	0.5	2.3	100.0	193.9	0.5	1.4	100.0
						4779.0				38164.8			
						46.9				34.7			
						36.5				22.1			
						10.4				12.6			
						x				38.3			

Bar, Velembusi), potatoes and tomatoes (Tomba), potatoes, musk-melons and water-melons (Burtaisi), or else musk-melons and water-melons only (Bartula, Bjelisi Polje, Zaljevo).

Grain crops everywhere share only a small proportion of the food crops ranging from 1.6% (Tomba) to 20% (Velembusi). Wheat is dominant in most villages while millet prevails at Bjelisi Polje only.

The production of fodder crops consists mainly of rough forage (40 to 70% of fodder output) with the prevalence of lucerne at Novi Bar, Topolica, Bjelisi Polje, Burtaisi; lucerne and maize straw at Zaljevo; lucerne and clover at Tomba and Velembusi, and all these three elements together at Bartula, or clover and maize at Stari Bar. There is also a relatively high proportion of power feed. Priority is on maize and only at Velembusi is maize equalled by oats while at Topolica where maize for grain is not grown at all, barley is dominant. The proportion of succulent foods is negligible and fodder roots prevail in this group with the only exception at Topolica and Zaljevo where silo maize is predominant.

Olives predominate in the group of industrial crops that in almost all villages exceed 35% of the total plant production with the exception of Novi Bar where they take only 19.1% and of Bjelisi Polje — 13.7% and Topolica — 3.2% soaring up to 90% at Stari Bar. At Novi Bar only, sunflower appears beside the olives as a secondary element.

Considering plant production as a whole one cannot fail to note the differentiation of elements that are prevalent in various villages Roughly speaking, the following orientations can be singled out:

1. Predominantly fodder orientation with prevalence of maize grown to be siloed and lucerne at Topolica. In spite of the fact that this is an experiment station for mediterranean crops — combined production of fruits and olives hardly exceeds 10% of total plant production. More than 80% of the total output represent fodder crops grown to feed the cattle which, in turn, supply dung (see livestock breeding);

2. Orientations that are based mainly on production of food and fodder plants with prevalence of vegetables, potatoes, grapes, and lucerne (Novi Bar), or figs, melons and lucerne (Bjelisi Polje);

3. Mixed orientations: food-fodder-industrial with prevalence of various elements, as for instance: figs, lucerne and olives at Burtaisi; figs, pomegranates, lucerne and olives at Tomba; pomegranates, maize and olives in Bartula; pomegranates, lucerne, maize and olives at Zaljewo; and almonds, clover and olives at Velembusi;

4. Specialized industrial orientation with absolute dominance of olives production at Stari Bar.

5. LIVESTOCK BREEDING AND ANIMAL PRODUCTION

As it follows from earlier considerations the basis for livestock breeding in the Barsko Polje region is provided by fodder plants grown on arable fields, which are utilized either in form of power feed, mainly maize grain, or as rough forage, mainly lucerne and in certain villages situated higher up in the mountains — clover. Fodder crops harvested from permanent grasslands do not exceed in general some 5% of the total fodder output. An exception in this case is Stari Bar where the figure is 7.5% and Novi Bar where it hits 11.5% of this output.

Draught and pack animals known in the region embraced by this study, include horses but first of all donkeys which are the primary means of transport; there are also mules and oxen. In the various villages either one or the other animals prevail. Very often cows are also used as draught animals.

In the category of productive animals there are cattle bred for milk and beef, pigs bred for pork and lard, and sheep which provide both wool, mutton and milk which is turned into cheese right on the spot. Then, there are considerable numbers of poultry, chiefly hens, which are bred for eggs, less frequently ducks.

With reference to the area of agricultural land the numbers of the livestock population (Table 9) are very high and most frequently range from between 115 and 125 big animal units per 100 ha of agricultural land. The numbers are much lower only at Novi Bar (55 units), Topolica (43 units) and Stari Bar (75 units) which are all urban settlements. On the other hand, the figure is above average at Burtaisi (with 155 big animal units). The situation is quite different when viewed from the point of the number of livestock population per 1 agricultural or semi-agricultural farm. This figure is of course very low because of the tremendous subdivision of land among tiny farms. It is only at Zaljevo that one draft animal is on an average in every farm. At Velembusi there is only 0.8 draft animal per farm whereas in the remaining villages the proportion is still worse with one animal per every two farms (Tomba, Bartula), 5 animals per farm (Bjelisi Polje) and even one animal for 8 to 16 farms.

At Zaljevo, Tomba and Bjelisi Polje only there is slightly more than one head of cattle per farm. In most villages this proportion is something like 0.7 to 0.8 cattle heads per farm. At Stari Bar there is only 1 cattle head per every 5 farms.

The number of pig population also appears rather small. It is only at Bjelisi Polje and Novi Bar that there is on an average 1 pig per every

farm while at Bartula, Tomba and Burtaisi the figure is even lower. At Velembusi there is only one pig per every 5 farms.

The greater numbers of sheep are bred at Zaljevo and Velembusi where there are more than 5 sheep per farm, then at Stari Bar and Bartula where there are more than 2 sheep per farm. Those, it will be remembered, are villages situated at the foot of the mountains. In

Livestock

Specification	Velembusi					Tomba-Čeluga				
				Heads					Heads	
	Heads	Big animal units	% big animal units	Per 100 ha agricultural land	Big animal units per 100 ha agricultural land	Heads	Big animal units	% big animal units	Per 100 ha agricultural land	Big animal units per 100 ha agricultural land
Horses, donkeys etc.	17	13.4	28.6	44.7	35.3	59	45.3	22.2	36.2	27.8
horses	3	3.6	0.7	7.9	9.4	8	9.6	4.7	4.9	5.4
mules	1	0.7	0.2	2.4	1.7	23	16.1	7.9	14.1	9.8
donkeys	13	9.1	27.7	34.4	24.2	28	19.6	9.6	17.2	12.6
Cattle	23	19.6	41.8	60.5	51.5	155	122.8	60.3	95.0	75.4
oxen	4	4.8	10.2	10.6	12.6	7	8.4	4.1	4.3	4.3
cows	12	12.0	25.6	31.5	31.5	92	92.0	45.1	56.4	57.4
other	7	2.8	6.0	18.4	7.4	56	22.4	11.1	34.3	13.7
Pigs	6	1.5	3.0	15.8	3.9	130	22.2	10.9	79.7	13.6
sows	—	—	—	—	—	9	2.7	1.4	5.5	1.7
cutters	6	1.5	3.0	15.8	3.9	49	12.3	6.0	30.0	7.5
piglets	—	—	—	—	—	72	7.2	3.5	44.2	4.4
Sheep	146	11.7	24.9	384.2	30.8	148	10.4	5.1	90.8	6.4
ewes and rams over 1 year	88	8.8	18.8	231.5	23.2	61	6.1	3.0	37.4	3.7
youth to 1 year	58	2.9	6.1	152.7	7.6	87	4.3	2.1	53.4	2.7
Poultry	120	0.7	1.7	315.8	1.8	963	2.9	1.4	590.8	1.8
Total	x	46.9	100.0	x	123.4	x	203.6	100.0	x	125.0
Draft and pack animals horses, mules, donkeys, oxen	21	18.2	38.8	55.3	47.9	66	53.7	26.3	40.5	32.1
Cattle	19	14.8	31.6	59.9	39.0	148	114.4	56.2	90.7	71.1
Pigs	6	1.5	3.0	15.8	3.9	130	22.2	10.9	79.7	13.6
Sheep	146	11.7	24.9	384.2	30.8	148	10.4	5.1	90.8	6.4
Poultry	120	0.7	1.7	315.8	1.8	963	2.9	1.4	590.8	1.8
Total	x	46.9	100.0	x	123.4	x	203.6	100.0	x	125.0

the basin bottom villages the numbers of sheep drops remarkably. For instance, at Novi Bar, on an average only every fourth farm breeds sheep.

The number of poultry per farm ranges from 3 to 7. Very little poultry is bred at Velembusi and Stari Bar while Bartula and Tomba have, on the other hand, relatively large numbers of poultry.

Table 9

breeding

Zaljevo-Podi					Novi Bar-Topolica					Total				
			Heads					Heads					Heads	
Heads	Big animal units	% big animal units	Per 100 ha agricultural land	Big animal units per 100 ha agricultural land	Heads	Big animal units	% big animal units	Per 100 ha agricultural land	Big animal units per 100 ha agricultural land	Heads	Big animal units	% big animal units	Per 100 ha agricultural land	Big animal units per 100 ha agricultural land
109	84.8	22.8	33.5	26.1	2	1.9	4.3	2.0	1.9	266	211.7	17.6	24.2	19.3
17	20.4	5.5	5.4	6.3	1	1.2	2.7	1.0	1.2	51	61.2			
8	5.6	1.5	2.4	1.7	1	0.7	1.6	1.0	0.7	35	24.5			
84	58.8	15.8	25.7	18.1	—	—	—	—	—	180	126.0			
218	196.0	52.6	67.1	60.3	49	40.8	92.7	48.0	40.0	828	701.4	58.6	75.5	63.9
55	66.0	17.7	16.8	20.3	1	1.2	2.7	1.0	1.2	84	100.8			
108	108.0	29.0	33.5	33.2	34	34.0	77.3	33.3	33.3	505	505.0			
55	22.0	15.9	16.8	6.8	14	5.6	12.7	13.7	5.5	239	95.6			
74	12.6	3.8	22.8	3.9	4	1.2	2.7	3.9	1.2	667	114.7	9.7	60.8	10.5
5	1.5	0.7	1.6	0.6	4	1.2	2.7	3.9	1.2	51	15.3			
28	7.0	1.8	8.6	2.1	—	—	—	—	—	252	63.0			
41	4.1	1.3	12.6	1.2	—	—	—	—	—	364	36.4			
927	76.4	20.5	285.2	23.5	—	—	—	—	—	1903	155.9	13.0	173.5	14.2
601	60.1	18.5	184.9	18.5	—	—	—	—	—	1215	121.5			
326	16.3	2.0	100.3	5.0	—	—	—	—	—	688	34.4			
897	2.7	0.5	276.0	0.8	30	0.1	0.2	29.4	0.1	4551	13.7	1.1	415.2	1.2
x	372.5	100.0	x	114.6	x	44.0	100.0	x	43.2	x	1197.4	100.0	x	109.2
164	150.8	40.5	50.3	46.4	3	3.1	7.0	3.0	3.1	350	312.5	24.2	31.8	28.5
163	130.0	34.9	50.3	40.0	48	39.6	90.0	47.0	38.8	744	600.6	52.0	67.9	54.7
74	12.6	3.8	22.8	3.9	4	1.2	2.7	3.9	1.2	667	114.7	9.7	60.8	10.5
927	76.4	20.5	285.2	23.5	—	—	—	—	—	1903	155.9	13.0	173.5	14.2
897	2.7	0.5	276.0	0.8	30	0.1	0.2	29.4	0.1	4551	13.7	1.1	415.2	1.2
x	372.5	100.0	x	114.6	x	44.0	100.0	x	43.2	x	1197.4	100.0	x	109.2

Livestock

Specification	Novi Bar					Stari Bar				
				Heads					Heads	
	Heads	Big animals units	% Big animals units	Per 100 ha agricultural land	Big animal units per 100 ha agricultural land	Heads	Big animal units	% Big animal units	Per 100 ha agricultural land	Big animal units per 100 ha agricultural land
Horses, donkeys etc.	2	1.9	5.8	3.4	3.2	15	10.5	15.9	16.9	11.9
horses	1	1.2	3.7	1.7	2.0	—	—	—	—	—
mules	—	—	—	—	—	—	0.7	1.0	1.0	0.8
donkeys	1	0.7	2.1	1.7	1.2	14	9.8	14.9	15.9	11.1
Cattle	27	22.8	69.3	45.8	38.6	26	22.0	33.4	29.5	25.0
oxen	—	—	—	—	—	1	1.2	1.8	1.2	1.4
cows	20	20.0	63.2	33.8	35.3	18	18.0	27.3	20.4	20.4
other	7	2.8	6.1	12.0	3.3	7	2.8	4.3	7.9	3.2
Pigs	40	6.9	21.0	67.8	11.7	46	7.8	11.9	52.2	8.7
sows	3	0.9	2.7	5.1	1.7	3	0.9	1.5	3.4	0.8
cutters	15	3.8	11.6	25.4	6.3	17	4.3	6.5	19.3	4.9
piglets	22	2.2	6.7	37.3	3.7	26	2.6	3.9	29.5	3.0
Sheep	9	0.6	1.8	15.3	1.0	253	24.2	36.8	287.5	27.5
ewes and rams over 1 year	2	0.2	0.6	3.5	0.4	230	23.0	34.9	261.3	26.0
youth to 1 year	7	0.4	1.2	11.8	0.6	23	1.2	1.9	26.2	1.5
Poultry	235	0.7	2.1	398.3	1.2	436	1.3	1.9	495.5	1.5
Total	x	32.9	100.0	x	55.7	x	65.8	100.0	x	74.8
Draft and pack animals: horses, mules, donkeys, oxen	2	1.9	5.8	3.4	3.2	16	11.7	17.7	18.1	13.3
Cattle	27	22.8	69.3	45.8	38.6	25	20.8	31.6	28.3	23.6
Pigs	40	6.9	21.0	67.8	11.7	46	7.8	11.9	52.2	8.7
Sheep	9	0.6	1.8	15.3	1.0	253	24.2	36.8	287.5	27.5
Poultry	235	0.7	2.1	398.3	1.2	436	1.3	1.9	495.5	1.5
Total	x	32.9	100.0	x	55.7	x	65.8	100.0	x	74.8

Animals which are bred here represent mostly local breeds characteristic for their small heigth and modest requirements and also for their low productivity. Horses of Montenegro breed are of small size but they are enduring and are used mainly for transport work. Average weight of cattle (outside Topolica where for the sake of experiments cattle of the Dutch White-Black breed are acclimatised) ranges (Table 8)

Table 9a

breeding

Bartula					Bjeliši—Polje					Burtaiši				
			Heads					Heads					Heads	
Heads	Big animals units	% Big animals units	Per 100 ha agricultural land	Big animal units per 100 ha agricultural land	Heads	Big animal units	% Big animal units	Per 100 ha agricultural land	Big animal units per 100 ha agricultural land	Heads	Big animal units	% big animal units	Per 100 ha agricultural land	Big animal units per 100 ha agricultural land
15	13.5	21.9	27.2	24.5	35	30.0	10.9	19.9	17.0	12	10.4	10.7	14.3	12.4
6	7.2	11.7	10.9	13.1	11	13.2	4.8	6.2	7.4	4	4.8	4.9	4.8	5.7
—	—	—	—	—	1	0.7	0.2	0.7	0.5	1	0.7	0.8	1.2	0.8
9	6.3	10.2	16.4	11.4	23	16.1	5.9	13.0	9.1	7	4.9	5.0	8.3	5.8
39	31.4	51.0	70.9	57.0	215	182.0	66.5	122.0	103.0	76	64.0	66.0	90.5	76.2
7	8.4	13.6	12.7	15.2	9	10.8	3.9	5.1	6.2	—	—	—	—	—
17	17.0	27.6	30.9	30.9	148	148.0	54.1	84.0	84.0	56	56.0	57.7	66.6	66.6
15	6.0	9.8	27.3	10.9	58	23.2	8.5	32.9	13.2	20	8.0	8.3	23.8	9.6
40	6.9	11.2	72.7	12.5	247	42.1	15.4	140.3	23.9	80	13.7	14.1	95.2	16.3
3	0.9	1.4	5.5	1.5	18	5.4	2.0	10.2	3.0	6	1.8	1.9	7.2	2.1
15	3.8	6.2	27.4	7.0	92	23.0	8.4	52.3	13.1	30	7.5	7.7	35.7	8.9
22	2.2	3.6	39.8	4.0	137	13.7	5.0	77.8	7.8	44	4.4	4.5	52.3	5.2
107	8.8	14.3	194.5	16.0	225	16.4	6.0	127.8	9.3	88	7.6	7.8	104.8	9.0
69	6.9	11.2	125.4	12.4	100	10.1	3.7	56.8	5.7	64	6.4	6.6	76.3	7.6
38	1.9	3.1	69.1	3.6	125	6.3	2.3	71.0	3.6	24	1.2	1.2	28.5	1.4
353	1.0	1.6	641.8	1.8	1094	3.2	1.1	621.6	1.8	423	1.3	1.3	503.6	1.5
x	61.6	100.0	x	111.8	x	273.7	100.0	x	155.4	x	97.0	100.0	x	115.5
22	21.9	35.5	39.9	39.7	44	40.8	14.8	25.0	23.2	12	10.4	10.7	14.3	12.4
32	23.0	37.4	58.2	41.8	206	171.2	62.6	116.9	97.2	76	64.0	66.0	90.5	76.2
40	6.9	11.2	72.7	12.5	247	42.1	15.4	140.3	23.9	80	13.7	14.1	95.2	16.3
107	8.8	14.3	194.5	16.0	225	16.4	6.0	127.8	9.3	88	7.6	7.8	104.8	9.0
353	1.0	1.6	641.8	1.8	1094	3.2	1.1	621.6	1.8	423	1.3	1.3	503.6	1.5
x	61.6	100.0	x	111.8	x	273.7	100.0	x	155.4	x	97.0	100.0	x	115.5

from 110 to 140 kg (Tomba 85 kg), sheep 14 to 16 kg (Tomba 13 kg). Milk output per year from one cow is hardly 1100 to 1300 l (Tomba 840 l), from one sheep 55 to 56 l (Tomba 40 l), hens lay on an average 60 to 80 eggs (Tomba 49), bees produce 18 to 25 kg of honey in one beehive.

The local breed of milch-beef cattle are grey or brown, pigs are

mostly black, sheep of the local breed are usually white. Goats which once were very popular in this region have disappeared altogether as a result of banning them throughout Yugoslavia.

The numbers and structure of draught and pack animals are also highly differentiated. Density of animal population of this group ranges from about 6 in the level areas of Novi Bar to over 40 per 100 ha of agricultural land at Zaljevo-Podi. The number depends — for that matter — on structure of draught and pack animals and is lower where horses prevail in the group and higher where oxen, mules or donkeys play the primary role. Quoting in big animal units, the following proportions can be established: horses and donkeys are equally dominating at Novi Bar and Burtaisi; horses, donkeys and oxen strike a balance at Bartula; donkeys are relatively prevailing over horses and oxen at Bjelisi Polje and Velembusi; donkeys and oxen are equally dominating at Zaljevo; mules and donkeys are relatively prevailing over horses and oxen at Tomba; finally donkeys are in a pronounced domination at Stari Bar.

As regards animal production (Table 8) again one meets there considerable differentiation both in size per area unit and in structure.

In most of the villages milch cattle breeding predominates but at the same time there is pig breeding either equally important as corresponding (at Novi Bar) or a secondary occupation (as at Bjelisi Polje, Burtaisi, Tomba) — pig or sheep breeding with meat production (Zaljevo) or meat and wool production prevailing (Velembusi). Breeding of milch cattle, pigs and sheep for mutton are equally important at Stari Bar.

Share of animal production in gross production, however, differs considerably. At Bjelisi Polje and Burtaisi animal production almost equals that of plant production. At Novi Bar, Velembusi, Bartula, Tomba-Čeluga and Zaljevo animal production constitutes about one third of the gross production while at Stari Bar hardly over one fifth of the total.

6. GROSS PRODUCTION

In spite of the tremendous differences observed in the structure of production the productivity of agriculture at the region embraced by this study does not show major divergence and ranges from 21 grain units per 1 ha of agricultural land at Velembusi to 46 grain units at Stari Bar and Topolica. Plant production ranges from about 14 grain units per 1 ha at Velembusi and over 15 grain units per 1 ha at Bjelisi Polje to 37 units at Topolica and 36 units at Stari Bar. Animal pro-

duction — from 8 grain units per 1 ha at Velembusi and 8.9 units at Novi Bar to 20.6 grain units at Burtaisi. However, in most of the villages the animal production ranges from 10 to 15 grain units per 1 ha.

An analysis of the structure of gross production (Table 8) reveals that in the area examined, the following orientations of agricultural production could be determined:

1. vegetable orientations:

a) industrial with meat, olives with mutton and wool sheep breeding, low productive — $2 \times V_3 (i_1 ol) + A_1(swm)m$, at Velembusi,

b) industrial with meat, olives with mutton sheep, fairly productive $4 \times V_3(i_3 ol_3) + A_1 (sm)m$ at Stari Bar,

c) industrial-fodder with milch-meat, olives and maize with dairy cattle and mutton sheep breeding, medium productitve — $3 \times V_3 (f_1 mz + i_1 ol) + A_1(cd + sm)lm$ at Zaljevo-Podi,

d) industrial-fodder with meat, olives-maize-lucerne with dairy cattle, fairly productive — $4 \times V_3(f_1 mz, lc + i_1 ol) + A_1(cd)m$ at Tomba-Čeluga,

e) industrial-food with meat, olives-pomegranates with dairy cattle and pig breeding, medium productive — $3 \times V_3(a_1 pg + i_1 ol) + A_1 (cd + pk)m$ at Bartula,

f) food-fodder with meat, vegetables-grapes-lucerne with dairy cattle and pig breeding, medium productive — $3 \times V_3 (a_1 vg, v + f_1 lc) + A_1(cd + pk)m$ at Novi Bar.

g) fodder with milk, maize lucerne with dairy cattle breeding, fairly productive — $4 \times V_3(f_3 mz_3 lc_1) + A_1(c_1 d)l$ at Topolica;

2. vegetable-animal one:

a) fodder-meat-milk, maize-lucerne-dairy cattle, fairly productive — $4 \times V_2(fmz, lc) + A_2(c_1 d)m_1 l_1$ at Bjelisi Polje,

b) fodder-meat, maize-lucerne-dairy cattle, medium productive — $3 \times V_2(f\, mz, lc) + A_2(c_1 d)m_1$ at Burtaisi.

Any estimates of labour efficiency (Table 8) in agriculture at Barsko Polje were hardly possible in view of the lack of data on the number of people employed in agriculture. These figures have been estimated on the basis of Table 2 by accepting for villages with major non-agricultural employment an index of at least one employed in agriculture per farm while for other villages by accepting percentage of agricultural farms plus half of mixed farms as a figure proportional to a percentage of people employed in agriculture in relation to the total number of professionally active people.

As a result the figure arrived at was, on an average, 30 to 50 grain

units per one employed. It was only at Novi Bar that this index was higher (about 52 grain units) while for Velembusi and Burtaisi it was lower (26—27 units).

These data bear it out that labour efficiency in agriculture of Barsko Polje is very low which follows both from tremendous over-population, insufficient mechanisation of field work, and from the prevalence of labour consuming, and unsuitable for mechanisation perennial crops. On the other hand, the already sizeable and still growing outflow of manpower from agriculture poses an important problem of the future of this kind of intensive farming based on vast outlays of manual labour.

It is really not feasible to estimate in terms of figures he marketability of agriculture in the Barsko Polje area on the basis of data available. Marketability relies first of all on the olive production which is mostly processed on the spot by the new oil mill. This is followed by fruit crops, chiefly figs, pomegranates, almonds, peaches, apricots and citrus fruits. A part of the fruit crop is used for manufacture of brandy (plums, mulberries and so on) or wine. For sale on the market are also a certain amount of vegetables, especially from Novi Bar, Bartula, Bjelisi Polje and Burtaisi. Finally, on sale are also put such farm products as milk, butter and cheese, meat and wool.

In view of the high over-population (Table 9) not much of those products are marketed outside Barsko Polje. The overwhelming majority of them are used up to feed the population of the two towns and the villages.

In a word, the farming in Barsko Polje may be described as pronouncedly intensive and unmechanised, with perennial crops prevailing, mostly intercultivated with annual plants (*coltura promiscua*). Generally speaking it is an area of medium or fairly high productivity but with low labour efficiency with an orientation on the production of fruits, olives, milk and meat, and a farming that is of low or medium marketability.

The spatial differentiation of farming is connected either with market (vegetable orientations at Novi Bar) or with natural conditions which account for the existence in the region examined of two agricultural micro-regions:

1. Areas on the basin bottoms with a prevalence of arable land over perennial crops and a relatively higher proportion of meadows and pastures on poor soil or at soaked grounds. This region is characteristic for none or only slight prevalence of plant over animal production and for fodder crops, mainly maize and lucerne in plant production. There

is also a considerable proportion of potatoes and vegetables. Dairy cattle and pig breeding prevail in animal production.

2. Sections of mountain slopes in the north and east of the basin bottom with the prevalence and even domination of perenial crops cultivated either in form of homogeneous groves (olives) or intercultivated with herbaceous plants. This region is characteristic for the prevalence of plant production mainly industrial crops with a large proportion of fruits over animal production, in which of wool and mutton sheep and dairy cattle breeding prevails.

GEOGRAPHIA POLONICA 5, 1965

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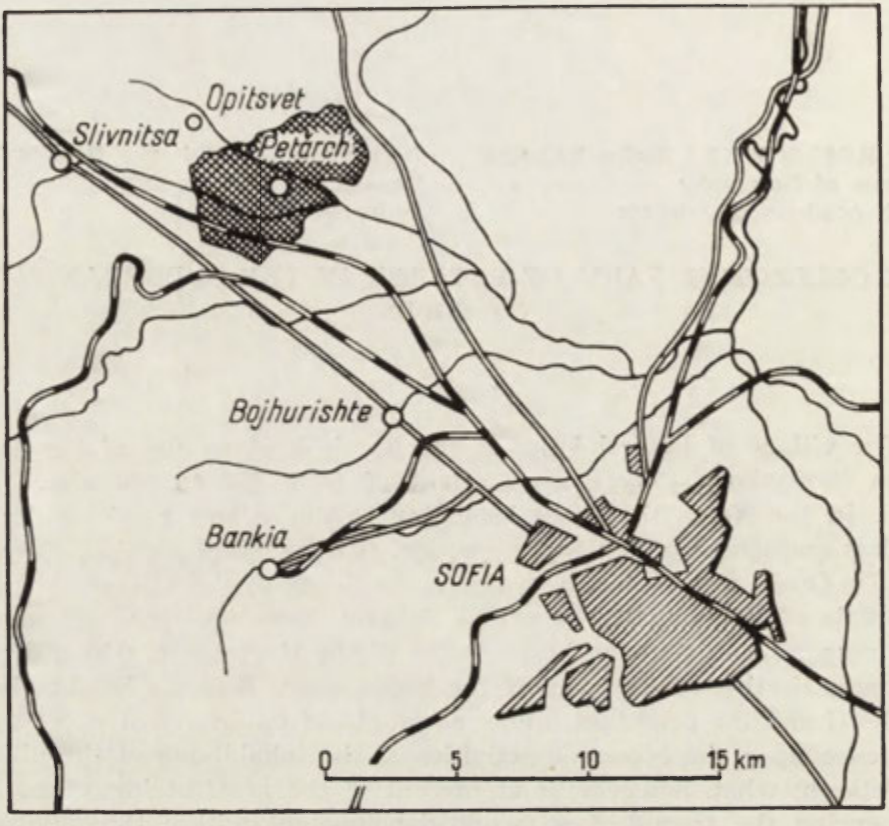
THE COLLECTIVE FARM OF PETARCH IN THE SUBURBAN ZONE OF SOFIA

1. SITE

The village of Petarch [1] lies at the North-Western end of the Sofia Basin (Sofiyskoye Polye), at a height of from 550 to 600 above sea level. In the North the lands belonging to the village reach as far as the last eminences of the Stara Planina, namely Mala Planina, Chepan and Tri Oushi (898 metres a. s. l.). To the South of the village rises the mountain of Viskiar (1052 m a.s. l.). Among these not very high mountain ranges is situated the broad valley of the river Blato, which drains the most north-westerly part of the Sofia Basin. Both its height above sea level and the conditions of its geographical environment exert their influence upon the economic activities of the inhabitants of the village of Petarch; what, however, is at present of the greatest importance in influencing the trends of economic development within the village is the immediate neighbourhood of Bulgaria's strongest economic centre — its capital, Sofia. Petarch lies at a distance of 25 km from Sofia (cf. maps) and is situated on the outskirts of its suburban zone. The economy of the village is, to a considerable degree, oriented towards the satisfying of Sofia's needs for milk, meat, eggs, vegetables and other food products. This task is made easier by good transport connections: at a distance of from two to three kilometres from the centre of the village there runs

[1] Since the Bulgarians use the Cyrillic alphabet, when translating this text into English the question of transcription of place- and personal names immediately arose. In most cases the transcription of Russian texts commonly used for bibliographical purposes has been adopted. Only the sound expressed in Bulgarian by the letter „ъ" gave difficulties. Ultimately the transcription by the letter a has been decided. In this case a should be spelled as in such English words as about, above etc.

a railway line, as well as the main Sofia — Belgrade road. Such connections make it possible to organize a permanent exchange of goods between Sofia and Petărch. Petărch is the seat of a village National



Map 1 Petărch. General situation.

Council as well as of the management authorities of the collective farm or the so-called TKZC, which also comprises the neighbouring villages of Opitsvet, Bezden, Bogovtsi and Buchin.

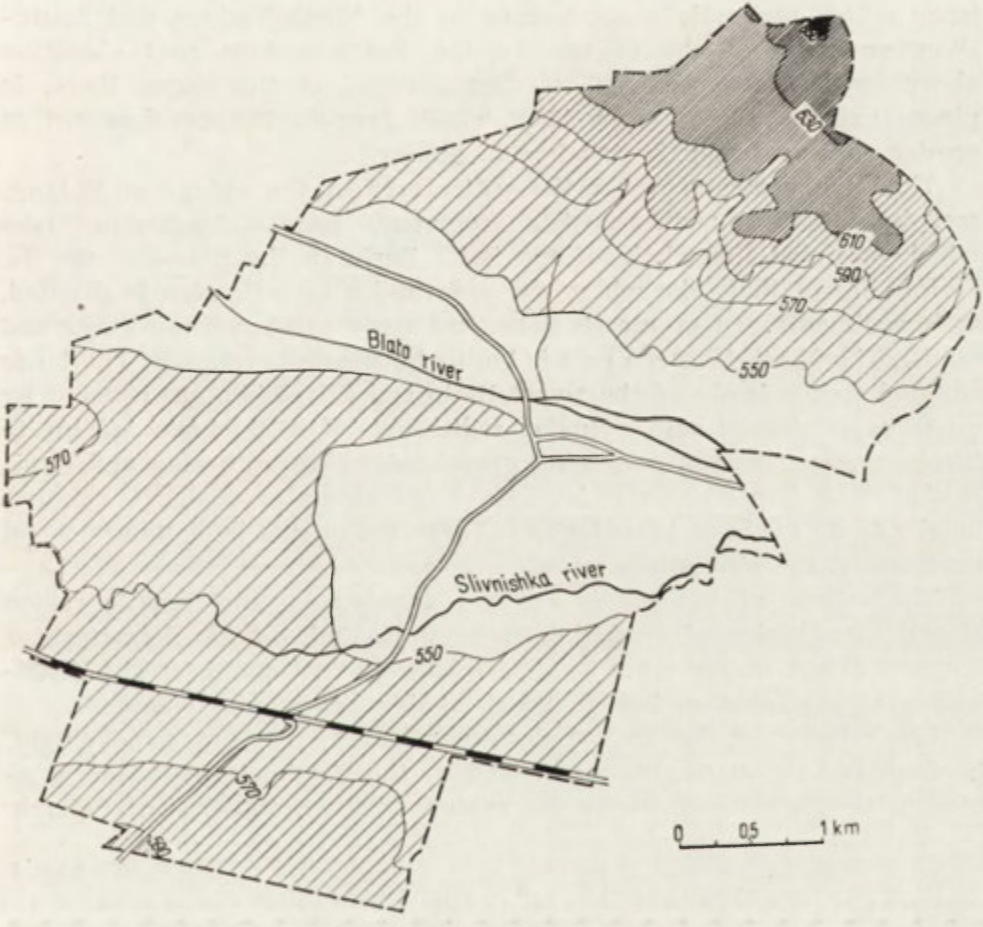
The village of Petărch occupies a surface of 3280 hectares and, in 1956, it numbered 2069 inhabitants; both the above features cause it to belong, under Bulgarian conditions, to medium-size villages.

3. NATURAL CONDITIONS

The situation of the village of Petărch, on the very edge of the Sofia Basin, accounts for the fact that land relief, here, is not as flat as is the case in the centre of that basin. The macroforms of that

region arose during the period of the pliocene and quaternary epeirogenic movements, which lowered the central part of the Sofia Basin, while raising its peripheral parts. The further formation of land relief was due to processes of erosion, denudation and accumulation. Along with the epeirogenic movements the valley of the river Blato was formed. The erosion and accumulation action of the latter then contributed to produce a variation of land relief.

Generally speaking, the grounds of the village of Petarch are inclined in the direction of the river Blato and of its tributary, the



Map 2 Petarch. Hipsometry

river Slivnishka. Apart from these, they are cut through by a number of other, shorter tributaries. Elevation above sea-level varies from 540 m in the East, on the banks of the river Blato, to 650 m in the part

of the region under discussion which reaches farthest to the North. Along the banks of the rivers Blato and Slivnishka there are well--developed and well-preserved lower river terraces. The larger part of the flood plain tarrace, of a relative heigth of from 1 to 3 m, is water--logged, while the remaining part is flooded when the waters rise, which causes these lands not be cultivated. The most favourable conditions for agriculture exist on the next two upper terraces, of a relative height of from six to ten and from 15 to 20 m respectively. It is also these same terraces which occupy a large part of the surface of the village. Clearly separated from the above terraces are the low, hill lands which make their appearance in the North-Eastern and South--Western parts of the village. In the North-Eastern part elevation above sea-level exceeds 600 m. The gradient of the slopes there, in places exceeds 10, or even 12%, which favours the development of erosion processes and the creation of gullies.

The soil substratum over the entire area of the village of Petarch are, for the most part, lacustrine sediments from a fresh-water lake which occupied the whole of the Sofia Basin in the pliocene. On the peripheries of that lake where the area under investigation is situated, such sediments are of marsh, lake and river origin (sandy clays and sands). The North-Western part is built of Jurassic limestones. The lands situated on the banks of the rivers Blato and Slivnishka are covered by quaternary alluvial and deluvial sediments, of a thickness of up to fifteen metres, mostly containing gravel mixed up with clay and sand. It is in those formations that both flood and upper terraces, of a relative height 6—10 m, have been incised. These sediments, both pliocene and quaternary, are strongly pervious.

The village of Petarch is entirely situated in the climatic region of the high basins of central-western Bulgaria [2], whose characteristic features are: a severe winter and a relatively cool summer. The distribution of precipitation has an unmistakably continental character.

The climate of the area under investigation may, to some extent, be described by quoting data provided by the Bojzhurishte station, situated in the Sofia Basin, twelve kilometres to the South-East of Petarch

Table 1

Mean monthly and annual temperatures

Station	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Bojzhu-rishte	-2.1	-0.6	4.4	10.1	14.6	18.0	20.6	20.0	16.5	10.1	5.0	-0.2	9.7

[2] Agroklimatichen spravochnik na N.R. Bălgaria. Sofia, 1960, p. 12.

It results from the above data that the mean annual temperature here is lower than the average for the country as a whole (11°). The average amplitude of the year is also lower. Consequently, conditions of temperature in the village of Petärch make impossible the cultivation of certain thermophilous plants, so characteristic of Bulgaria, such as the vine, cotton, rice and others, as well as that of early ground vegetables.

Precipitation in the area in question is not high (Table 2). The annual amount is lower than the national average (650 millimetres).

Table 2

Average monthly and yearly precipitation (1896—1945)

Station	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Bojzhu-rishte	41	27	29	49	78	86	67	51	49	57	50	37	621
Slivni-tsa	34	32	29	53	70	82	45	56	36	59	52	41	589

Summer precipitation, even though twice as high as the winter one, is not sufficient to ensure the vegetation of certain cultivable plants. This is why artificial irrigation is practised in the area in question.

The relief of the land distorts those general climatic conditions. On the one hand, the hill and mountain ranges which surround the village protect it from northern, north-western and western winds, while, on the other hand, the inside of the basin is characterized by winter and autumn inversions of temperature. Such inversion, together with elevation above sea-level are the cause of late spring light frosts (on 24th May) as well as of early autumn ones (25th September).

The river Blato, a tributary of the Iskär, which flows from North-West to South-East, divides the grounds of the village of Petärch into two parts. The locality itself is situated on the banks of the river.

The sources of the river are to be found in the nearby Karst grounds, built of Jurassic limestones. The river collects its waters from about twenty Karst springs, of varying productivity [3]. The inclination of the river is on the average of 1.6 m per 1 km [4], which causes its terraces to become waterlogged. The mean annual run-off of the river Blato

[3] The productivity of some of the springs amounts e.g. to: Opitsvet — 280 l/see,. Bezden — 8P l/sec., Bistritsa — 60 l/sec. etc.

[4] Hidrologichen spravochnik na rekite v NRB. Sofia, 1957, p. 84.

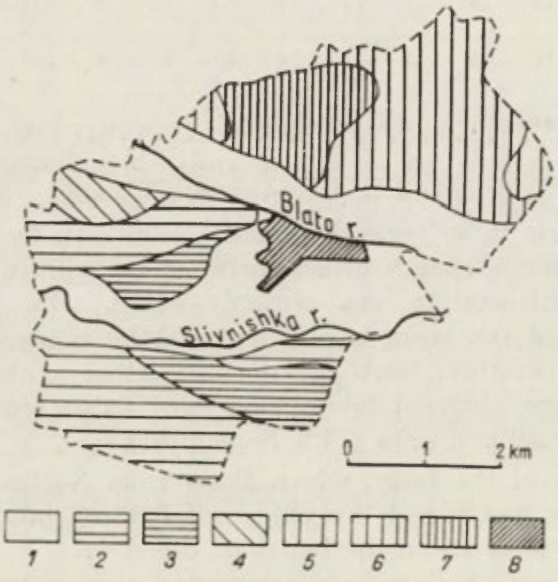
amounts to about 27 million cubic metres of water. The fluctuation of the run-off is illustrated in Table 3.

Table 3

Run-off waters from the river Blato. Monthly and annual mean in the year 1935/1936 to 1954/1955

Run-off	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	IX	Year
in m³/sec.	0.56	0.63	0.97	1.09	1.34	1.19	1.16	1.2	0.75	0.65	0.50	0.49	0.86
per cent of annual mean	5.53	6.01	9.59	10.77	12.09	11.76	10.06	10.06	7.17	6.43	4.93	4.68	100.0

As can be seen from the above, the run-off of waters varies. In summer and early autumn (July to November) the run-off is low, inadequate for the needs of agriculture, while in winter and early



Map 3 Petarch. Soils

1 — alluvial and diluvial meadow soils, *2* — feebly leached away and leached away deep black earths (smolnitsi), *3* — strongly leached away deep black earths (smolnitsi); *4* — humous — carbonate soils; *5* — feebly podsolized mountain kaneleni soils; *6* — feebly leached away mountain kaneleni soils; *7* — feebly leached away and leached away mountain dark kaneleni soils; *8* — settlement

spring (January to May) it is higher. Since, as stated above, the cultivation of many plants is impossible without irrigation, it is indispensable to accumulate winter waters for the summer needs of agriculture by constructing small reservoirs.

The river Slivnishka, which flows into the Blato within the village itself, 1 km to the East of the settlement, carries little water with it. In spite of this its waters may be utilized also for purposes of irrigation, on condition that they have been stored.

phot. J. Kostrowicki

Fig. 1. The headquarters of the collective farm authorithies. The plan of production for the current year is advertised

phot. J. Kostrowicki

Fig. 2. Large arable field on the rich, black „smolnitsi" soils, northern part of the village land

phot. J. Kostrowicki

Fig. 3. The starting soil erosion processes

In the village of Petărch the following three types of soil make their appearance. In the southern part the largest area is occupied by feebly degraded and degraded (leached away) deep black earths (smolnitsi), (cf. the map 3), and the strongly degraded deep chernozems. The *smolnitsi* are typical of the Sofia Basin [5]. They have mostly been formed on pliocene, and partly on quaternary rocks, under a copious covering of grass vegetation. Hence their high contents of humus. The depth of such soils reaches from 80 to 120 cm. For raising their fertility they require a proper cultivation and manuring.

Feebly leached away and leached away forest soils and dark feebly leached away and leached away forest soils (kaneleni) cover the northern part of the area of the village. Such soils have, similarly to the others, been formed on pliocene and quaternary sediments, but under cover of a broad leaved forest. Their depth varies from 25 to 65 cm. Carbonates have been leached away from them to a depth of from 80 to 140 cm [6]. Such soils are less fertile than are the "smolnitsi".

Humus carbonate soils (rendzina) formed on limestone parent ma-

[5] For details see: Pochvite na Bălgaria. Sofia, 1960, pp. 504—505.

[6] See the same, pp. 235 and 505.

phot. J. Kostrowicki

Fig. 4. Pastureland on the northern upper part of the village land, dissected by the deep gullies, overgrown with false acacia trees and bushes

terial, occupy but small areas, and even those are all situated in the north-western part of the village [7].

Alluvian and deluvial meadow soils occupy a broad belt on both sides of the rivers Blato and Slivnishka, covering the lower-lying terraces. They have been formed on river and deluvial sediments of the quaternary period. They are rich in humus and are fit for intense cultivation, both of field crops and of vegetables and others.

In the northern part of the village area the soils have been depleted owing to a process of far-advanced denudation and erosion. In many places the humus horizon has been washed away and deep gullies have been formed. Erosion processes have also developed on the slopes of the south-eastern part of the village. So far all the attempts at fighting erosion have failed to yield satisfactory results.

The above data lead us to the conclusion that both the relief and the soil conditions are, generally speaking, favourable, and do not, by themselves, create any difficulties for agriculture. Limiting factors are, on the other hand, climatic conditions, connected with the elevation

[7] See the same, p. 505.

above sea level, and the phenomena of inversion, which is the result of the land relief. Such conditions, however, do not place any obstacles in the way of development of grain crops cultivation, livestock breeding, and even of agriculture of a suburban type. On the other hand, what stands in the way of an intensification of agriculture is the inadequate amount of precipitation, as well as the limited supply of flowing water, which could be made use of for purposes of irrigation. The development of erosion processes, already started, if not prevented in time, may menace the agricultural exploitation of the hill slopes. Altogether, however, the conditions of the geographical environment of the village of Petarch may be considered to be favourable for the development of agriculture with various production orientation.

3. SOCIAL AND PROPERTY RELATIONS

The beginnings of the village of Petarch reach far back into very remote times, but the village has been situated in its present position for a relatively short time, because in the past it has changed its location several times [8]. At first the village of Petarch, then known under the name of Kamiko, was situated more to the north, in the neighbourhood of the present-day village of Gradets, close to the present highway Sofia-Lom [9]. At the beginning of the Turkish occupation the village was destroyed by the Turks, and its population moved to a new place, situated about 1.5 km. to the north-east of the present-day village. In the eighteenth century the village was once more destroyed, and it was only then that the surviving population settled on the present spot. During the period of Turkish rule the lands of the present village of Petarch belonged to several chifliks, i.e. Turkish feudal landowners.

After the Liberation (1878) these lands were divided among the inhabitants of the villages Petarch, Ponor, Bogovtsi and others still. In 1880, the village of Petarch numbered 150 houses and 933 inhabitants [10]. The population rapidly increased, both by natural increase and immigration. In 1926, the village already numbered 280 houses and 1837 inhabitants [11].

In the first place the peasants received middle-size holdings but,

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[8] I. Penkov, I. Khristov. Sofiysko Polye. Sofia, 1959, pp. 114—115.
[9] Z. Chankov. Geografski Rechnik na Bălgaria. Sofia, 1958, p. 343.
[10] I. Penkov, I. Khristov, op. et loco cit.
[11] Z. Chankov, op. et loco cit.

as a result of divisions of inheritances and of the lack of possibility of manpower surpluses flowing away from the countryside, the process of splitting up holdings made rapid progress. In 1908, 31% of the village inhabitants possessed holdings of a surface exceeding 10 ha. These occupied 60% of the area of the village, while dwarf holdings, numbering below three ha, occupied 2.7% of that area [12]. By 1944, as many as 65% of the holdings were below 3 ha of surface. The grounds of the several holdings were greatly fragmented.

The land reform of 1945 which limited the size of a farm in Bulgaria to 20 hectares, did not exert any influence on the village of Petarch, since not a single one of its holdings reached that size.

As early as 1945, on the other hand, there arose in the village of Petarch the beginnings of collective farming. In the autumn of that year the first collective farm (TKZS) was formed there, comprizing an area of 280 hectares, and having 105 members. As shown in the annexed Table 4, till 1950 the progress of collectivization was rather slow, and involved mostly the poorest farmers. It was only that year that in the village, just as in the whole of Bulgaria, the intensity of collectivization increased and even more well-to-do farmers joined the collective [13].

Table 4

Share of the socialized economy in the village of Petarch in the years 1947—1958

Year	Percentage of holdings	Percentage of land area
1947	29.4	18.8
1948	34.5	21.8
1949	50.4	31.1
1950	97.5	93.9
1953	98.5	
1958	.	97.7

By 1958 the collective farm already comprized 1883.7 ha of arable land, 86.3 ha of pastures, shrubs and forests; 155 ha were under the members' allotments. By 1960 there were no longer any individual holdings in the village of Petarch.

At the same time the surplus of the population began to flow away to non-agricultural occupations, mainly in Sofia. As a result of this the number of families diminished from 576 to 531, and so did the

[12] M. Billaut. La collectivisation agraire en Bulgarie: L'exemple du village de Petartch. Annales de Géographie, 69 (1960), 375, pp. 484—492.

[13] Cf. the same, p. 488.

average number of persons per family. In 1959, the number of members of the collective farm amounted to 630, including 436 men and 194 women, out of a total number of 1229 able to work persons (532 men and 697 women). About 120 persons commuted daily to work in the capital. In 1960, the village of Petärch was inhabited by 2289 persons, of which number there were 1379 able to work, i.e. about 75 able to work persons per 100 ha of agricultural land, and 84 per 100 ha of arable land.

As a result of the operation of consolidation of collective farms, the village of Petärch became the centre of a new big collective in 1959, one comprizing six villages of a total surface of 4836 ha. The present contribution, however, deals with the village of Petärch itself.

4. LAND UTILIZATION

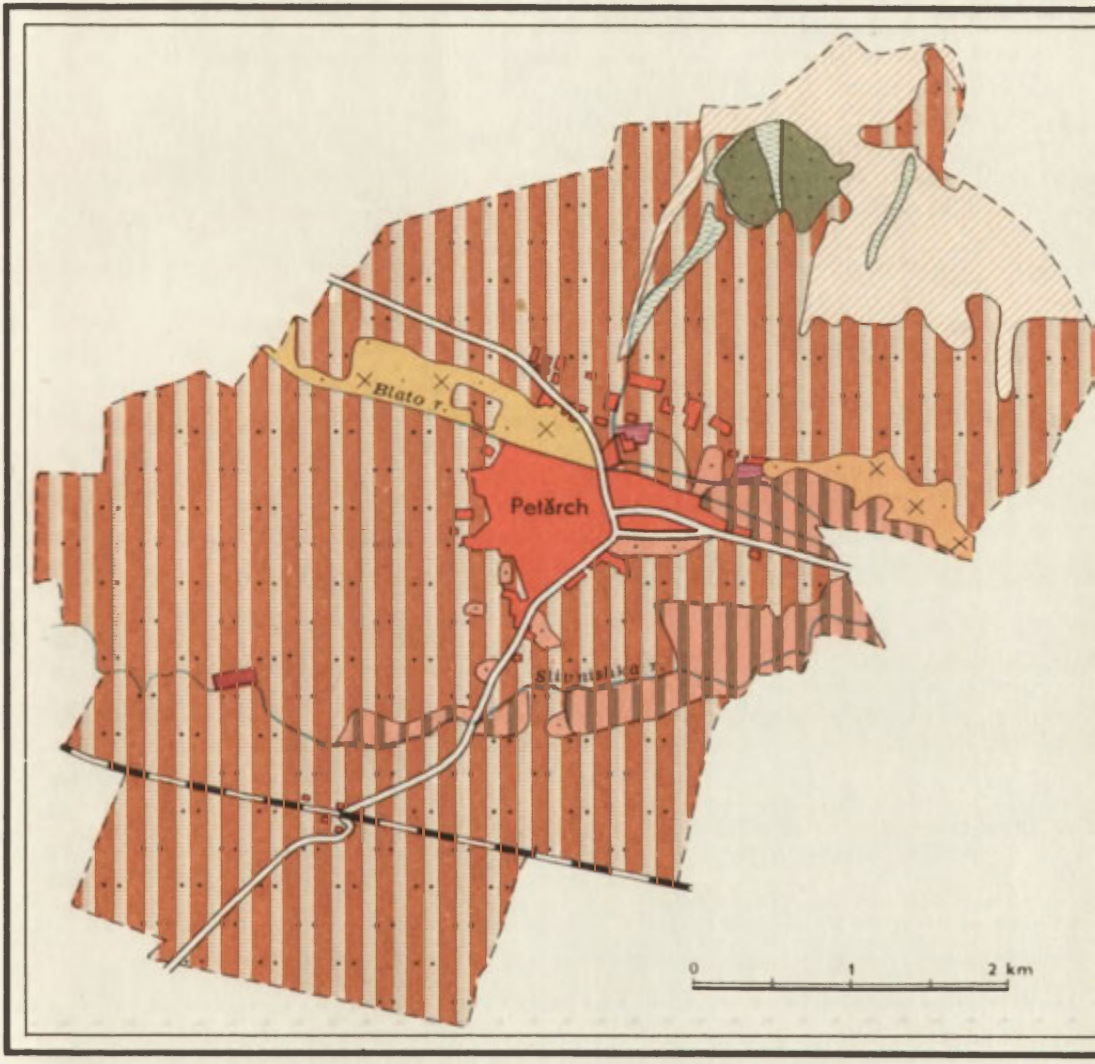
According to the statistical data obtained from the collective farm management authorities, the total area of the village of Petärch amounted to 2194 ha in 1960, of which there were:

cultivated land	ca 1789 ha
including:	
perennial crops	30.1 „
members' allotments	283.0 „
natural meadows	87.3 „
Total agricultural land	ca 2089 ha

The above data does not correspond with the data concerning the structure of crops on the arable land of the collective farm, the summing up of which yields the figure of 1664 ha. If, from that area we eliminate rye and maize, probably sown as aftercrops and mown green, i.e. 160 ha we obtain 1506 ha which, together with the members' allotments and perennial crops gives a total of 1819 ha consequently 46 ha more that was given as the figure for agricultural land. Considering the fact that data concerning the structure of crops are frequently rounded off, the above degree of exactitude may be considered satisfactory.

At the same time, however, the survey has brought to light the fact of the existence, in the northern part of the village, of a rough pasture, of a surface of approximately 180 ha. Similarly, the surface of the settlement itself (about 75 ha) has not been taken into consideration in the above data.

Taking into consideration the above, the approximate structure of the principal land uses of the village of Petärch would look as follows:



Map 4. The collective farm of Petărch. Land utilization map

Table 5

Village of Petarch
Structure of land uses according to types of property

Specification	ha	%
Collective farming	about 1806	82.3
Arable land	1506	68.6
Perennial crops	30	1.4
Meadows	87	4.0
Pastures	about 180	about 8.2
Individual farming	358	16.3
Members' allotments	283	12.9
Settlement (total)	about 75	about 3.4
Total	2195	100.0

Table 6

Collective Farm of Petărch (TKZS)
Structure of principal land uses

Specification		ha	%
Arable lands	about	1506	83.9
Permanent grasslands	„	267	14.8
Perennial crops	„	30	1.3
Total	„	1803	100.0

The above data indicate that almost the entire area of the village of Petărch is utilized agriculturally and, also, that almost all agricultural land is actually arable land. A rather small stretch of meadows is situated on the Blato river to the Northwest and Northeast of the village; hills in the Northeastern section of the village are mostly pastureland. A small wooded area is located in the same section of the village. Therefore, one can fairly correctly claim that the intensity of agricultural utilization of land in the village of Petărch is very high.

a. Arable Land

As indicated by Table 7 in the village of Petărch cosiderable quantities of various plants are cultivated, of which about 90% as main crops and over 10% as aftercrops.

The largest surface is occupied by winter wheat (480 ha), mostly of the local varieties, grown as the principal bread grain. Other cereals, such as barley, are only grown as fodder, and rye as an aftercrop for green fodder.

Agricultural land utilization Table 7

Specification	Surface ha	%			
		Agricultural land	Arable land	Sown land	Given group
Collective Farm					
I. Arable land	1506	83.4	100.0	x	x
A. Exhaustive crops	580	32.1	38.5	34.8	100.0
wheat	480		31.9	28.8	82.8
barley	100		6.6	6.0	17.2
B. Intensifying crops	435	24.1	28.9	26.1	100.0
maize (for grain)	280		18.6	16.8	64.4
therein: maize for grain	150 (30N)		10.0	9.0	34.5
incultivated with beans	130		8.6	7.8	29.9
vegetables	30 N		2.0	1.8	6.9
therein: cucumbers	2		0.1	0.1	0.5
tomatoes	5		0.3	0.3	1.1
paprika	4		0.3	0.3	0.9
gourds	2		0.1	0.1	0.5
onions	1.2		0.0	0.0	0.2
snap beans	2		0.1	0.1	0.5
green pea	1		0.0	0.0	0.2
carrots	1		0.0	0.0	0.2
early cabbage	2		0.1	0.1	0.5
potatoes	0.3		0.0	0.0	0.0
other vegetables	9.5		0.6	0.6	2.1
sunflower	75		5.0	4.5	17.2
sugar beet	10 N		0.7	0.6	2.3
fodder roots	40 N		2.7	2.4	9.2
therein: mangolds	20		1.3	1.2	4.6
fodder gourds	10		0.7	0.6	2.3
kale	10		0.7	0.6	2.3
C. Structure Forming Crops	491	27.2	32.6	29.5	100.0
lucerne (hay)	266		17.7	16.0	54.2
lucerne (seed)	40		2.7	2.4	8.1
vetch (hay)	120		8.0	7.2	24.4
field pea	30 N		2.0	1.8	6.1
red clover (seed)	3		0.2	0.2	0.6
white clover (seed)	10		0.7	0.6	2.0
sainfoin (seed)	12		0.8	0.7	2.4
yezhova glova (hay. seed)	10		0.7	0.6	2.0
D. After crops	160		x	9.6	100.0
rye (green)	60		x	3.6	37.5
maize (green)	100		x	6.0	62.5
Total sown land	1666		x	100.0	x
II. Perennial crops	30.1	1.7	x	x	100.0
Fruit bearing	3.6				11.9
Young stands	26.5				88.0
therein intercultivated: strawberries	3.6				11.9
III. Permanent grasslands	ca 270	14.9	x	x	100.0
meadows	87				32.2
pastures	ca 180				ca 66.7
Agricultural land	ca 1806	100.0	x	x	x
Individual Farming members allotments	283				
Total agricultural land	ca 2089				

N — irrigated.

The second most important place, next to wheat, is occupied by maize (380 ha) grown, both for grain and as green fodder. About 30 ha of maize were grown on irrigated land, thereby obtaining higher crops (40 q from a ha) than on non-irrigated land (27 q per ha). On about one-half of the land maize was intercultivated with beans, which makes use of the maize stalks, yields an extra profit and, being a papilionaceous plant, enriches the soil in nitrogen.

In spite of the smaller surface occupied by them (about 30 ha) an important part in the income of the village of Petärch is played by vegetables [14] destined, first and foremost for supplying the Sofia market. The most important part among them was played by tomatoes, sweet paprika, onions, pumpkins, cucumbers, early cabbage as well as green beans and peas. The growing of strawberries on a large scale has also been undertaken. Such crops are almost totally irrigated and intensely manured.

Of the industrial plants, the village of Petärch grows sunflowers and for the time being on a small area, sugar beet.

A large area of land is occupied by various structure-forming plants, grown exclusively for fodder. The most important part among them is played by lucerne, a lesser one by vetch, grown both for hay and for seed, and by field peas, grown for hay for cattle. An important part is also played by the cultivation of forage plants for seed. Apart from lucerne, both red and white clover are grown here, so is sainfoin and the so-called „yezhova glova" (hedgehog head) [15]. The growing of fodder root crops is undertaken mostly in the form of beetroot, pumpkin and fodder kale.

As can be seen from the above, we have to do, in the village of Petärch, with a fairly balanced, mixed land utilization, in which none of the three principal agronomic groups of crops obtains a clear predomination. The largest share belongs to exhaustive plants (in this case to cereals) — 34.8% of the area sown; this is followed by the structure-forming plants — 29.5% and, in the third place, the intensifying plants — 26.5%. Since among the exhaustive crops it is definitely wheat that predominates (82.8% of the group), among the structure-forming — lucerne (54.2% of the group), and among the intensifying crops —

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[14] M. Billaut (op. cit.) informs us that the surface under vegetables in the village of Petärch amounted to 4.5 ha in 1950, to 31,2 ha in 1953, and to 54.9 ha in 1958. If the above data are exact, we would have to do with a decrease of the surface under vegetable cultures in the years 1958—1960.

[15] A kind of grass, probably some meadow-grasses as *Poa trivialis* or the *Poa silvicola*.

maize (64.4% of the group), we have here a mixed wheat-lucerne-maize orientation of the utilization of arable land ($E_2wh\,I_1mz\,S_1lc$); it is connected with the evolution in crop-rotation, now taking part in the Danubian countries; the former two-year crop-rotation initially with fallow land (1. fallow land, 2. wheat) has become transformed into a two-year rotation without fallow land, in which the place of fallow land has been taken by maize (usually 1. maize and other intensifying plants, such as e.g. sunflower, 2. wheat and other winter cereals), and which is now being transformed into a three-year crop rotation (1. maize and other intensifying plants, 2. wheat and other winter cereals, 3. lucerne and others). This takes place, first and foremost, in those villages which do not have a sufficient amount of meadows and natural pastures and which develop, for some other reasons, livestock breeding. In the case under consideration this is a result of the farming of the village of Petarch being concentrated on the breeding of dairy cattle, connected with the situation of the village in a suburban zone. Of course, the collectivization of agriculture has considerably hastened this process, while at the same time widening the range of cultures.

Such transformations are also connected with the changes in ways of farming arable land and of manuring it.

Natural manure, the production of which can be estimated at about 6000 tons, is now applied, in principle, every two years, on land under intensifying plants, in the following quantities:

Maize	300 q/hec.	Potatoes	200 q/hec.
Sugar beet	400 q/hec.	Fodder beet	200 q/hec.
Tomatoes	400 q/hec.	Fodder kale	200 q/hec.
Sweet paprika	400 q/hec.		

Moreover, on land under cereals (wheat and barley) from 100 to 120 q/hec. of nitrogen and phosphorus fertilizers are applied, and under maize about 150 kg. of nitrogen fertilizers and 300 kg of potassium fertilizers.

The amount of sowing grain is from 180 to 200 kilogrammes/hec. of local wheat, from 230 to 250 kg of Italian wheat, and from 30 to 40 kg of maize per ha.

The land is tilled mechanically. The collective farm has not over many machines of its own (three heavy tractors) since, in this respect, it is served by a motor-tractor station (MTS). As a result, however, ploughing, sowing and siloing are entirely mechanized, while harvesting is so in 90% of the cases. Lucerne is mown twice or three times a year. On the other hand, the collective farm has nine lorries which serve both for internal transport and for supplying the farming products to pur-

chase stations and to the Sofia market. In 1960, about 360 ha were irrigated. A pump station has been built on the river Blato. The area irrigated increases from year to year.

Data are not available concerning the crops grown on members' allotments and the yields obtained from them. From observations it seems that a considerable proportion of them are occupied by vegetables and fruit-trees, while maize, wheat and lucerne are also grown.

b. Perennial Crops

The area of perennial crops in the village of Petärch comprises a mere 30.1 ha, i.e. barely 1.6% of the farmed land, of which 25.5 ha are young, freshly planted orchards in which maize, vegetables, etc. are intercultivated. Old orchards occupy a small area (3.6 ha) in the eastern part of the village of Petärch. Among the fruit-trees, apple--trees and plum-trees predominate.

c. Permanent Grasslands

The whole of the cultivated grasslands within the village of Petärch occupies a mere 87.3 ha.

They make their appearance in two separate groups: on the banks

phot. J. Kostrowicki

Fig. 5. Rough pasture on the northern margin of the village land

of the river Blato, to the north-west of the village and, secondly, also to the north-east of that river. The meadows are under full exploitation and utilized alternately, i.e. they are sown in the spring, and then grazed.

Such meadows have been classified as follows: the western area, situated in the valley of the river Blato, in its flood plain, have been classed among inundated (post łęg) meadows, while the eastern area situated on the slope of the Blato valley, above the flood plain — among post grond poplawa meadows fertilized by waters flowing down from fields.

Moreover, in the north-western part of the area of the village there is a dry rough pasture area (about 180 ha) on the hills, mostly utilized for the grazing of sheep and overgrown with dry grasses and with such herbs as yarrow (*Alchemilla*), spurge (*Euphorbia*), scabwort (*Inula*), fever-weed (*Eryngium*) and others. That pasture is subject to strong erosion, the effect of which can be seen in the deep gullies with slopes overgrown with bushes, partly planted with false acacia (*Robinia pseudoacacia*), which prevents a widening of the erosion.

d. Forests

The only forest area in the region under investigation is a small planted grove, situated on the hill slopes in the northern part of the village, and constituting part of the property of the State. The trees are mostly pines with an admixture of oak and false acacia. The age of the trees does not exceed twenty years. The undergrowth is chiefly composed of acacia. The wood has been considerably devastated, mostly by sheep grazing and does not bring any appreciable profit.

e. Settlement

The village of Petarch is a large nucleated settlement of irregular, many-street pattern, shaped like a triangle, and situated in the spot where the Sofia-Belgrade road crosses the river Blato. Like the majority of Bulgarian villages, it is a large village composed of buildings made of bricks baked on the spot. The houses are mostly two-storey ones, covered with tiles. Every farmstead is surrounded by a small home-yard garden in which vegetables and fruits are cultivated for the needs of the household. Immediately to the north of the village there is the so-called farm, i.e. the co-operative farm buildings, large, modernly built byres, stables, sheepcots, and pigsties, as well as a smithy, carpenter's shed, storehouses, etc. The village has electric light and a radio network, as well as running water.

phot. J. Kostrowicki

Fig. 6. The old farm house

phot. J. Kostrowicki

Fig. 7. A new farm house, upper floor is yet uninhabited and used mostly for drying paprika

During the period of our investigation the construction of a service centre for the collective settlement was in progress, right in the centre of the village.

5. AGRICULTURAL PRODUCTION

a. Plant Production

The village of Petarch obtains, for Bulgarian conditions, fairly high yields of cereals per ha, while maize yields are less high.

Table 8

Yields per ha of the principal crops in q [15]

Specification	1947	1950	1953	1958	1960	
					planned	achieved
Wheat	15.8	19.5	19.0	14.0	20.0	19.8
Barley	10.4	31.4	20.7	15.0	22.0	28.9
Maize	22.5	24.0	18.2	16.3	27.0	35.1
Sugar beet	115.0	—	200.0	345.0	500.0	461.2

This is rather more than the average yields for the Sofia Basin amounting to 15 to 16 q of wheat and 16 to 17 q of maize [17] and equally more than the average yields of the same crops for Bulgaria as whole (wheat 17.3, barley 20.1, maize 20.2 q per ha in 1959 [18].

Fairly high yields are also obtained by the Petarch collective farm where such plants as sugar beet, fodder root crops as well as vegetables and sunflower are concerned. They considerably exceed the average yields for Bulgaria.

The calculation in grain units presented in Table 9 is based on the data concerning the area sown and the yields obtained in the collective farm. Included in the calculation have been the straw of both cereals and maize, used for fodder after having been mixed with hay, as well as the fodder obtained secondarily, e.g. the leaves of sugar beet, etc.

As shown by the table enclosed (Table 9), owing to an intensive land utilization and relatively high yields, the collective farm of Petarch obtains high plant production, viz. 52 312 grain units, without counting the members' allotments for which data is lacking. Since, as has been found, on such allotments an intense growing of both vegetables and

[16] M. Billaut, op. cit., p. 488 and interviews.
[17] I. Penkov, T. Khristov, op. cit., pp. 66—68.
[18] Statisticheski Spravochnik 1960. Sofia, 1960.

Table 9

Gross production

Specification	Yields q per ha	Crops in q, kg, l	Crops in grain units	% gross production	% branch production	% given group
Collective Farming						
A. Plant production			52312.0	70.1	100.0	
I. Food crops			11255.7	15.1	21.5	100.0
a. Grains			9816.0	13.1	18.8	87.2
wheat	19.8	9504.0	9504.0	12.7	18.2	84.4
beans	2.0	260.0	312.0		0.6	2.8
b. Vegetables			1176.1	1.6	2.2	10.5
cucumbers	191.0	382.0	95.5		0.2	0.8
tomatoes	217.8	1089.0	163.4		0.3	1.5
paprika	225.8	903.2	271.0		0.5	2.4
gourds	252.1	504.2	151.3		0.3	1.3
onions	165.5	198.6	59.6		0.1	0.5
snap beans	194.8	389.6	97.4		0.2	0.9
green peas	140.0	140.0	42.0		0.1	0 4
carrots	720.0	720.0	108.0		0.2	1.0
early cabbage	600.0	1200.0	180.0		0 3	1.6
potatoes	105.7	31.7	7.9		0.0	0.1
c. Fruits			263.6	0.4	0.5	2.3
strawberries	42.0	151.2	128.4		0.3	1.1
apples	.	161.5	64.6		0.1	0.6
plums	.	130.5	62.3		0.1	0.5
pears	.	20.7	8.3		0.0	0.1
II. Industrial crops			3943.0	5.3	7.5	100.0
sunflower	18.6	1395.0	2790.0	3.7	5.3	70.8
sugar beet	461.2	4612.0	1153.0	1.6	2.2	29.2
III. Fodder crops			37113.3	49.7	70.9	100.0
a. Grains			12823.0	17.2	24.5	34.6
maize	35.1	8775.0	8775.0	11.8	16.8	23.7
maize irrigated	38.6	1158.0	1158.0		2.2	3.1
barley	28.9	2890.0	2890.0		5.5	7.8
b. Succulent foods			12295.4	16.5	23.5	33.1
mangolds	678.3	13566.0	1356.6		2 6	3.7
fodder gourds	248.1	2481.0	496.2		0.9	1.3
kale	784.0	7840.0	784.0		1.5	2.1
maize (green)	416.6	41660.0	4582.6	6.1	8.8	12.3
maize (husks, stems foliage)	70.0	19600.0	4900.0	6.6	9.4	13.2
sugar beets (foliage)	160.0	1600.0	176.0		0.3	0.5
c. Rough forages			11699.9	15.7	22.4	31.5
lucerne (hay)	40.0	10640.0	5320.0	7.1	10.2	14.3
lucerne (hay from seed cultures)	20.0	800.0	400.0		0.8	1.1

Table 9a

Specification	Yields q per ha	Crops in q, kg, l.	Crops in grain units	% gross production	% branch production	% given group
vetch (hay)	42.5	5100.0	204.0		0.4	0.5
field pea	122.7	3681.0	478.5		0 9	1.3
rye (green)	150.0	9000.0	990.0		1 9	2.7
meadow hay	38.0	3306.0	1322.4		2.5	3.6
cereals straw	40.0	23200.0	2320.0		4.4	6.3
pasture	10.0	1800.0	540.0		1.0	1.5
white clover) hay from	10.0	100.0	50.0		0.1	0.1
red clover (seed cultures	18.0	54.0	27.0		0.0	0.1
sainfoin	10.0	120.0	48.0		0.1	0.1
yezhova glova	10.0	100.0	40.0		0.1	0.1
d. Seeds			295.0	0.4	0.6	0.8
lucerne	0.5	20.0	100.0		0.2	0.3
white clover	1.2	12.0	60.0		0.1	0.2
red clover	1.0	3.0	15.0		0.0	0.0
sainfoin	1.5	18.0	90.0		0.2	0.2
yezhova glova	1.0	10.0	30.0		0.1	0.1
B. Animal Production			22326.0	29.9	100.0	
I. Milk			10808.6	14.5	48.4	100.0
cow milk		. 1326800	9951.0	13.3	44.6	92.0
sheep milk		. 107200	857.6		3.8	8.0
II. Meat-stock			9853.4	13.2	44.1	100.0
beet and veal		. 96240	5774.0	7.7	25.9	58.6
pork		. 30500	1325.0	1.8	5.9	13.5
mutton and lamb		. 39600	2376.0	3.2	10.6	24.1
poultry		. 6300	378.0		1.7	3.8
III. Wool	2.6 kg	4160	1664.0	2.2	7.5	100.0
Total Collective Farming			74638.0	100.0		
Individual Farming						
A. Vegetable production			ca 10000	47.6		
B. Animal production			ca 11000	52.4		
Total Individual Farming			ca 21000	100.0		
Grand total			ca 95638			

fruit-trees is the practice, it is reasonable to consider that their productivity is not lower, but rather higher than the average for the village as a whole. Accepting the above assumptions, we may estimate the production of such household allotments at about 10 000 grain units.

The share accounted for by the several economic groups of crops point to the fact that, in the village of Petarch, we are concerned with an orientation which principally aims at the production of fodder. This is connected, first and foremost, with the utilization of fodder

production, not only as regards papilionaceous and fodder root crops, but also of the entire production of maize, barley and rye. In the village of Petărch maize accounts for more than 36% of the entire plant production and over 52% of the fodder production. Of the total production of fodder grain fodder accounts for about 35%, rough forage, mostly lucerne — for 32%, and succulent foods — for about 33%. Petărch also produces a fair quantity of fodder plant seeds (lucerne, clover, sainfoin, etc.).

Among the food plants the main role is played by wheat (18% of the plant production), and then vegetables (105% t. of the plant production). Industrial plants constitute a mere 7.5% of the plant production of the collective farm, of which sunflower accounts for over two-thirds, and sugar beet for the remaining one-third.

6. LIVESTOCK BREEDING AND ANIMAL PRODUCTION

The development of livestock breeding in the village of Petărch is matter of the last fifteen or so years. In 1947, livestock breeding provided the village with a mere 8.3 per cent. of its income, in 1951 — with 19.4% while by 1958 that percentage had already increased to 46 per cent [19]. This was the result not so much of an increase in the number of heads of cattle, as of the modernization of breeding methods; consequently the raising of productiveness was a result of a better care of the animals and their better selection, rational feeding, etc. As a result of all this livestock breeding is now a fundamental part of the economy of the village. Its state is also indicated by the number of heads per 100 ha of farmed land (85.4 big animal units per 100 ha of farmed land), of which number 64.3 heads were the property of the collective farm [20].

As is evident from Table 10, the dominant element in livestock breeding, both in the co-operative and in the private economy, is cattle The second place belongs to the breeding of sheep. The breeding of pigs, whether in collective or in individual farming, is rather feebly developed.

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[19] M. Billaut, op. cit., p. 489.

[20] While the data concerning co-operative property may be considered to be exact, those concerning the animals which constitute individual property are merely approximate. It should be concluded that not all the heads of cattle entered are fully grown ones. This is why the recalculation into big animal units is probably too low. At the same time data concerning poultry are completely missing.

Table 10

Livestock breeding

Specification	Heads	Big animal units	% of big animal units	Heads per 100 ha agricultural land	Big animal units per 100 ha agricultural land
A. Collective farming					
draft horses	78	93.6			
foals	2	1.2			
Total horses	80	94.8	8.2	4.4	5.2
draft oxen	36	43.2		2.0	2.4
bulls	3	3.6			
cows	400	400.0			
heifers	152	106.0			
calves	211	25.3			
Total cattle	802	578.1	49.8	44.4	32.0
sows	83	24.9			
boars	15	4.5			
cutters	180	45.0			
piglets	543	54.3			
Total pigs	821	128.7	11.1	45.5	7.1
sheep	1600	160.0			
hogs	600	30.0			
Total sheep	2200	190.0	16.4	121.8	10.5
chickens	11300	169.5	14.6	625.7	9.4
TOTAL	x	1161.1	100.0	x	64.3
B. Individual farming					
cows	ca 450	450.0	72.0	21.5	21.5
pigs	ca 300	75.0	12.0	14.4	3.6
sheep	ca 2000	100.0	16.0	95.7	4.8
Total	x	625.0	100.0	x	29.9
Altogether					
horses	80 *	94.8	5.3	3.8	4.5
cattle	ca 1250	ca 1030.0	56.6	59.8	49.3
pigs	ca 1220	ca 200.0	12.3	58.4	9.6
sheep	ca 4200	ca 290.0	16.2	200.1	13.9
poultry	ca 11300 *	ca 170.0	9.5	540.9	8.1
GRAND TOTAL	x	ca 1785.0	100.0	x	85.4

* Collective owned only.

The high percentage of cows in the herd indicates that in livestock breeding here we have to do with a milk-production orientation. The cattle belong mainly to the grey Iskär breed, and yield a high amount of milk. The average quantity of milk obtained from one cow (3200 l.) is higher than the average for the Sofia Basin, and two-and-a-half times higher than the national average. The cows are milked mechanically.

Sheep are mostly bred for wool and milk. They are mostly common-woolled sheep, more rarely crossbreeds with merinos. The yield of milk per one ewe (85 l) slightly exceeds the average for the Sofia Basin and is twice as high as the national average. A large part of the lambs are sold for meat.

The pigs, of white Bulgarian breed, are bred principally for meat. Similarly, a large proportion of the piglets are destined for meat. The meat is supplied to the processing plant Myasokombinat in Sofia.

Few horses and oxen are left to serve for purposes of traction. The number of draft animals per 100 ha of utilized land amounts barely to 6.4.

In the village there is a co-operative poultry farm which breeds only chickens (broilers) for sale. Chicks from the incubator are also sold to other farms. The breeding of laying hens is done in another village, belonging to the same collective. The fowl are of the New Hampshire or Leghorn breeds.

An estimate of the size of livestock production is difficult owing to the lack of some evidence. An approximation is given in Table 9. As can be concluded from it, the breeding of milch cows predominates there. Milk, indeed, constitutes 48.4% of the total animal production.

Milk production greatly increases from year to year. This is brought out by the following data:

Table 11

Milk production in the village of Petarch

Years	Cow milk (in thousands of litres)	Sheep milk (in thousands of litres)
1950	103.1	
1953	360.2	54.8
1958	444.9	78.7
1960	1326.8	107.2

The fat content in cow milk amounts, on an average, to from 3.6 to 3.7%, in sheep milk — to from 6.5 to 9.0%. Three-fourths of the milk production is despatched to Sofia, where the collective farm has a shop

of its own. About one-fourth of the total quantity of milk is processed by the local dairy; about forty tons of sheep milk is made into cheese.

To form an estimate of the size of the production and the farming orientation of individual livestock breeding is difficult, owing to the lack of data. 80% of the members of the collective possess cows, the member also has the right of keeping one pig and five sheep. On the basis of the number of heads it can be estimated at over 11 000 grain units (Table 9).

Altogether, the village of Petărch produces over 16 grain units from livestock breeding per one hectare of utilized land. Of the above number over two thirds are the products of collective farming, the rest of the individual.

7. GROSS PRODUCTION

The productivity of the entire farm is given in Table 12. Altogether over 95 thousand grain units are produced in the village of Petărch, from 2089 ha of utilized land, i.e. over 45 units from one ha. Of that amount about two-thirds are accounted for by plant, and less than one-third — by animal production. Of the above sum the collective farming accounts for over three-fourths, and the production of members' allotments for about one-fourth.

Table 12

Agricultural productivity and labour effectiveness

Specification	Collective farming		Individual farming		Total		Gross production per 1 employed in farming
	Grain units	Per 1 ha agricultural land	Grain units	Per 1 ha agricultural land	Grain units	Per 1 ha agricultural land	
Plant production	52312	29.0	ca 10000	35.3	ca 62312	29.8	46.2
Animal production	22326	12.4	ca 11000	38.9	ca 33326	16.0	24.2
Total	74638	41.4	21000	74.2	ca 95638	45.8	69.4

Attention: For the evaluation of agricultural productivity the following acreages have been adopted

Collective farming	1806 ha
Individual farming	283 ha
Total	2089 ha

Owing to the uncertainty of the data concerning the production of the members' allotments, the following analysis of the data concerning the agricultural production of the village of Petărch will be limited to the collective farm.

Of the gross production of the collective farm less than one-third

is accounted for by animal production, while over two-thirds fall to plant production. Since, however, two-thirds of the entire plant production, and 40% of the gross production is accounted for by fodder plants, we may speak, in this case, of a vegetable with animal, fodder, maize with dairy and beef cattle breeding orientation — $4 \times V_3 (f_2 mz, lc) + A_1 (cd) lm$.

Since about 1250 persons are actively engaged in agricultural labours, 69 grain units are obtained per one person so employed.

The commercial part of agricultural production in the village of Petarch is high in the socialized economy, and very low in the individual allotments, which on principle are destined to satisfy the members' own needs. Unfortunately data are lacking which would make it possible to define the total of the commercial production of the village of Petarch; all that is known is that the principal elements of the marketing production of the collective farm are: milk and other dairy products, meat-stock (Table 13), as well as vegetables, industrial plants and the grain of both wheat and maize.

Table 13

Sale of livestock 1960

Specification	Heads
Calves up to 1 year	136
Heifers and bullocks 1—2 years old	48
Fattened beef cattle	50
Draught oxen	6
Cows	1
Total cattle	241
Piglets up to 2 months	280
Fattened pigs	400
Total pigs	680
Lambs up to 6 months	1050
Ewes and rams	180
Total sheep	1230
Poultry	7300

Part of its marketed production is sold by the collective farm through the intermediary of its own shops in Sofia, of which it has three; they sell milk, both sweet and sour (Bulgarian milk jogurt), vegetables, eggs, etc. Livestock is sold mostly to the Myasokombinat, and corn through the socialized trade centres.

The large investments for the extension of farming and its modernization provide the reason why the farmers' incomes so far, are not

yet high. In 1959 the calculated daily wage amounted to 16.60 levas, while there were 5300 levas per one member of the collective per year. For 1960 it was planned to reach 6200 levas. Considering the fact that the members of the collective derive a substantial income from their allotments as well as from their own livestock, the above sum cannot be considered to be low. The inhabitants' prosperity is also born witness to by the construction of new, more spacious and better equipped homes, visible at every step, as well as the general increase in the standard of both material and cultural life of the village inhabitants.

GEOGRAPHIA POLONICA 5, 1965

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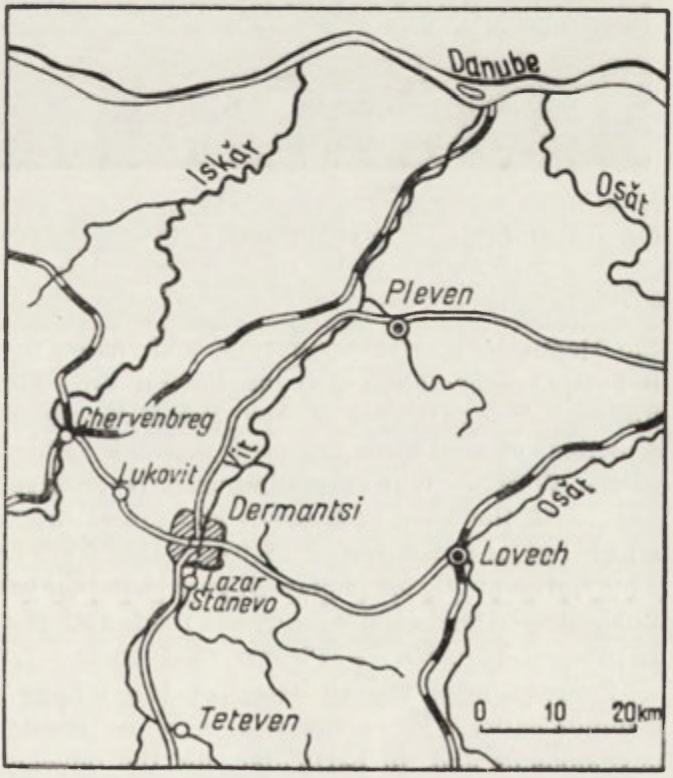
THE COLLECTIVIZED VILLAGE OF DERMANTSI IN THE NORTHERN FOOTHILLS OF THE BALKAN RANGE

1. SITE

The village of Dermantsi is situated between 43°05' and 43°10' latitude North, and between 24°15' and 24°20' latitude East, on the northern slopes of the Prebalkan range, at a height of between 170



Map 1 Dermantsi.
General situation

to 350 above sea lavel, and at this point the river Vit emerges from the mountain ranges, widens its valley, and takes a northward course, towards the Danube Plain (cf. map 1). The particular course of the Vit river valley makes it possible for the village to maintain contacts with the Balkan (Stara Planina) Mountains to the South, and with

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Fig. 1. Dermantsi. The western part of the village from the south-twest, a brick factory on the right. A vineyard on the foreground

the Danube Plain to the North, and, more particularly, with such an important economic centre as Pleven. In addition to this, the strong folding of the ranges of the Prebalkan mountains in an East-West direction makes communication possible along the synclinal valleys: to the West — with the administrative centre of Lovech, and to the East, with the town of Lukovit and the railway station of Chervenbreg, which lies at a distance of 26 kilometres from Dermantsi. This' explains why Dermantsi is an important road junction where the Chervenbreg — Lukovit — Dermantsi — Lovech road, and the Teteven — Lazar Stanevo — Dermantsi — Pleven road cross.

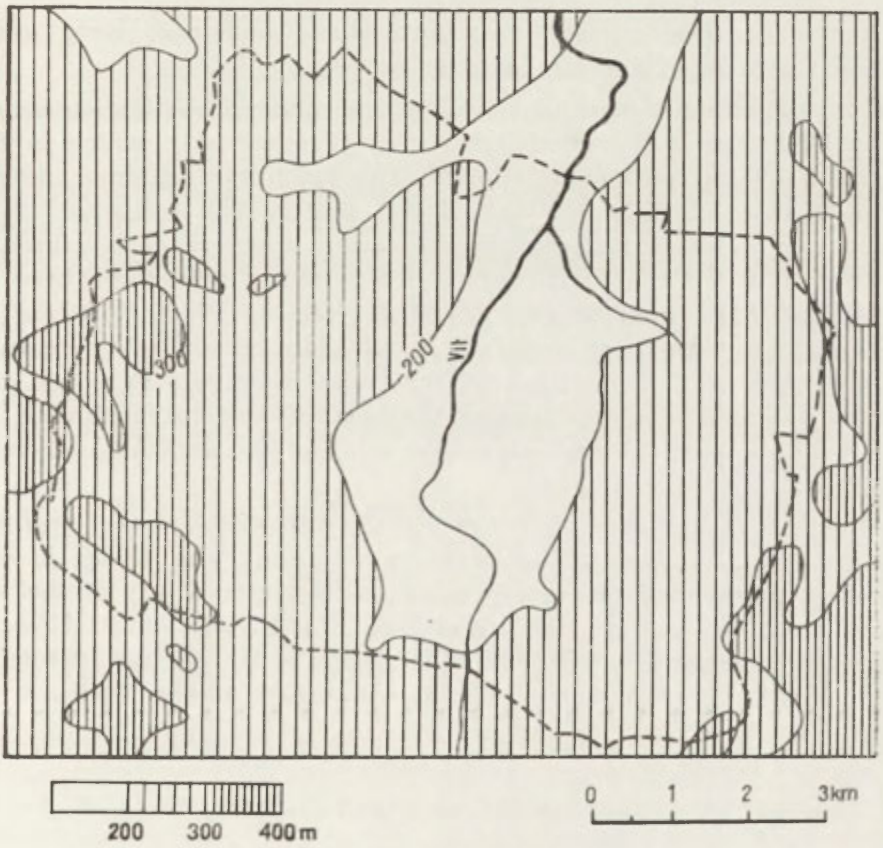
Consequently, the situation of the village as far as position and communications are concerned, may be considered favourable for its development and, in particular, for the development of farming there.

The area of the village of Dermantsi covers about 8500 ha. Being a large and well populated village (5024 inhabitants in 1954) Dermantsi has its own Village National Council, and constitutes a separate collective farm unit.

2. NATURAL CONDITIONS

Even though Dermantsi lies in the valley, the land relief is varied, for although the valley of the river Vit widens here, the lands of the village also include the slopes of the surrounding hills. These hill slopes reach a gradient of from 10 to 12 degrees and provides favourable conditions for fruit and grape growing. The steeper slopes are covered with permanent grassland and forests.

Of particular importance for agriculture are the lower river terraces, which occupy a large part of the widened valley; of these,



Map 2 Dermantsi. Hipsometry

the lowest terrace is especially well-developed and preserved. At time of flood this terrace is often inundated, so that in places it is covered with gravel and sand deposits, while in other places it is marshy. Thus only small parts of it are fit for farming.

The second terrace of a height of from five to seven metres is again very well developed and preserved. It constitutes a wide and flat plain. On this terrace the most fertile lands of the village are situated.

The soil substratum in the village consists of Eocene rocks. This is the so-called Stara Planina (or Balkan) formation of the Lower and Middle Eocene. They cover a considerable area and are divided into two nearly equal parts by the Vit river valley [1]. While the lower strata are mostly built of clay and marl layers, which belong to the Ypresian age, the upper strata are probably of the Lutecian age [2], and are built of sandstone. In addition, conglomerates occur frequently. The lowest-lying parts of the area under investigation, i.e. the river-bank terraces are covered by quaternary river alluvia.

Of the above-mentioned rock formations sandstone, river gravel and sand are important for building purposes.

From the climatic point of view, the area under investigation belongs to the Prebalkan submountainous region (Priplaninski), which is characterized by its continental climate. The amount of summer precipitation is twice as high as that of the winter. The influence of the nearby mountains is reflected in the lower summer temperatures, as a result of which the mean annual temperature differences here are lower than those in the northern climatic region [3]. The climate of the area under investigation possesses in addition certain other features, which distinguish it from the climate of the other regions of the submontane climatic region. Such conditions of the local climate are a result of the particular situation and relief of the area under investigation.

Along the valley of the river Vit the influence of the mountain climate is clearly evident. The broad valley around the village of Dermantsi is surrounded on nearly all sides by hills which protect the valleys from the strong North-West and North-East winds. However land relief conditions do not favour the arising of temperature inversions and of fogs largely because the airflow can escape to the North.

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[1] E. Bonchev, Geologiya na Balgaria, part II, Sofia 1960, p. 34

[2] Op. cit., p. 35.

[3] For details, see: Agroklimatichen Spravochnik na N.R.B., Sofia 1960, pp. 9—15.

When comparing the climatic data for the Dermantsi station with those for Lovech and Pleven (Table 1), it can be seen that in the area under investigation the winters are relatively milder, and the summers — cooler than in the neighbouring areas.

Table 1

Mean monthly and annual air temperatures (1916—1955) *

Station	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Dermantsi	—1.0	0.4	4.6	10.0	16.7	20.4	22.3	22.0	17.0	12.2	5.6	2.7	11.4
Lukovit	—1.5	0.0	5.6	12.0	17.0	20.6	23.0	22.3	18.6	12.5	6.3	0.7	11.4
Ougărchin	—1.7	—0.2	5.6	12.7	17.4	21.1	23.6	23.0	19.1	12.8	6.2	0.4	11.7

* For Dermantsi station the years are 1957—1960

The data concerning pricipitation, on the other hand, prove that precipitation at Dermantsi is higher than in the nearby localities of Lukovit and Ougarchin.

Table 2

Mean monthly and annual amounts of precipitation (1896—1945)

Station	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Dermantsi	44	38	33	57	92	108	84	50	49	52	58	41	706
Lukovit	34	29	35	54	89	92	65	52	42	47	44	38	621
Ougărchin	35	28	40	58	84	95	70	55	46	48	43	34	636

At Dermantsi the summer pricipitation is twice as high as the winter one, which reflects the continental character of its climate; at the other stations, however, that ratio is even higher. Since, however, summer precipitation comes in the months of the greatest heat, evaporation is high and the amount of water is inadequate for the growth of a number of crops. Moreover, droughts occur fairly frequently. This is why artificial irrigation is indispensable in order to obtain high yields.

The climatic conditions in the area under investigation make possible the cultivation of both wheat and maize, as well as sugar-beet and sunflower, and fairly-early vegetables. The climatic and land-relief conditions favour the development of fruit and vine-growing.

The rivers of the area under investigation compensate for the shortage of precipitation. The most important of these is the river Vit, a tributary of the Danube. The sources of this river lie in the Zlatirsko-Tetevenske Mountains (a part of the Balkans). From there the river flows across a Karstic area, where part of its flow disappears. In spite of this in the North, from the Boaza Pass onwards, it carries conside-

rable amounts of water. The gradient of the river is small (2.5 m per 1 km), and for this reason it forms numerous meanders. Seasonal oscillations are however considerable. Between January and March the river waters usually rise, from April till the end of July the flow is at its

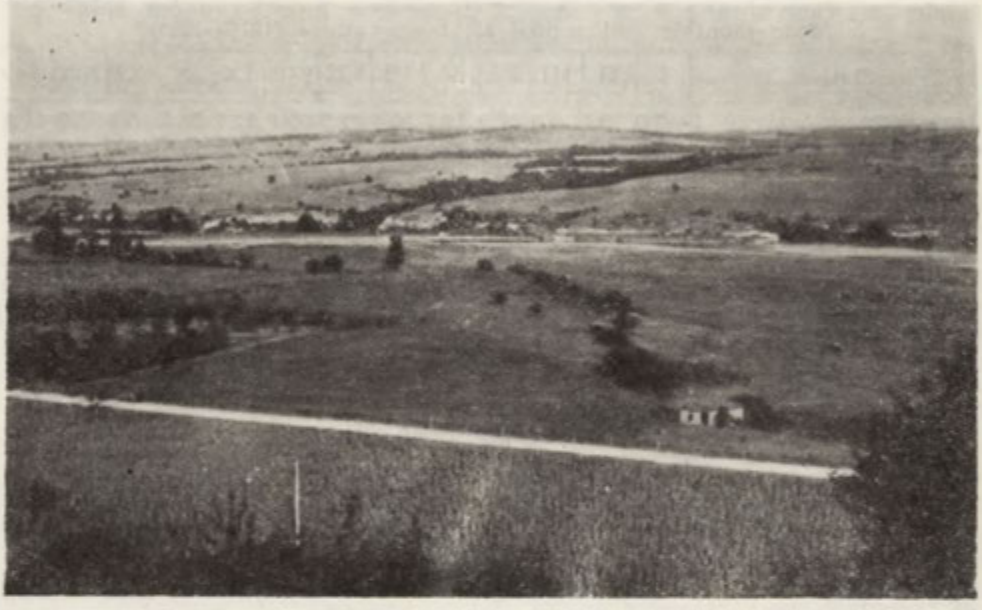

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Fig. 2. Dermantsi. The valley of Vit, downward from the village, used mostly as pasture land. A collective vineyard on the foreground

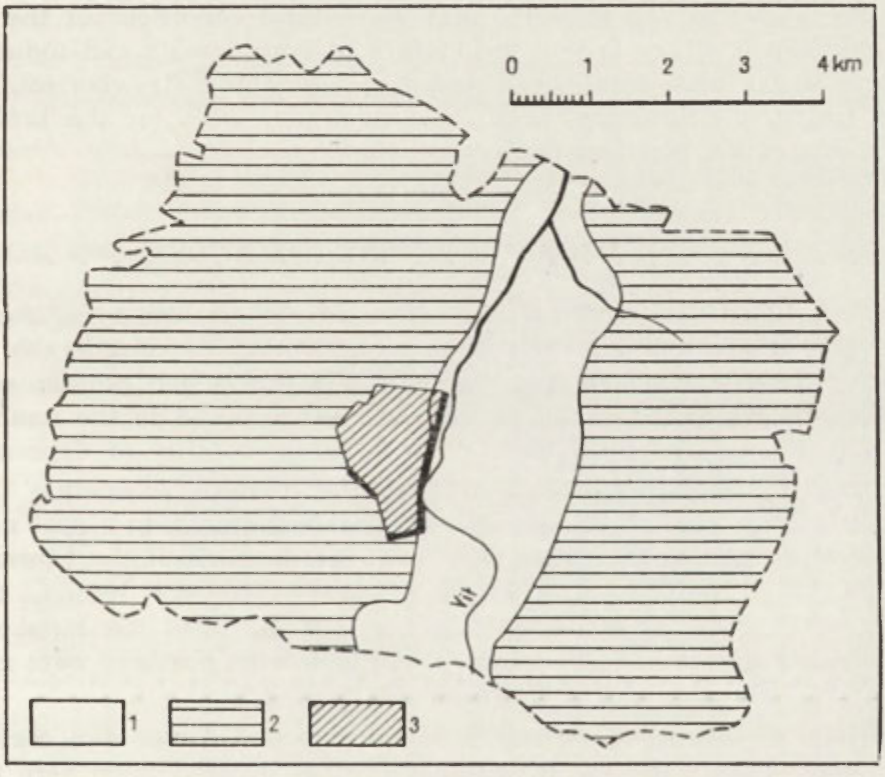
largest because of snow thaw and precipitation in the mountains. After this the flow rapidly decreases, and the volume of the river remains low until the end of December. Thus, it can be seen that in the period of summer droughts the amount of water in the river is insufficient to irrigate the areas through which it flows. Consequently, in order to be able to utilize the waters of the river for purposes of irrigation at the time of the biggest flow (the annual flow is estimated at an average of 380 million cubic metres at the station of Sadovyets, some fifteen km to the North of Dermantsi) its spring waters must be stored in water reservoirs.

At the moment a "Sopot" dam is being constructed on one of the larger tributaries of the Vit, the river Kalnik, in the proximity of the village of Lesidrem, as well as an irrigation system, which will also include the area under investigation. In addition, the ground waters, which are to be found at a small depth on the second (5 to 7 m) terrace

and which have been but poorly exploited so far, could be of some economic importance.

Two basic types of soil are found in the area under investigation (cf. map 3). They are: grey forest soils and alluvial soils. The substratum of the grey forest soils are Lower and Medium Eocene rocks (of the Ypres and Lutece periods), and those of the alluvial soils — contemporary river deposits.

The grey forest soils found here are dark-grey and highly carbonate. Such soils were formed under conditions of sparse broad leaf deciduous forest, with many open spaces. They are characterized by a very distinct illuvial horizon. The carbonates have been deeply leached away, and are not even found in increasing amounts in the upper layers of the soil horizon. The amount of humus down to a depth of 1 m reaches from 200 to 300 tons per ha. The topmost layer of the soil of up to 20 cm in thickness, contains from 40 to 50% of the humus



Map 3 Dermantsi. Soils

1 — alluvial and deluvial meadow soils; *2* — dark grey deeply carbonate mountain soils; *3* — settlement

ontent of the whole 1 m layer. These soils have lost a considerable part of their fertility as a result of their improper utilization in the past. Their humus content has diminished, and erosion processes have developed. In places a considerable part of the humus layer has been washed away and deposited on lower slopes, while ravines are forming on the slopes. At present a number of operations are applied for the purpose of raising the fertility of the soil, such as for e. g. a systematic fight against erosion, the introduction of a correct crop rotation, proper manuring, etc.

Alluvial soils cover the lower-lying terraces, on the banks of the river Vit. They were formed on river deposits, carried down from the neighbouring hills by erosion processes [4]. The soils of the lower-lying flood terrace were formed on a substratum of sand, gravel and thicker rock material, and they have little depth. The soils of the extensive higher-lying terrace, however, are rich in organic substances and are deeper. They are the most fertile soils of the village of Dermantsi.

The above survey indicates that the natural conditions of the area of Dermantsi village favour the culture of both cereals and industrial plants (sugar beet, sunflower, hemp), of vegetables, strawberries, vine and fruit-trees. Similarly, favourable conditions exist for the breeding of sheep, cattle, pigs and poultry.

3. SOCIAL AND PROPERRTY RELATIONS

The village of Dermantsi is an area of old established settlement. Evidence that from an early time a settlement of considerable size existed here, situated on the communication line which ran across the Balkan ranges to the valley of the river Vit is found in the remnants of both Roman and Byzantine fortresses in the locality of Chereshata.

Prior to Bulgaria's liberation from the Turkish occupation there existed, in the present village, also a Tartar settlement, in a spot nowadyas referred to as the "Tartar Hollow". At the time of the Liberation Dermantsi was already a settlement of considerable size, referred to as a "gradets", i. e. a small town, a borough. In 1880, the number of inhabitants approached 3250 (Table 3), of which the numbers were made up of 2435 Bulgarians, 715 Turks and 99 Gipsies.

After the liberation the place of the expelled Turks was occupied by Balkandji, i. e. Bulgarian mountaineers, who came down here from

[4] For details cf. Pochvite na Bălgaria, Sofia 1960, pp 402—414.

the surrounding mountains. By 1900, out of a total number of 3466 inhabitants, only 166 were of non-Bulgarian nationality and most of these were Gipsies.

In the Capitalist period the village began to develop in new ways and Dermantsi becomes a well-known stock-breeding centre. It was here that the Dermantsi breed of pigs, well-known and valued in Bulgaria, was bred, and the quality of their breeding influences the surrounding areas. Dermantsi also becomes an important centre of the breeding of grey Iskar cattle. Purchasers came here to buy bulls, cows and calves of this particular breed from as far as the neighbourhood of Pleven and Lukovit. Plant production was almost exclusively orientated towards grain crop cultivation.

Handicrafts were also developed in the village.

In that period social differences began to make themselves felt in the village. A considerable part of the wealth became concentrated in the hands of five families, which owned between forty to fifty hectares of land each, a considerable number of heads of cattle, water mills, etc.

After the war those farms were parcelled out among the poorer peasants.

During the Second Warld War Dermantsi became a centre of revolutionary struggle. The anti-Fascist movement vigourously developed here.

After the war the number of the population decreased, as a result of emigration to the towns, and to industry. Out of the total of 1160 families who lived at Dermantsi in the period under investigation, some 80 families were Pomaki or the islamized Bulgarians, who preserved with particular care old customs and costumes. There were also several Gipsy families.

Table 3

Dermantsi. Number of inhabitants, 1926—1960

Year	Number of population	Year	Number of population
1880	3249	1946	5030
1900	3466	1956	4703
1926	4450	1960	4883
1934	4939		

Until the year 1948 the village of Dermantsi was divided into individual farms. The first collective farm was formed, however towards the end of the year 1948, and, at first, comprized about two hundred hectares of land, brought in by the thirty-seven founder members. By 1949 the collective already numbered over 150 families and compri-

zed 400 ha of land. Owing to favourable weather conditions of the year 1949 a remarkable success was achieved, which encouraged the further individual farmers to join the collective. From 1950 there took place over a period of 3 years the operation of turning the village into an exclusively collective village. From the very beginning it was decided to widen the hitherto one-sided orientation of farming, and mass operations were undertaken in planting orchards, small fruit bushes and vineyards, and in developing the culture of sugar-beet, vegetables and strawberries, and the breeding of cattle and pigs.

Organisational and technical shortcomings. hesitation as to the farms' productive orientation, lack of stability of the farmers' membership in the collectives — all this combined to produce the difficulties characteristic of the transitional period. Although state subsidies were quite considerable, they were used up for the various investment projects (such as construction of cow byres, piggeries, planting orchards), which appeared necessary in the new conditions. At the same time production grew very slowly and day wages were rather low and so that village folk were not encouraged to take to the new form of farming. All those drawbacks were successfully overcome during the next five year period. A steady improvement and normalisation of the functioning of the collectives became noticeable from 1955. The investment projects started to bring returns, the productivity of the farms increased and so did the income drawn by members of the collectives.

The process of integration of collective farms had no impact on the village of Dermantsi, which was sufficiently large in size to survive within its present boundaries.

4853 people lived in the village in 1960, of which 1264 were employed in agriculture and 1708 people pursued other trades and professions.

Table 4

Population structure

Specification	Total	%	Men	%	Women	%
Population in productive age	2184	44.7	1050	48.1	1134	51.9
Active in agricultural occupations	1384		686	49.6	698	50 4
in non-agricultural occupations	800		364	45.5	436	54 5
Over productive age	1883	38.5	897	47.6	986	52.4
therein: active in agricultural occupations	158		92	58.2	66	41.8
Under productive age	820	16.8	.		.	
therein: youth 12—16 years old	336		.		.	
children up to 12 years old	484		.		.	
Total	4887	100.0				

Consequently, there are 38 persons employed in agriculture per 100 ha of agricultural land. Those employed outside agriculture were working either in the brickworks (about 120 persons), the machine repair plant and the sawmill (about 120 persons between them), or in services of various kinds, administration, etc.

4. LAND UTILIZATION

The total surface area of the village of Dermantsi amounts to 6270 ha, of which 3861.6 ha are under the management of the collective farm (TKZS), 581 hoctares are occupied by the alloments of the collective members, and 70.7 ha are in the possession of other institutions, such as the agricultural vocational school, the irrigation station, the National

Table 5

Land Utilization

Specification	Owned by TKZS		Individual farming		Other	Altogether	
	ha	%	ha	%	ha	ha	%
1. Arable lands	2246.3	58.2	409.7	65.5	60.8 [1]	2727.3	43.6
2. Gardens			10.5	1.7			
3. Perennial crops	324.8	8.4	105.0	16.8		429.8	6.9
therein: orchards	201.1	5.2				201.1	3.2
small fruits	20.1	0.5				20.1	0.4
vineyards	103.6	2.7	105.0	16.8		208.6	3.3
4. Permanent grasslands	819.3	21.2				819.3	13.1
therein: meadows	372.8	9.6				372.8	6.0
pastures	446.5	11.6				446.5	7.1
Total agricultural land	3390.4	87.8	525.2	84.0		3976.4	63.6
5. Forests	334.4	8.6			1700 [2]	2034.4	32.5
therein: windbreak belts	26.1	0.7				26.1	0.4
forests	308.3	7.9			1700 [2]	2008.3	32.1
6. Build up area	41.0 [3]	1.1	100.0 [4]	16.0	8.1 [5]	149.1	2.4
7. Other	95.8	2.5				95.8	1.5
therein: empty spaces	55.3	1.4				55.3	0.9
waters, swamps, marshes	40.5	1.1				40.5	0.6
Total	3861.6	100.0	625.2	100.0	1768.9	6255.7	100.0

[1] Ground of technical school 48.5 ha, experimental fields of the elementary school — 1.2 ha, Communal Council — 2.7 ha, Meat Purchasing Center — 0.5 ha, irrigation fields — 1.6 ha, Sportsclub — 2.5 ha, Small Industry Union — 1.2 ha, Commercial Cooperative — 1.2 ha, Power Station „Lazar Stanevo" — 1.4 ha.
[2] State forest.
[3] Farm buildings, sheep cots.
[4] Total build up area.
[5] Irrigation station.

Council, etc. An additional 100 ha are under buildings and 1700 under the State forest. The division of the village land into the several forms of ownership, as well as the forms of land utilization, is shown in Table 5.

The highest percentage of land of the collective farm, viz. 63.6% is under crops, while about 32.5% is occupied by forest and 1.5% by empty spaces, i. e. stone-covered river-bank land, ravines, etc., as well as by waters and bogs, which are utilized in a very small way or not at all.

Agricultural utilization of land in the village of Dermantsi is intense. The predominant element is arable land, which occupies over two--thirds of the agricultural acreage in the village and of which 4.2% is lying fallow; a smaller area, but still a fairly considerable one, is occupied by meadows and permanent crops.

Because of the great depth of the soil structure it is both possible and necessary to practise deep ploughing, in order to destroy weeds efficaciously. 90% of the ploughing is mechanized. Other kinds of field work are also mechanized to a considerable extent (for example, sowing of corn is 100 per cent., of maize is from 75 to 80%, the sowing of artificial fertilizers is 100%). Apart from its own, fairly well-equipped machine depot (Table 6), the co-operative society also avails itself of heavy machinery, borrowed from a machine and tractor station (MTS).

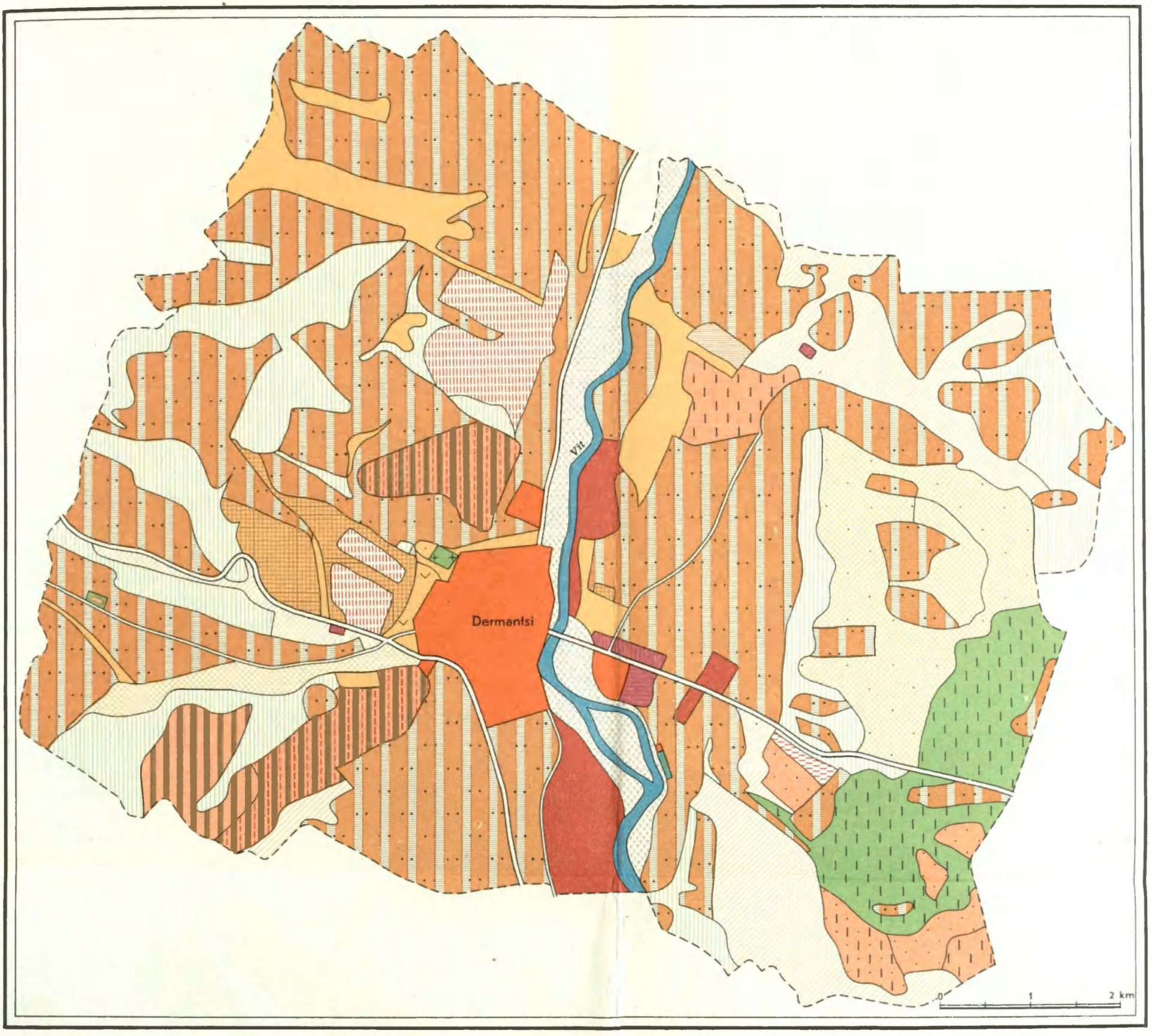
Table 6

Machinery and Technical Equipment Collective Farm Dermantsi 1960

Tractors	3	Horse drawn sprayers	7
Ploughs	90	Corn mill	1
Tractor drawn ploughs	1	Mowers	2
Harrows	79	Electric engines	23
Cultivators	1	Electric pumps	4
Cylinder seed cleaners	2	Ards	350
Seed cleaners	1	Milking apparatus	1
Corn husker	1	Lorries	5
Ridging plough	1	Motor-cycles	1
Beet cutters	3	Motor-cars	1
Hay baler	1	Trailers	4
Cream separator	1	Carts	561
Sprayers	102	Two-wheel carriage	1

Sixty per cent of the harvesting is done with the help of combines while thrashing is also mechanized.

The manuring of the land is not too heavy (Table 7). Farm manure is only used under tobacco, sugar-beet, sunflower, vegetables, about one-tenth of the maize and about 60% of the fodder root-crops, i. e.



Map 4. The collectivized village of Dermantsi. Land utilization map

altogether under about 9% of the arable land; perennial crops are only partly manured. Nearly all the arable land and the land under perennial crops, as well as the meadows, receive nitrogen fertilizers of over 1 q per ha, while about 60% of the farmed land receives phosphorous fertilizers (mostly wheat, maize, the industrial plants and vegetables, as well as the perennial crops). Some potassium fertilizers are also sown on the meadows.

Table 7

Manuring in 1960

Crops	Farm manure		Fertilizers					
			Nitrogenous		Phosphorous		Potassium	
	Area manured ha	Amount of manure in q	Area fertilized ha	Amount of fertilizers q	Area fertilized ha	Amount of fertilizers q	Area fertilized ha	Amount of fertilizers q
Wheat	—	—	1180	1566	725	2352	—	—
Barley	—	—	72	83	15	30	—	—
Maize	56	18200	432	651	410	1265	—	—
Sunflower	10	3500	50	100	50	260	—	—
Tobacco	8	2600	8	4	8	24	—	—
Sugar — beets	12	3600	20	30	20	86	—	—
Vegetables	48	22350	48	64	25	86	—	—
Fodder roots	12	5800	22	39	22	82	—	—
Perennial crops	78	19800	161	223	67	185	—	—
Meadows	—	—	100	100	100	260	50	120
Total	224	76650	2143	2910	1462	4630	50	120

Irrigation constitutes a special problem. There is a pump station in the village and in 1960 about 100 ha were irrigated. About one-half of the land under lucerne was irrigated (56 ha), so were 11.2 ha of maize grown for grain, about forty per cent. of the land under sugar beet (8 ha), about 35%. of the fodder beet (8 ha). Part of the orchard area (10 ha) is also irrigated. A whole irrigation system, comprizing a number of villages, and based on the utilization of the river Vit, is now under construction. During the period of investigation intensive labour was going on in the village to construct irrigation canals.

a. Arable Land

As is shown in Table 8, the arable land is almost entirely utilized. The collective farm applies the following two-year crop rotation: 1. maize and other intensifying and structure-forming plants, 2. wheat and other exhaustive and structure-forming plants. On about 6.5% of the

phot. J. Kostrowicki

Fig. 3. Dermantsi. Myetla (*Andropogon sorghum* ssp. *saccharicum*) used for brushes and brooms production

arable land aftercrops are sown in the form of maize, which is cut green and put into silos.

Among the exhaustive crops wheat definitely predominates and occupies over one-half of all the arable land; apart from wheat, small quantities of barley, oats and rye are also grown, the latter mostly being grown for green forage.

Among the intensifying plants maize predominates, often intercultivated with beans or sometimes with gourds. A fairly large area is also occupied by vegetables the most important of which are tomatoes, sweet paprika and onions, as well as industrial plants, such as sunflower and sugar beet. A little tobacco is also grown, some castor-oil plant, and the so-called myetla (*Andropogon sorghum* ssp. *technicum* Koern), a plant of African extraction, which is a variety of sorghum, and which serves for the production of brooms and brushes. A small area is also occupied by fodder root crops such as mangolds.

Structure-forming crops occupy a relatively small percentage of the arable land (6.6%). Among them, lucerne predominates (70%); this crop is usually sown in a field of cereals or else with spring crops, and left over to the next year as the main crop in a field of maize. Apart

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Fig. 4. Dermantsi. A new planted collective orchard on the south-west of the village intercultivated with tomatoes

from the lucerne, a little vetch and more rarely cereal-fodder mixtures (mashlum) are also grown.

An analysis of the utilization of arable land shows that there is a predominance of exhaustive crops here, particularly wheat, while intensifying plants, especially maize are also important. Therefore, the orientation of the arable land utilization in the collective farm of Dermantsi may be defined as a wheat and maize one ($E_3\ wh + I_2\ mz$).

b. Perennial Crops

Perennial crops in the village of Dermantsi occupy a fairly large area, but the majority of them are young and still unproductive plantings (Table 8).

The majority of the old orchards are former peasant, mixed orchards, where fruit-trees, vine, vegetables and even maize, cereals, lucerne and other field cultures are intercultivated at the same time. In these orchards the most common trees are plum-trees, pear-trees, cherry-trees and apple-trees but quinces, walnuts etc. also occur. Large areas of these older orchards are to be found to the North and North-West of the village buildings.

The new orchards, usually planted farther away from the village, on former uncultivated land and pastures, are homogeneous, but in some young orchards vegetables are occasionally intercultivated, particularly watermelons and melons, strawberries, raspberries, tomatoes, etc. A large area under this kind of cultivations is to be found in the south-western part of the village.

phot. J. Kostrowicki

Fig. 5. Dermantsi. An old Bulgarian peasant in his traditional, nowadays disappearing costume, guarding the orchard

Table 8

Agricultural Land Utilization

Specification	ha	%			
		Agricultural land	Arable land	Sown land	Given group
Collective Farming					
I. Arable land	2246.3	66.2			
A. Exhaustive crops	1360.0	40.1	60.5	59.0	100.0
wheat	1180.0	34.8	52.5	51.2	86.8
rye (grain)	8.0		0.4	0.3	0.6
rye (green)	50.0		2.2	2.2	3.7
barley	72.0		3.2	3.1	5.2
oats	50.0		2.2	2.2	3.7
B. Intensifying crops	795.3 (641.9)	18.9	35.4	34.5	100.0
maize (grain) *	432.0	12.7	19.2	18.7	54.3
maize (grain)	65.0		2.9	2.8	8.2
maize (silo and green)	153.4		6.8	6.7	19.3
vegetables	38.4		1.7	1.7	4.8
therein: tomatoes	16.0				
paprika	6.0				
onions	5 6				
onions (green)	0.4				
chive	0 6				
cabbage	3.0				
snap beans	2.0				
green pea	1.0				
cucumbers	0 6				
other vegetables	2.0				
potatoes	1.0				
frames	0.2				
tobacco	8.0		0.4	0.3	1.0
sunflower	55.0		2.4	2.4	6.9
castor oil plant	1.5		0.1	0.1	0.2
sugar beet	20.0		0.9	0.9	2.5
mangolds	22.0		1.0	0.9	2.8
C. Structure forming crops	149.0	4 4	6.6	6.5	100.0
pea (grain)	8.0		0.4	0.3	5.4
lucerne (hay)	105.0	3.1	4.6	4.7	70.4
mashlum	8.0		0.4	0.3	5.4
vetch (hay)	28.0		1.2	1.2	18.8
Total sown area	2304.3			100.0	x
D. Fallow	95.4	2.8	4.2	x	100.0
Total arable land	2246.3	66 2	106.7	x	x
II. Perennial crops	324.8	9.6			100.0
apple trees	104.8	3.1			32.1
therein: fruiting	23.4				7.2
plums	85.8	2.5			26.4
therein: fruiting	14.9				4 6

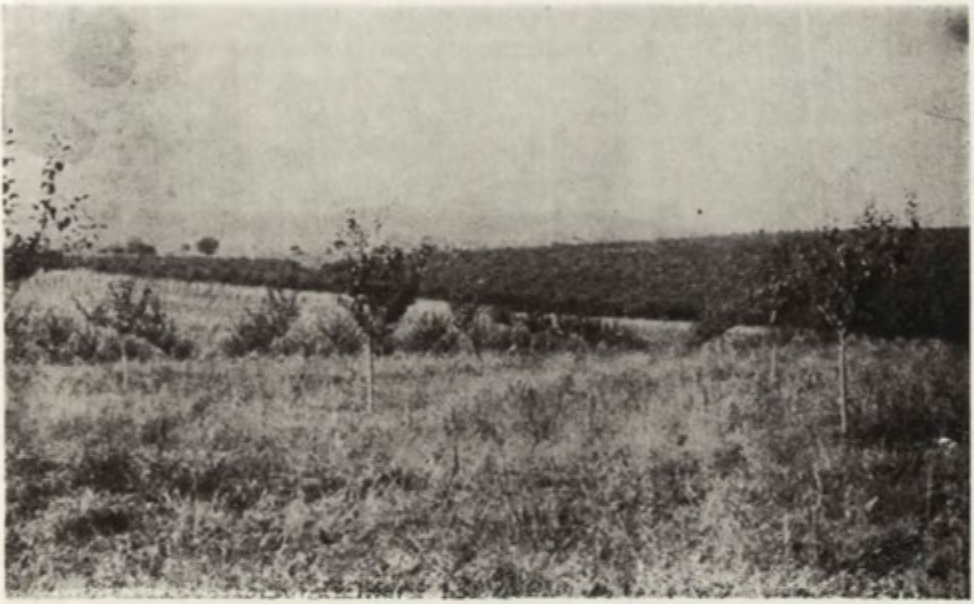
Table 8a

Specification	ha	%			
		Agricultural land	Arable land	Sown land	Given group
pears (young)	11.0				3.4
vineyards	96.4	2.8			29.7
therein: fruiting	47.4	1.4			14.6
dessert sorts	0.8				0.2
wine sorts	46.6				14.4
unproductive	49.0	1.4			15.1
dessert sorts	9.5				2.9
wine sorts	39.5				12.2
nursery beds	4.2				1.3
therein: productive	3.6				1.1
vine nurseries	3.0				0.9
strawberries	20.1				6.2
Therein: intercultivated:	248.1	7.3			100.0
watermelons and melons	16.0				6.4
maize (silo)	7.0				2.8
maize (milk ripe stage)	100.0	2.9			40.3
sunflower	2.3				0.9
lucerne	101.0	3.0			40.7
strawberries	15.8				6.5
therein: fruiting	5.6				2.3
raspberries	6.0				2.4
therein: fruiting	3.0				1.2
II. Permanent grassland	819.3	24.2			100.0
meadows	372.8				45.5
pastures	446.5				54.5
Total agricultural land	3390.4	100.0	x	x	x
Individual farming (members' allottments)					
I. Arable land	420.2	80.0	100.0	100.0	x
B. Intensifying crops	315.2	60.0	75.0	75.0	x
C. Structure farming crops	105.0	20.0	25.0	25.0	x
II. Perennial crops	105.0	20.0	x	x	x
Total agricultural land	525.2	100.0	x	x	x
Grand Total					
I. Arable land	2666.5	68.1	100.0		x
A. Exhaustive crops **	1360.0	34.7	51.0	49.9	x
B. Intensifying crops	1110.5	28.4	41.6	40.8	x
C. Structure forming crops	254.0	6.5	9.5	9.3	x
Total sown land	2724.5	x	x	100.0	x
D. Fallow *	95.4	2.4	3.6	x	x
II. Perennial and semi perennial crops	429.8	11.0	x	x	x
III. Permanent grassland	819.3	20.9	x	x	x
Total agricultural land	3915.6	100.0	x	x	x

* Intercultivated with beans and in 100 ha with gourds too.
** TKZS only.

Similarly, the newly-established vineyards occupy separate areas, mostly in the northern and western parts of the village.

Both among the old and the perennial crops apple trees and the vines predominate. Plum-trees are primarily grown for the production of plum-brandy (s l i v o v a), grapes — for wine or grape brandy (g r o z d o v a). New introductions into collective farming are the growing of pear-trees, of raspberry bushes and of dessert varieties of gra-



phot. J. Kostrowicki

Fig. 6. Dermantsi. A new planted collective intercultiveted orchard on the foreground. A dwarf oak woodland on the background. South-west of the village.

pes. The collective also runs vins vine planting beds and nurseries and, in this respect, it supplies not only its own needs, but also those of other collective farm societies. A small part of the perennial crops are irrigated, and in particular the fruit-trees.

c. M e m b e r s' A l l o t m e n t s

There is a lack of exact data concerning the utilization of the cottage allotments. The only thing that is known is that their average size per one member of the collective is about 0.5 ha of land, of which about one-fifth is destined for a vineyard, 0.01 ha for vegetables, lucerne is grown on about one-fifth, and maize on the rest of the land.

d. Permanent Grasslands

Permanent grassland in the village of Dermantsi occupies about 24% of agricultural land; of this less than one-half is accounted for by natural meadows, another twenty per cent of the total meadow area is irrigated, there are about ten ha of cultivated meadows, partly manured.

Because the flood terrace of the river Vit is covered with stony alluvia, all the meadows and pastures of the village are situated on the higher hill slopes. The dry meadows of the post grond type are mown but once a year and in the autumn are used as pastures. They are characterized by a low dense vegetation, closely resembling natural xerophilous associations. Their productivity is small ranging from 16 to 20 q from one ha.

The pastures are scattered along the fields and, from the point of view of their habitat, do not much differ from the meadows. The only difference is that they more frequently occupy lands with steeper slopes such as ravines, etc. and are often overgrown with bushes.

A relatively small area of idle land, situated to the West of the village, is also made use of as pasture, and so to a certain extent also are the stony flood terraces of the river Vit, which are overgrown with scanty vegetation. The latter are chiefly utilized as a paddock for pigs.

e. Woodland

The area owned by the village of Dermantsi includes a fairly large section of forest. Part of this is managed by the collective, while part consists of a fairly large State owned forest.

The forest under collective management covers an area of over 300 ha and consists of degraded woodland overgrown with dwarf oak (*Quercus cerris, Q. pubescens etc.*), and with bushes which once upon a time formed part of the xerophilous oak forests which covered these areas. That forest brings the village but exiguous advantages. Occasionally sheep are grazed there, and the wood is used for fuel while oak leaves are collected and dried for fodder for sheep and for litter. About twenty additional hectares are occupied by forest protective windbreaks.

The State forest in no way differs from the collective forest as to its biotic type, but it is better maintained and looked after. Rational forest management is being introduced here. This is why the oaks here reach a height of several metres, forming trunks from five to about fifteen centimetres thick. Proper exploitation of that forest, however, remains a matter for the future.

phot. J. Kostrowicki

Fig. 7. Lazar Stanevo. Oak trees with cut out branches to get leaves for sheep feeding

3. SETTLEMENT

The settlement of Dermantsi occupies a polygon, somewhat extended in a North-to-South direction, and whose eastern edge follows the river Vit. Only part of the farm buildings belonging to the collective, however, are situated to the east of the river, while some are found on its western bank, and to the north of the village proper. The form of the village is shapeless: it is a large many-street village and is built mainly with brick houses, mostly of one or two stories. The older houses are built of beaten clay or else of non-baked bricks. Many houses, however, have been built, within the last few years, of bricks produced on the spot and dried in the sun. Such houses are frequently still unfinished or are only partly furnished. The unfinished parts of those houses often serve for the drying of paprika, tobacco, etc. The roofs of the houses are built of fireproof material.

In the central part of the village are situated, in a few small houses, the administrative, party and social authorities. Here, also, there is a restaurant and several shops. In the eastern part of the village there is the large new building of the agricultural vocational school. Within

the village there are also: a preparatory school for the secondary school, a meat purchase centre, a pump station, brickworks, a sawmill, a maternity ward, a surgery, and a reading room, etc. The production of the brickworks, where 120 persons are employed, amounts to 1800 thousand bricks per annum.

4. PLANT PRODUCTION

The village of Dermantsi gains, on an average, yields which are slightly higher than the average for Bulgaria, as far as cereals and industrial plants are concerned. On the other hand, as a result of its less favourable climatic conditions, the yields of fruit and vegetables are lower than the national average. In 1959 they appeared as follows, for the selected more important crops (Table 9):

Table 9

Yields in q from 1 hectare in 1959

Crops	Dermantsi	Bulgaria*
Wheat	19.0	17.3
Rye	15.2	11.7
Barley	20.3	20.8
Maize	28.4	20.2
Sunflower	18.4	11.7
Tobacco	10.3	8.1
Sugar beet	277.7	216.1
Tomatoes	192.9	242.9
Potatoes	97.2	102.7
Apples	20.0	86.4
Grapes for wine	30.7	47.4

* Statisticheski spravochnik na N. R. Balgaria. 1960. Sofia 1960, p. 70.

If we recalculate the above into comparable units, the Dermantsi collective farm gains over 15.4 grain units from one ha of farmed land.

About one-half of the plant production (Table 10) of the collective farm consists of food plants, the bulk of which is wheat, which supplies over one-third of the entire plant production, and two-thirds of the food plant production. Of the remaining plant food products an important part is played by fruits with 8.4%. Here grapes and, to a considerably lesser extent, strawberries, plums and apples are important. Vegetables supply but 6.8% of the food plant production, and here tomatoes are the chief crop followed by paprika, onions. pumpkins and cabbage; of lesser importance are: snap beans, cucumbers and early potatoes.

The industrial plants supply but a small part of the plant production

Agricultural Production Table 10

Specification	Yield q/ha	Production q	Production in grain units	% Gross production	% Branch production	% Given group
Collective farming						
A. Plant production			49963	73.3	100.0	
I. Food crops			22636	33.2	45.3	100.0
a) grain			19207	28.2	38.4	84.0
wheat	16.0	18876.0	18876	27.7	37.7	83.3
beans	0.5	235.3	282		0.6	1.2
peas	5.1	40.8	49		0.1	0.3
b) vegetables			1536	2.2	3.1	6.8
tomatoes (very early)	323.1	2584.5	382		0.8	1.7
tomatoes (early)	307.6	2460.8	369		0.7	1.6
paprika	117.5	704.8	211		0.4	0.9
cucumbers	318.7	191.2	48		0.1	0.2
onion	56.9	318.6	96		0.2	0.4
onion (green)	255.0	102.0	31		0.1	0.1
chive	55.3	33.2	10		0.0	0.0
cabbage	295.0	886.5	133		0.3	0.6
green peas	34.0	33.9	10		0.0	0.0
snap beans	144.5	289.0	72		0.1	0.3
potatoes	122.5	122.5	31		0.1	0.1
water melons, melons N	32.0	512.2	30		0.1	0.1
gourds N	5 6	564.4	113		0.2	0.5
c) Fruits			1893	2.8	3.8	8.4
apples	53.1	1242.8	497		1.0	2.2
plums	31.4	467.1	234		0.5	1.0
strawberries	32.4	647.5	486		1.0	2.1
grapes	20.7	979.4	490		1.0	2.2
therein: dessert	34.6	27.7	14		0.0	0.1
wine	20.1	951.7	476		1.0	2.1
planting beds	9000p.	270000p.	.		.	.
nurseries	2456p.	73670p.	.		.	.
pears (per 1 tree) N	15.2	53.3	21		0.0	0.1
cherries (per 1 tree) N	0.1	1.1	0		0.0	0.0
raspberries N	11.2	33.6	25		0.0	0.1
strawberries N	33.4	187.3	140		0.3	0.6
II. Fodder crops			24057	35.3	48.1	100.0
a) Grains			9443	13.9	18.9	39.3
rye	8.7	69.3	69		0.1	0.3
barley	15.7	1132.9	1133		2.3	4.7
oats	13.5	646.6	647		1.3	2.7
maize	17.6	7594.0	7594	11.1	15.2	31.6
b) Succulent foods			7938	11.6	15.9	33.0
maize (straw)	50.0	21600.0	5400	7.9	10.8	22.4
mangolds	435.8	9586.2	959		1.9	4.0

N — irrigated.

Agricultural Production Table 10a

Specification	Yield q/ha	Production q	Production in grain units	% Gross production	% Branch production	% Given group
maize (silo)	79.8	5089.0	560		1.1	2.3
maize (milk ripe stage) N	26.6	2660.0	346		0.7	1.4
maize (silo) N	50.0	350.0	39		0.1	0.2
rye (silo)	111.2	5763 l	634		1.3	2.7
c) Rough forage			6676	9.8	13.3	27.7
vetch (hay)	21.3	595.5	238		0.5	1.0
lucerne (hay)	30.2	142.0	57		0.1	0.2
lucerne (green)		12654.0	1898	2.8	3.8	7.9
fodder mixtures	34.2	274.0	274		0.5	1.1
meadow (hay)	16.0	5945.0	2378	3.5	4.8	9.9
lucerne (green) N	3.0	300.0	45		0.1	0.2
pastures	10.0	4465.0	1786	2.6	3.5	7.4
III. Industrial plants	x	x	3270	4.8	6.6	100.0
sunflower	17.8	1022.1	2044	3.0	4.1	62.5
castor oil plant	0.4	0.6	1		0.0	0.0
tobacco	3.1	24.4	49		0.1	1.5
sugar beet	227.1	4540.3	1135	1.7	2.3	34.7
sunflower N	9.0	20.7	41		0.1	1.3
B. Animal production	x	x	18188	26.7	100.0	
I. Milk (litres)		621975 l	4892	7.2	26.9	100.0
cow milk	1919 l	470028 l	3525	5.2	19.4	72.1
buffalo milk	1546 l	91229 l	821	1.2	4.5	16.8
sheep milk	30 l	60718 l	546	0.8	3.0	11.1
II. Meat stock (kg live weight)		187073 kg	10055	14.7	55.3	100.0
beef	473 kg	22246 kg	1335	2.0	7.3	13.3
veal	265 kg	30772 kg	1539	2.3	8.5	15.3
buffalo	465 kg	9784 kg	587		3.2	5.8
buffalo veal	276 kg	7183 kg	359		2.0	3.6
pork	90 kg	75176 kg	3759	5.5	20.7	37.1
piglet	5.3 kg	3971 kg	199		1.1	2.0
mutton	35.5 kg	11177 kg	671		3.7	6.7
lamb	10.5 kg	10648 kg	639		3.5	6.4
poultry	1.1 kg	13660 kg	820		4.5	8.2
fish	20 kg	2456 kg	147		0.8	1.5
III. Eggs	137 p	420622 p	1052	1.6	5.8	100.0
IV. Wool	2.04 kg	5472 kg	2189	3.2	12.0	100.0
Total	x	x	68151	100.0	x	x
Individual farming						
A. Plant production			ca 10700	34.9	100.0	
I. Food crops			ca 5500	17.9	51.4	100.0
vegetables	.	.	ca 500		4.7	9.1
vineyards	.	.	ca 5000	16.3	46.7	90.9

N — irrigated.

Table 10b

Agricultural Production

Specification	Yield q/ha	Production q	Production in grain units	% Gross production	% Branch production	% Given group
II. Fodder crops			ca 5200	16.9	48.6	100.0
maize	.	.	ca 3700	12.1	34.6	71.2
lucerne	.	.	ca 1500	8.1	14.0	28.8
B. Animal production			ca 20000	65.1	100.0	
I. Milk			5500	17.9	28.8	100.0
cow milk	.	.	2000	6.5	10.4	36.4
buffalo milk	.	.	3000	9.8	15.7	54.5
sheep milk	.	.	500		1.6	9.1
II. Meat stock			5270	18.6	27.6	100.0
beef and veal	.	.	420		2.2	8.0
buffalo	.	.	750	2.4	3.9	14.2
pork	.	.	2100	6.8	11.0	39.8
mutton	.	.	2000	6.5	10.4	38.0
III. Wool	.	.	1400	4.6	7.0	100.0
IV. Eggs	.	.	3000	9.8	15.0	100.0
V. Honey	.	.	4000	13.0	20.0	100.0
Total	x	x	30700	100.0	x	x

(only 6.6%). Sunflower and sugar beet are most important while tobacco, castor-oil plant and myetla (*Sorghum*) are of quite secondary importance.

Over 40% of the entire plant production is supplied by the various fodder crops. Of greatest importance here are the various kinds of concentrated foods (39.9%) such as maize and a little barley and oats, as well as the succulent foods, which include various forms of maize, fodder beet and rye for silage. Hay is mostly obtained from the growing of lucerne (about one-eighth of the fodder plants), and from natural meadows (over 16%). In spite of its large area, the pasture itself supplies little more than 4% of the fodder.

Because of the lack of data, the plant production of the members' allotments can only be roughly estimated (cf. Table 10). Assuming that their yields approach the average yields for the collective farm, they must be estimated at about 10 700 grain units, which could give an average of over 18 units per hectare. About one-half of their production is supplied by the vineyards and about one-third by maize. The latter together with lucerne constitute the basis of the feeding of the livestock owned by the members of the collective.

5. LIVESTOCK BREEDING AND ANIMAL PRODUCTION

The data concerning livestock breeding (Table 11) in the Dermantsi collective farm consist of the number of heads of the various varieties of animals, incomplete data concerning the structure of the herd, data concerning the production and the average yield of milk, wool, eggs and animal production of particular species. On the other hand, we lack the complete data concerning the structure of the herd and, in particular, more exact data concerning livestock breeding production in individual farming — data which would be indispensable for obtaining comparable values in big animal units. While realizing that inaccuracies are thus inevitable, the missing data concerning the structure of the herd has been estimated, assuming a correct structure of the herd, and of the amount of animal production; on the other hand, the figures for the natural increase of the herd have been based on normal figures.

Because as yet, there is little mechanization, the Dermantsi collective farm, in 1960, maintained still a considerable number of draft animals: the number of horses and oxen amounted, together with the small number of draught buffaloes, to about 10 heads per 100 ha of farmed land, and about 11 fully grown heads per 100 ha of arable land. They are used both for local transport and for the tillage, both of the land with

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Fig. 8. Dermantsi. Draught oxen of the Iskăr breed. Collective farm houses on the background. Road going north from the village

Table 11

Livestock Breeding

Specification	Heads	Big animal units	% in big animal units	Heads: Per 100 ha agricultural land	Heads: Big animal per 100 ha agricultural land
I. Collective farming					
Horses	197	217.8	13.1	5.8	6.4
therein: draft horses	104	124.8	7.5		
mares	62	74.4			
foals	31	18.6			
Donkeys	1	0.5	0.0	0.0	0 0
Cattle	777	627.9	37.7	22.9	18.5
therein: draught oxen	132	158.4	9.5		
cows *	280	280.0			
other, heifers and calves	365 (200) (165)	189.5			
Buffaloes	180	134.0	8.0	5.3	4.0
therein: draught buffaloes	10	12.0	0.7		
buffalo cows **	70	70.0			
other, heifers and calves	100 (55) (45)	52.0			
Pigs	985	227.2	13.7	29.1	6.7
therein: sows	80	24.0			
cutters	751	187.8			
piglets	154	15.4			
Sheep	2709	252.2	15.2	79.9	7.4
therein: ewes ***	2117	211.7			
ewe hogs (6—18 months)	554	38.8			
other	38	1.9			
Poultry	10017	205.3	12.3	295.5	6.1
therein: hens ****	5500	137.5			
chickens	4517	67.8			
Bees (hives)	85	.	.	.	.
Total	x	1665.1	100.0	x	49.1
II. Individual farming					
Cattle	206	178.0	15.9	5.1	5.2
therein: cows	146	146.0			
other, heifers and calves	60 (35) (25)	32.0			

() in parantheses estimated proportions

* therein milking cows 245, ** therein milking cows 59, *** therein milking ewes, **** therein laying hens

Table 11a

Livestock Breeding

Specification	Heads	Big animal units	% in big animal units	Heads	
				Per 100 ha agricultural land	Big animal per 100 ha agricultural land
Buffaloes	417	374.0	33.4	10.3	11.0
therein: buffalo cows	327	327.0			
other, heifers and calves	90	37.0			
	(50) (40)				
Pigs	1333	270.0	24.1	33.0	6.6
therein: sows	490	147.0			
other and young	843	123.0			
	(168) (675)				
Sheep	2064	173.2	15.5	51.2	4.3
	(1400) (664)				
Goats	68	5.4	0.5	1.6	0.1
Poultry	7770	116.5	10.4	192.7	2.8
Bees (hives)	271	.	.	.	.
Total	x	1117.1	100.0	x	30.0
Grand total					
Horses	197	217.8	7.8	5.0	5.6
Donkeys	1	0.5	0.0	0.0	0.0
Cattle	983	805.9	29.0	25.1	20.6
Buffaloes	597	508.0	18.3	15.2	13.0
Pigs	2318	497.2	17.9	59.1	12.7
Sheep	4773	425.6	15.3	121.9	10.9
Goats	68	5.4	0.2	1.7	0.1
Poultry	17787	321.8	11.5	454.2	8.2
Bee hives	85	.	.	.	.
Total	x	2782.2	100.0	x	71.1

a more varied relief, where the introduction of the tractor meets with difficulties, and also for labours connected with orchards, vegetables or other plants, where mechanization of the work of tillage or collection is difficult. The horses mostly belong to the local breed, of small build and do not require special foodstuffs. On the members' allotments no draft animals are kept. Such allotments are cultivated either with the equipment and livestock of the collective or else by hand. with the help of a hoe.

The cattle mainly belong to the grey Iskăr breed and are bred both for milk and for meat.

A specific feature, which distinguishes Bulgaria among other European countries, is the breeding of buffaloes; the number of these among the herd of the collective farm is relatively small but, on the other hand, they are bred, in large numbers, on the members' allotments both for milk and for meat. The animals destined for slaughter are either fully grown animals or else young, two-year old animals. Buffalo cows yield less milk than bovine cows, but its fat content is, on the other hand, considerably higher (about 8%). On an average, every second member of the collective owns either a cow or a buffalo cow.

Both the collective farm and its individual members keep a considerable number of pigs and sheep. The pigs belong to the local, mottled Dermantsi breed, productive and well-adapted to the local conditions; they are bred till they reach from 90 to 100 kg as fattened pigs or else they are sold, or eaten on the spot, as piglets. The majority of the sheep belong also to a local breed, only about thirty per cent. of the sheep which are the property of the collective farm are thin-fleeced Merinos. The sheep are bred both for wool and for milk and meat. Both fully-grown sheep and lambs are destined for slaughter. Moreover, some goats are also bred on the allotments. On an average there is one pig and two sheep per one member of the collective; they are kept on

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Fig. 9. Dermantsi. A buffalo and a cow of Iskar breed. The vine nursery to the left

phot. J. Kostrowicki

Fig. 10. Dermantsi. A collective poultry farm on the north-west from the village, where Leghorn chickens are grown. Maize fields and vineyards on the background

their allotments. Every second member of the collective owns one head of cattle or buffalo.

The collective farm owns a poultry farm. The hens of the Leghorn breed are bred for eggs and meat. A considerable number of poultry, principally of hens, are bred also by the collective members on their allotments or home-yards with an average of seven hens per one member.

The members of the collective also breed bees which supply considerable quantity of honey.

Altogether, in the village of Dermantsi, there are per 100 ha of farmed land, about eighty big animal units of livestock, of which 49.1 are the property of the collective farm, 30.0 the individual property of its members. In the collective herd cattle breeding predominates, while in individual farming the breeding of buffaloes and pigs is dominant.

The animal production of the Dermantsi collective farm amounts to over 620 thousand l. of milk, of which eighty %. consists of cow milk, about 17% of buffalo milk and over 11% of sheep milk, while production of meat is about 185 t. of meat (live weight) of which over 27% is accounted for by beef and veal, about 12 per cent by mutton, over 9%

by buffalo and over 42% by pork stock. About 5.5 t. of wool and over 420 thousand eggs (Table 10) have been obtained.

Over and above this, about 800 thousand l. of milk are produced on members' allotments, of which over one-half comes from buffalo cows, as well as 100 t. of meat stock, of which about 40% consists of pork, and somewhat less of mutton. The individual farmers also produce over 1000 kg of honey.

The orientation of livestock breeding in the village can be better estimated when we take into consideration the proportions between the various branches of animal production. About 55% of the animal production consists of meat stock, about 27% — of milk, while eggs, honey and wool play a minor role. About 22.2 of the total animal production is supplied by the sheep, and 35.2% — by cattle. The rest is accounted for by poultry (10.3%), pigs (21.8%), buffaloes (5.2%) and bees (10.5%). Since in livestock breeding meat stock predominates, the orientation of livestock-breeding in the Dermantsi collective farm may be determined as meat-with-milk, with a predominance of pork--stock with milch cattle breeding.

As far as the orientation of livestock breeding in individual farming is concerned, it is a highly mixed — milk, meat and honey, with the breeding of milch buffaloes, pork, mutton stock and bees breeding prevailing.

6. GROSS AGRICULTURAL PRODUCTION

Altogether, the village of Dermantsi produced, by 1959, over 25 grain units from one ha of farmed land (Table 13), of which number over 15 grain units was accounted for by plant, and less than 10 grain units by animal production Taking for the basis the calculations contained in Tables 10 and 12, we could determine the farming orientation of the whole village economy as a medium productive, vegetable with animal, food-fodder, wheat-maize, with dairy cattle and wool and mutton sheep — $3 \times V_3 (a_1wh + f_1mz) + A_1 (sd + swm) m$.

If, however, we analyse separately the farming of the collective farm and the individual farming of its members we can find very marked differences. While in the farming of the collective farm plant production markedly predominates (with over 73% of the gross production), in the individual farming nearly two-thirds or over 65%, consists of animal production. Individual farming shows a higher share of the production of fruit, particularly of grapes, as well as a lower share of cereals, vegetables and fodder plants (with the only exception

Dermantsi village, gross production Table 12

Specification	TKZS		Individual farming		Altogether	
	grain units	of gross production	grain units	gross production	grain units	gross production
A. Plant production	49963	73.3	ca 10700	34.9	60663	61.3
I. Food crops	22636	33.2	ca 5500	17.9	28136	28.5
a. Grain	19207	28.2	—	—	19207	19.4
therein wheat	18876	27.7	—	—	18876	19.1
b. Vegetables	1536	2.2	ca 500	1.6	2036	2.1
c. Fruits	1893	2.8	ca 5000	16.3	6893	7.0
therein: grapes	490	0.7	ca 5000	16.3	5490	5.6
II. Fodder crops	24057	35.3	ca 5200	17.0	29257	29.6
a. Grains	9443	13.9	ca 3700	12.1	13143	13.3
therein: maize	7594	11.1	ca 3700	12.1	11294	11.4
b. Succulent foods	7938	11.6	—	—	7938	8.0
therein: maize (straw)	5400	7.9	—	—	5400	5.5
c. Rough forage	6676	9.8	ca 1500	4.9	8176	8.2
therein: meadows (hay)	2378	3.5	—	—	2378	2.4
lucerne	1898	2.8	ca 1500	4.9	3398	3.4
pastures	1786	2.6	—	—	1786	1.8
III. Industrial plants	3270	4.8	—	—	3270	3.3
therein: sunflower	2044	3.0	—	—	2044	2.1
B. Animal production	18188	26.7	ca 20000	65.1	38188	38.7
I. Milk	4892	7.2	5500	17.9	10392	10.5
therein: cow milk	3525	5.2	2000	6.5	5525	5.6
buffalo milk	821	1.2	3009	9.8	3821	3.8
II. Meat stock	10055	14.8	5270	17.2	15325	15.5
therein: pork	3958	5.8	2100	6.8	5859	5.9
III. Wool	2189	3.2	1400	4.6	3589	3.6
IV. Eggs	1052	1.5	3000	9.8	4052	4.1
V. Honey	—	—	4000	13.0	4000	4.0
Total	68151	100.0	30700	100.0	98851	100.0
A. Plant production	49963	50.5	ca 10700	10.8	60663	61.3
I. Food crops	22636	22.9	ca 5500	5.6	28136	28.5
II. Fodder crops	24057	24.3	ca 5200	5.3	29257	29.6
III. Industrial plants	3270	3.3	—	—	3270	3.3
B. Animal production	18188	18.4	ca 20000	20.3	38188	38.7
I. Milk	4892	4.9	5500	5.6	10392	10.5
II. Meat stock	10055	10.1	5270	5.3	15325	15.4
III. Wool	2189	2.2	1400	1.4	3589	3.6
IV. Eggs	1052	1.1	3000	3.0	4052	4.1
V. Honey	—	—	4000	4.0	4000	4.0
Grand total	68151	68.9	30700	31.1	98851	100.0

of lucerne). Industrial plants are not grown at all on the members' allotments. Treating these two kinds of farming as separate entities, one might determine the orientation of the former, i.e. the collective farming, as markedly vegetal with animal, food-fodder, wheat-maize with pork stock breeding — $V_3(a_1wh + f_1mz) + A_1(pk)$, while the second, i.e. that of the individual farming, as highly mixed, animal with vegetable, pork-mutton stock and milch buffalo with vine and maize orientation — $V_1(av + fmz) + A_3(pk_1mt + dbf)$.

Labour efficiency per one man employed in agriculture amounts in Dermantsi to over 70 grain units (Table 13).

Table 13

Productivity and labour efficiency

Specification	Collective farming	Individual farming	Altogether	Grain units per one employed in agriculture
	Grain units per 1 ha farmed land	Grain units per 1 ha farmed land	Grain units per 1 ha farmed land	
Plant production	12.7	2.7	15.4	43.6
Animal production	4.6	5.2	9.8	27.6
T o t a l	17.3	7.9	25.2	71.2

The lack of data makes it impossible to state the commercial production in the village of Dermantsi. Because of the lack of data concerning consumption it is difficult even to estimate it approximately. All that is known is that in 1959 supplies for the State amounted to 300 t of wheat, 70 t of maize, 15 t of beans; moreover, 440 t of milk and about 185 t of livestock were also disposed of (Table 14), mostly pigs (over 42%), cattle (over 27%), sheep (about 12%), buffaloes (over 9%), poultry (over 7%). As can be seen from the above, the amount of goods supplied to the market by the collective farm is fairly high, being principally based on sales of wheat, maize, as well as of milk and livestock. It is also to be presumed that the sunflower seeds and sugar beet produced are also sold, as well as a certain amount of fruit and vegetables. In individual farming the amount of goods supplied to the market is undoubtedly low and is chiefly comprized of livestock-breeding products: dairy produce, meat, honey and eggs.

Similarly, it would be difficult, because of the lack of data, to assess the income of the village inhabitants per head. The calculated daily wage, in 1959, amounted to 17.30 levas, while it was planned to achieve 18 levas in 1960. The average per one member was 250 calculated

Table 14

Sale of livestock 1960

Specification	Heads	Kg live weight	% of the live weight
Specification			
Cattle (grown up)	47	22346	12.1
Calves	107	28696	15.5
Buffaloes (grown up)	21	9784	5.3
Calves	26	7183	3.9
Fattened pigs	834	75176	40.6
Piglets	747	3971	2.1
Sheep	320	11177	6.0
Lambs	999	10543	5.7
Poultry	13247	13666	7.4
Fish	.	2456	1.3
T o t a l	x	184998	
Slaudhtered for internal consumption			
Calves	10	2076	
Lambs	7	105	

workdays. This, consequently, fixes the average income of one collective farm member at from 4000 to 5000 levas. If we take into consideration, moreover, the income accruing from the members' allotments, the above constitutes a sum sufficient for living as well as for a number of investments.

GEOGRAPHIA POLONICA 5, 1965

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THE „KOSSUTH" COLLECTIVE FARM OF BÉKÉSCSABA IN THE SOUTHERN PART OF THE GREAT HUNGARIAN PLAIN

1. SITE

The object of this study is the „Kossuth" collective farm of the town of Békéscsaba, a typical representative of loess-ridge farming of the Southern part of the Great Hungarian Plain (region of Békés Csanád). The collective belongs to Békés county (in the south-eastern part of Hungary) and is situated within the administrative boundaries of the town of Békéscsaba, 3 km away from the built up area of the town.

Transport conditions and market relations are favourable; for Békéscsaba with its 42 000 inhabitants serves as a local market and there is a railway-loading depot only 7 km distant from the collective. The trunk-lines of the Budapest-Lökösháza-Bucarest (Rumania) and Békéscsaba-Szeged express trains meet in Békéscsaba which is also crossed by the trunk-road Szeged-Debrecen. As a result, the transport facilities of the collective are adventageous: particularly important is the connection with capital, for Budapest is the main consumer of agricultural products in Hungary and the transport lines of the South-Great Plain cross regions where the character of production is sufficiently similar for there to be little exchange of goods. The collective occupies an area of 2174 ha, of which 1876 ha is under common cultivation, the rest comprising the household plots of the collective members. The national average area of cooperative farms is 1129 ha, 1297 ha in the Great Plain and 1439 ha in the Békés county. Collective members amount to 497 persons and their share of the common land is 4 ha per capita. This proportion is higher than the national average (national average: 3.7 ha, County average 3.8 ha).

2. THE NATURAL CONDITIONS

The collective lies on the loess ridge of Békés-Csanád to the east of the valley of the Tisza river; to the north it is bordered by the Körös rivers, while the frontier of Rumania and Hungary lies to the east. The surface of the area is formed by an extensive detrital cone of the „Pre"-Maros river which flowed across an area south of the present Körös river. The „Pre"-Maros carved out numerous beds for itself and was surrounded by sand-dunes. Wind spread alluvial deposits over the whole area, so that it became a large quicksand area.

In the neopleistocene a contiguous loess cover settled on the quicksand, which reached a maximum depth of 15 m in the west. The later loess cover was eroded and dissected so that the original sand cover now forms the surface in many places. The sand areas can be regarded as parts of two dune-rows, the greatest height of which is 107 m above sea level. Apart from these sand ranges the surface of the area is a perfect plain. The area of the cooperative is completely flat thus providing favourable conditions for large-scale farming, i.e. the setting up machine-stocks and organizing their operation.

Of the soils found on the Békés-Csanád loess-ridge, adobe soil of fields or chernozem is most important with a fertility which is one of the highest in the country. Chernozems are particularly suitable for producing the most requiring crops on arable land.

The substratum of chernozem soils is formed of loess. It possesses a high content of humus and an excellent structure. The humus layer is 70—150 cm deep. These soils are rich in nutritives and have a high lime content. Saline alkalization however occurs in depressions and in patches in the subsoil. Occasionally the subsoil also contains magnesia which holds the moisture in such a way that roots are not able to absorb it. These features help to destroy the structure of the soil and they gain particular force in times of drought. Nevertheless chernozem soils have a positive impact on production and are suitable for producing a significant yield of almost all Hungarian crops on arable land.

The area of the collective farm is almost exclusively made up of chernozem soil. Sand adobe soil of which there is 16 ha, and clayey adobe which makes up another 20 ha, are almost as fertile as chernozems but require more careful cultivation. On the whole the clayey adobe is occupied by forests.

Forests areas are very few in the South-Great Plain (on an average only 1.5—2% of the total area): the natural vegetation has a steppe

character. In the course of the past centuries forests had been cut down in order to extend the arable land, for they lay on soils appropriate for arable land utilization. Sand adobe soils are planted with fruit trees. Favourable soil conditions have been the most important factor in establishing arable land cultivation as the chief form of land utilization.

The climatic conditions of the area under study are determined by the continental character of the Great Plain and have both adventageous and disaventageous features. Temperature conditions are extremely good for heat requiring crops for example those of a subtropical nature: (rice, castor oil plant, peanut etc.). Precipitation, however, has an unfavourable impact on the size and annual trend of yields. The South-Great Plain is the hottest region of the country. The sum of temperaturs in the growing season exceeds 3200°C, and the number of hours of sunshine is very high. The annual average temperature does not exceed the national average, for the hot summer is followed by a winter colder than the national average. The vegetation season is very long and its average temperature is + 18°C; autumn is also long and hot. The number of days with frost does not exceed 80, 10—12 days less, than in the Middle-Great Plan. The number of hot days is high having sometimes a detrimental affect on production (rust, grain-contraction, etc.). The temperature conditions are thus suitable for the large-scale production of heat-requiring crops and for early ripening of vegetables, a point which is important for exports.

Precipitation conditions however may be regarded as unfavourable, though there are some indirect advantages, for example drought contributes to the strength of the sunshine thus improving the quality of some oleagineous crops, lucernes, the gluten content of wheat, etc. The annual quantity of precipitation is 550 mm (according to the average of 1901—1950), its distribution from year to year and throughout the year is, however, uneven and droughts are frequent.

The collective farm does not possess either surface waters or other water-sources suitable for irrigation, nor is it possible to tap the ground water for an irrigation by means of wells.

The natural conditions of the collective may be considered as favourable. The plain surface, excellent soils and adventageous temperature conditions emphasize the importance of arable land cultivation.

A high standard of utilization of water-requiring crops (e.g. rough forages) and natural grasslands (meadows and pastures) encounters, however many difficulties.

3. SOCIAL AND ECONOMIC RELATIONS

The degree of utilization and the character of the natural conditions are strongly influenced by social and economic conditions. Here the development of the society, and the way of production have a well-known Hungarian character. This paper studies only some elements of the social and economic conditions which influence the local characteristics of agriculture (manpower, technical conditions).

The collective farm was established in 1948, at the beginning of the organization of large-scale farming.

Considering the size — only 50 ha altogether — and farming level of the collective it was then below the standard of a large-scale farm business. A dogmatic economic policy checked agriculture at that time in every socialist country. The 1956 abolishment of improper economic obligations resulted in a considerable increase in area and members as well. In 1958 the total area of the collective was extended to 1200 ha exceeding the yields of private farms both in crop production and stock-raising. From this time development was continuous and the area of the farm was again increased in the years of total collectivization (1959—1961).

With only a medium level of mechanization, the numerical-, age- and professional composition of the collective members as the quantity and quality of manpower resource still influences the structure of production. From general information given it appears that the number of collective members amounts to 497 persons and their share of the common land is 4 ha per capita which is over the national average. (Each farmers' family possesses also a houshold plot of about 0.6 ha). The number of effective workers is 378 altogether, their per capita cultivation being 5.4 ha of the total area (4.8 ha of which is arable land). The increase of productivity is shown by the fact, that the private farms of an average size of about 2 ha (cultivated by more than one adult worker) produced lower yields on the same area, than the collective at present. The increase of productivity resulted in a considerable excess of manpower, a large number of which left agriculture and migrated from the area of this county (in relation to the size of migrations, county Békés takes the third place among the counties). This phenomenon may be regarded as a natural consequence of the technical development of agriculture. Too large a number however of the emigrants are from the young age group, capable of work; consequently, the age composition of the collective members is rather unfavourable. In all branches of the people's economy 49.4% of the gainfully occupied population is over 40 years of age, while the rate is 58% in agriculture

and 70% in the „Kossuth" collective; 22% of the total members (119 persons) are retired not taking part in production at all, or only doing some casual work.

The technical standard of agricultural production is the result of numerous factors. The enumeration of all these factors cannot be the object of this study, which only picks out those which are most characteristic.

The proportion of mechanization is 100% in cereal production, in ridged up crop production it is, however, only at preliminary stage. A large part of the mechanical work is done by the local machine station. The collective possesses the following machine-stock of its own: 8 tractors, 4 tractor ploughs, 1 silage combine, 4 trailers and 1 lorry of 3.5 t. The proportion of tractors and tractor ploughs shows, that tractors are used mainly for transport around the farm and not as agricultural engines.

A significant development of the use of artificial manures has taken place in the last few years, but it is still not very large; 117.3 kg are used yearly for 1 ha agricultural land (national average: 180 kg). It must be taken into consideration, however, that the natural nutritive power of soils in this area is out-standing, so that their need for fertilizers is below average. The meadows and pastures of the collective are also manured, a rare feature of the Great Plain at present.

Organic manure is put on 17% of the arable land yearly, being less than the optimum (25%) and more than the county average (10—12%). After ploughing, lucerne which occupies large areas gives by its roots a lot of organic materials to the soil. One hectare receives 250 q of the farm manure. Pastures are also manured, a practice unknown in small farms previously. As a result of rational pasture-farming, this method of utilization is an important source of forage production. Otherwise, the pastures of the Great Plain (situated mainly on unfavourable alkali soils) serve above all for the grazing of the stock so that their forage yield is low.

4. THE MAIN FORMS OF LAND UTILIZATION

The distribution of land according to the main forms of utilization gives the first general information on the character of production, trends of specialization, etc. Changes in cultivation in the South-Great Plain give a true picture of the different stages of social development and of the alteration of physical conditions. Up to the 14th century the main form of natural resource utilization was nomadic herding and

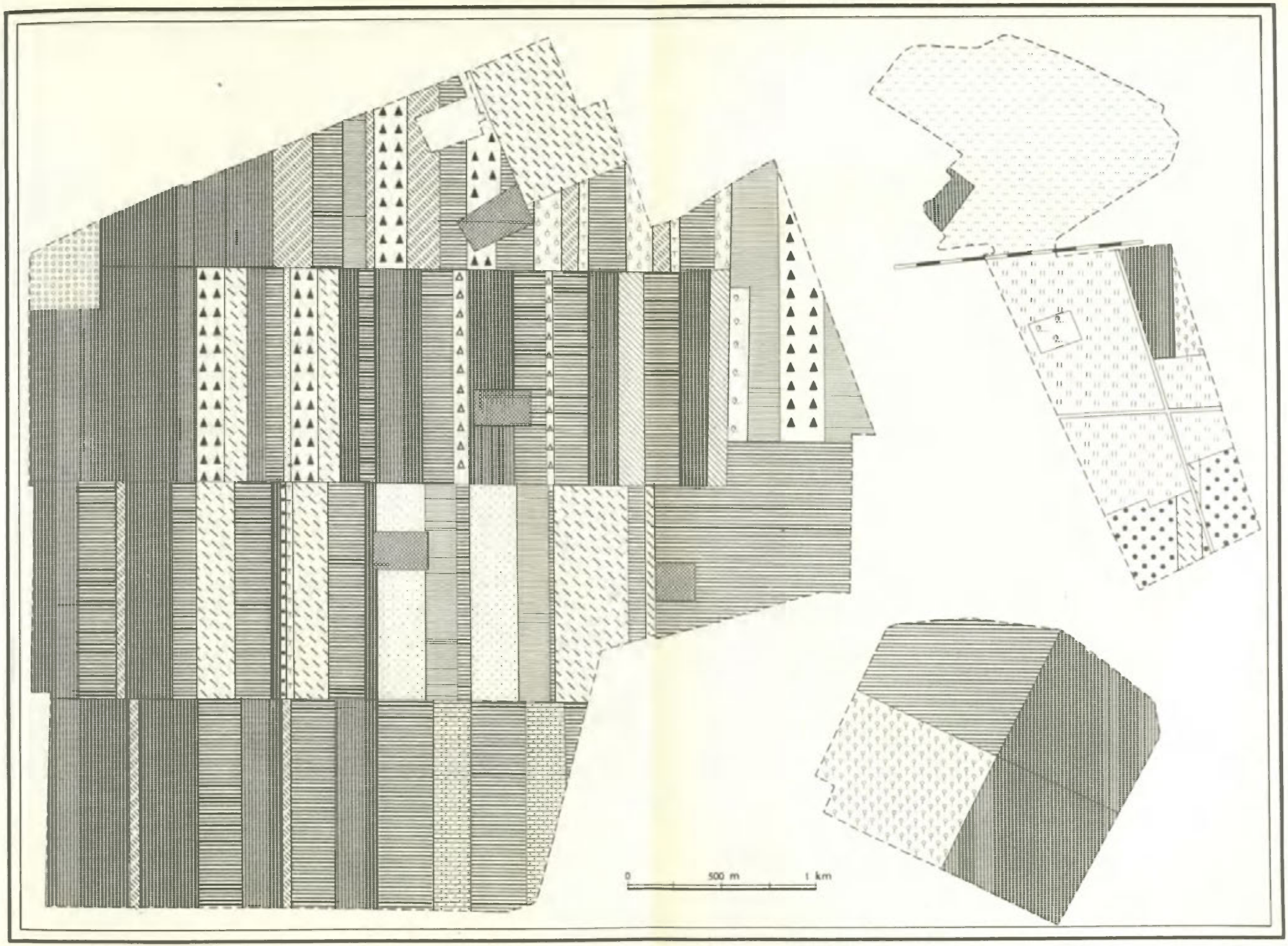
fishing. Tributaries of uncontroled rivers (Körös, Tisza, Maros) formed a network throughout a vast area providing meanwhile the proper water-supply for pastures — at the beginning of summer at least. (West of the Danube agriculture was significant already in the 11th century). In the South-Great Plain arable land cultivation began to spread in the 15th century over the unflooded ridges, but only over an area sufficient to ensure a bread-supply for its population. Sheep herding produced a considerable excess, however, and big herds were driven on foot to the South-German and North-Italien markets.

In the course of the 150 years of Turkish occupation (16—17th century) a great deal of the population perished or fled from the area and the arable lands became marshy and overgrown by forests.

The successive repeopling of the area began at the end of the Turkish occupation (1699) partly by foreign settlers. In the 19th century the increase of population as well as the slow development of capitalist commercial production completely changed the character of land utilization of the area. Although export facilities for cattle and wool grew worse, cereal exports to industrialized Western Europe became important. Internal demands for cereals increased as well. This brought about an alteration from the so far dominating pasture utilization to arable land utilization. Two preconditions were necessary for this alteration, river control, and the provision of the technical facilities for mass commodity transport. The gigantic work of river control was achieved in the second third of the 19th century first, on the tributaries of the Körös later on the Tisza river. From this time arable land utilization spread rapidly to the detriment of pastures. In 1875 it already occupied 60% of the total area, while in 1935 it exceeded over 75%. Because of the increase of built up areas there has been a slight decrease from that time — arable land utilization however covers nearly the whole utilizable area.

The change in the main form of land utilization altered the whole farming system. The change of the fodder basis affected also the structure of the livestock. The cattle- and sheep herding which had previously prevailed fell into the background, while pig and poultry breeding based on grain-forages (maize, etc.) increased in significance. These characteristics of the South-Great Plain land utilization are strongly reflected in the „Kossuth" collective (Table 1).

Excellent soil conditions certainly play an important role in the outstanding rate of arable land utilization. In the Great Plain mainly pastures, alkali and sandy areas remain unsuitable to crop production. The meadows and pastures of the collective, however, are situated on fertile soil and therefore they are of first class quality. Meadows can



Map 1. The "Kossuth" Collective Farm of Békéscaba. Land utilization map

Table 1

The main forms of land utilization (1961)

Specification	„Kossuth"		County of Bekes %	Hungary %
	ha	%		
Arable land	1558	83.0	77.6	57.8
Meadow	113	6.0	0.8	5.4
Pastures	134	7.1	10.2	9.9
Vineyard	—	—	0.2	2.3
Orchard	16	0.9	1.9	1.9
Forest	20	1.1	2.7	13.7
Other	35	1.9	7.6	9.0
Total	1876	100.0	100.0	100.0

be mowed twice a year (after the first mow most of the meadows of the Great Plain can be utilized only as pastures), and more than a half part of the pastures is cattle-pasture (In the Great Plain the so called sheep-pastures are exlusive). The adventageous soil conditions and the supply of the soil's producing capacity mean that 55 q of hay can be harvested on 1 ha meadow, while the grass yield of 1 ha pasture is 26 q (also in hay value).

Fruit growing is not particularly developed in this area and is not characteristic of the farming on the collective. The most wide-spread species are plum trees followed by sour cherry which require heavier soils.

a. Arable Land

The areal proportion of arable land indicates, that it fundamentally determines the farming of the cooperative. The other forms of utilization occupy 17% of the area altogether, but only give 8.5% of the production value.

Soil conditions provide for a many-sided specialization. Cereal production predominated before the liberation, and crop-rotation was characterized at that time by the succession of wheat and maize: cereals were often sowed after cereals. From 1945 the area planted with bread-grains diminished (although economic political measures tried to hinder this). Before 1956 the trend was mainly to industrial crops, from 1956 there has been a change to forage crops. The predominance of cereals has diminished, but not disappeared completely. In 1960 67% of the arable land was sowed with cereals in Békés county, of which 43.3% was forage grain.

The data of the arable crop production of the collective are as follows.

Table 2

Sowing area and yields (1961)

Specification	Sowing area ha	Sowing area +	Average yield q/ha
1. Wheat	513	32.9	19.6
2. Winter barley	102	6.6	24.5
3. Summer barley	42	2.7	19.4
4. Oats	30	1.9	14.6
5. Maize	292	18.7	38.4 (dry caryopsis)
2 — 5 Fodder grain	466	29.9	—
6. Sugar beet	66	4.3	260.0
7. Sunflower	30	1.9	13.3 (grain)
8. Hemp	60	3.9	40.6 (fibre)
9. Flax (for oil)	18	1.1	9.5 (grain)
10. Tobacco	6	0.4	—
6 — 10 Industrial crops	180	11.6	—
11. Potatoes	3	0.2	54.4 (early potatoes)
12. Peas (for consumption)	42	2.7	20.1
13. Peas (fodder)	12	0.8	17.3
14. Beans	7	0.5	—
15. Soy-beans	18	1.1	5.6
12 — 15 Leguminous crops	79	5.1	—
16. Lucerne	158	10.2	37.4 (hay)
17. Winter fodder mixture	9	0.6	287.3
18. Silage maize	94	6.0	239.7
19. Green maize	11	0.7	256.7
20. Fodder beet	9	0.6	540.6
16 — 20 Rough fodders and succulent fodders	281	18.1	—
21. Vegetables of arable land total	36	2.2	—
Arable land total	1558	100.0	—

The largest area of arable crops is under wheat, other bread-grains are not produced. The collective farm is situated in the main wheat--belt of the country. From 1957 wheat took the second place behind maize in Békés county and on a national scale, too. The low manpower however contributes to the fact that wheat here is still the leading crop; maize production is not yet properly mechanized. Wheat produced on the collective is of excellent quality, and its silage contents is high.

Yields surpass the national average every year, but are erratic (for example up to 1958—61 they fluctuated between 18.7 and 25.5 q).

The area under fodder-grains is also significant. Amongst them maize is the most important — utilized in Hungary as a forage crop — it gives very high quality yields. The climate allows the production of species with high yields and a long growing season, and only hybrid seed-grain is used. Winter barley crops also possess favourable characteristics, inspite of the danger of frost damage when the winters do not have a snow-cover.

The area of rough fodders has been extended considerably in past years but because of the dry climate they are less important than grain forages. Lucerne is the predominant crop here, its proportion (10.2%) exceeding by 2 times the national average. Its deep roots utilize well the ground water. Lucerne is the chief alimentary basis for the livestock. Lucerne seed-grain of first class quality is also meant for the market. From among mass-forages, silage maize is the most important requiring no particular precipitation conditions and giving excellent yields on the fertile soils. Precipitation conditions hinder the large-scale production of rough forages, so that stock-breeding specializes in pig-breeding.

With the exception of lucerne-seed all forage crops are utilized in the collective. The areal proportion of industrial crops is also significant (11.6%) because of the intensification of farming in recent years. They are marketed thus increasing the cash income of the collective (part of the cereals and forage crops is distributed among the members). The collective is situated in the most important sugar beet producing region of the country; its production is stimulated not only by advantageous soil conditions, but by the near-by sugar factory at Sarkad as well.

While sugar beet production has only been established for a few decades, the production of fibre hemp requiring high temperatures is traditional and exceeds by four times the national average in the area it covers.

Vegetable production is insignificant, largely because of the lack of irrigation facilities. The cooperative produces vegetables requiring high temperatures such as onions, paprikas and tomatoes. It should be mentioned here, that market gardening is not associated with horticulture in Hungary, but is an organic part of arable land cultivation [1].

In noticing the yields, it should be appreciated that the summer of 1961 which suffered from severe droughts did not affect wheat pro-

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[1] Using Polish methods the orientation in arable utilization may be determined as a wheat-maize one ($E_3wh + I_3mz$) (Editor's comment).

duction, but compared with average, the yields of ridged up crops of long growing time (maize and sugar beet, especially), were considerably diminished.

5. THE LIVESTOCK BREEDING

Investigating stock-breeding on „Kossuth" collective farm, we should first of all point out that in this direction large scale farming has not yet attained high standards as in crop production. This is a common feature of Hungarian agriculture. The construction of large-scale farm buildings for stock-raising requires high investments, thus it can be effective only gradually. The role of household plots — including also commercial production — is quite important for stock-raising even for commercial production and in the case of some animals it is even more important, than that of the common livestock. As the size of the household plots is small and only meets personal demands, the livestock from the household plots have to be fed with forage produced on the common land. For this reason (when investigating stock-raising) attention must be paid to total numbers of live-stock, including those of the common household plots.

Calculated in big animal units twenty per cent of the total stock of the cooperative belongs to household plots, while this proportion is 35% in the case of pig-stock and 58% in the case of poultry stock.

The structure of the live-stock is represented by the following table:

Table 3

Structure of the live-stock (March, 1961)

Kind of animals	Heads	Big animal units	Proportion of the household live-stock %	Structure of the „Kossuth" collective farm live-stock	Structure of the national live-stock
				in % of big animal units	in % of the total big animal units
Cattle	553	457	15.5	49.5	54.1
Pigs	1569	246	34.6	26.6	22.7
Horses	119	108	—	11.7	12.9
Sheep	592	45	10.0	4.9	6.5
Poultry	16597	67	58.3	7.3	3.8
Total	—	923	21.3	100.0	100.0
Proportion of cows				38.2	47.0
Proportion of sows				10.3	9.5

This structure indicates the relative importance of pig and poultry-holdings. The proportion of cattle is higher than average on the Great Plain.

In addition to the structure of the live-stock it is necessary to represent also the density of animals per unit area (Table 4).

Table 4

The density of live-stock (1961)

Kind of animal	Number of big animal units			Number of animals		
	Per 100 ha of agricultural land					
	Collective		Hungary	Collective		Hungary
	Common	Total		Common	Total	
Cattle	21	25	21	25	30	26
Pigs	9	13	9	80	86	80
Horses	6	6	5	6	6	6
Sheep	2	3	3	30	33	36
Poultry	2	4	1	373	911	364
Total of big animal units	40	51	39	—	—	—

The large quantities of forage produced on the arable land means that stock-raising has greater significance here than is common in Hungary. The total density of animals, as well as the density of the different kinds of animals (here sheep are not taken into account) — exceed the national average. In addition to the number of animals, animal yields also are above average (table 5).

Table 5

Yield and growth of animals (1961)

Product	Unit of measure	Annual yield of one animal	Annual yield of one animal on the national average
Cow's milk	litre	2863	2190
Hen's egg	piece	111	83
Wool (grown-up sheep)	kg	4	3.6
Growth of calves per one cow	head	0.9	0.7
Growth of pigs per one sow	head	11.8	9

Cattle breeding on the collective is also more important than is usual on the Great Plain. The best cattle rearing area of the Great Plain has developed on the loess-ridge with the most fertile soils. In the case of the „Kossuth" collective farm this development is increased by the proximity of the town market (town population + dairy plant).

Twenty per cent of the total commercial production of the collective (in value) is made up of cattle for milk and slaughter. There is no specialized milk production (as is shown by the cow proportion), rather cattle are reared for milk and meat alike, though cattle fattening is considerable. The milk yield though exceeding the average on the Great Plain — could be increased by better fodder.

An increase in cattle-stock is necessary not only because it provides a higher milk-supply for the local population, but because it also meets the growing manure needs of the expanding areas under intensive crops.

Animal production on the South-Great Plain tends to specialize in pig-raising, but on the collective farm cattle rearing may be regarded as equally important. Besides fattening breeding is also of great importance and a considerable number of breeding animals are marketed. The number of pigs is 2.8 times higher than the number of cattle, the average rate for the South-Great Plain being 1 : 4.

Horse- and sheep- rearing are not significant. Horses have been pushed into the background by mechanization, while there are few sheep because of the small extent of the pastures. In addition, sheep in Hungary receive only a small quantity of the arable land forage, so that their geographical spread is parallel with that of the pastures.

Poultry breeding in the South-Great Plain is a special interest of national importance. The extensive method of poultry rearing is still common, i.e. the stock rummages for the greater part of its food for

Table 6

The balance of forages (1961)

Specification	Grain--forages q	Rough--forages q	Succulent forages q
Main crop	14931	10230	45357
After-crop	—	—	5850
By-products	—	—	2564
PRODUCTION	14931	10230	53771
Cattle	1302	5484	52555
Pigs	9623	738	11070
Horses	1080	1296	8748
Sheep	225	675	5535
Poultry	2518	—	—
NEEDS	14748	8193	77908
SURPLUS (+)	183	2037	—
DEFFICIENCY (—)	—	—	24137

itself. This way favours cheap meat production. The poultry-stock of the household plots (58% of the total poultry) are reared in this way, in the common stock more up-to-date ways of poultry rearing have been developed, however, resulting in a more intensive egg production.

The crop production provides a proper basis for stock-raising, for on the collective there is no greater lack of forage (lack of forage is frequent on the Great Plain). (Drawing up the balance of forages we assumed that the forage needs of the household poultry were met by the household plots). The balance of forage is the following: (Table 6).

The balance of forage shows a considerable surplus (lucerne-hay is marketed) indicating the possibility of a further increase in the cattle-stock. Succulent fodders are sufficient. Forage-pumpkin production on maize-fields is widespread in this region, though this is not registered statistically. On 1 ha a high yield can be harvested in — although maize is the main product.

6. THE ORIENTATION OF PRODUCTION ON THE COLLECTIVE

The structure of production value has been used as a basis for determining the orientation of production in the collective, but this may not be exclusive.

The results of value-investigations are controlled or rather corrected by concrete studies of the forms of land utilization and by the composition and size of the commodity production (Table 7).

The forage crops are used up by the stock-raising of the collective itself and for this reason they should be investigated together with live-stock-raising when determining the orientation of production.

Taking this and the previously mentioned factors into consideration, the farming of the collective is not characterized by one specialization, but by cattle- and pig breeding and by the production of cereals and industrial crops.

Pig- and cattle breeding are equally important, practically (although including the stocks of household plots, pigs are somewhat more important). Physical conditions and traditions still support the relatively large cereal production, but on the whole its proportion of total crops is decreasing.

The significance of industrial crops is outstanding as compared with the national average.

The cooperative is situated in a region that possesses the most fertile soils of the country, providing thus excellent conditions for choice in

Table 7

The structure of the gross value of production

Specification	Collective farm	Hungary
Bread-grain	12.3	8.3
Forage-grain	17.0	18.5
potato	0.1	8.0
Industrial crops	10.9	3.2
Vegetable	3.0	4.5
Vine and wine	—	5.8
Fruit	0.6	2.7
Meadow-pasture, mass forages	15.0	7.3
Cattle	11.0	12.7
Pigs	9.5	14.5
Sheep	0.9	1.2
Poultry	5.2	11.4
Other branches	14.5	18.1
Total	100.0	100.0
Gross value of production per 1 ha of agricultural land, Forints	9319	7730

orientation of production [2]. The number of the crops produced will certainly decrease in the future, largely because the cooperative has preserved a great deal of the all round production of small peasant farming. In all probability a pig-cattle-breeding orientation will come to predominate.

[2] Using Polish methods the farming orientation of the „Kossuth" Collective Farm in Békéscsaba may be determined as a productive, vegetable, fodder, maize with pork stock one — $4 \times V_3 (f_2 mz) + A_1 (pk) m$. The productivity per 1 ha of agricultural land amounts to over 41 grain units, of which about 30 grain units are of plant, and over 11 grain units are of animal production. The labour efficiency is about 200 grain units per 1 employed in agricultural activities (Editor's comment).

GEOGRAPHIA POLONICA 5, 1965

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NYIRADONY — THE VILLAGE IN NORTH EAST OF THE GREAT HUNGARIAN PLAIN

Nyiradony, the object of this study is an agricultural settlement in the southern part of Nyirség region with a population of 7325 inhabitants (1960), and represents the main characteristics of agricultural development in the region. The village is situated in the north-eastern part of Hungary, some 20 km north-eastwards of Debrecen at the junction of the railway-lines from Debrecen-Mátészalka and Nyiregyháza-Nyiradony, and along the highway between Debrecen-Vásárosnamény and the Soviet Union. The narrow gauge railway-line from Debrecen to Nyírbéltek passes through the southern part of the village boundary. Thus, Nyiradony has very favourable transport conditions.

The area within the village boundary covers 9660 ha (16786 cadastral yokes). Considering the number of its inhabitants and the size of the area Nyiradony is one of the larger agricultural settlements of the country; in the relation of the Great Plain, however, it is only medium size, because it does not reach the size of a Hungarian market-town.

1. NATURAL CONDITIONS

From the physical point of view the agricultural area of the village is typical of the natural conditions in the southern part of Nyirség-region.

Nyirség is situated in the north-eastern region of Hungary. Geomorphologically the region is part of an area of 5100 km² made up of a cone of waste material from pleistocene rivers in the north-eastern Carpathians. The pleistocene rivers ran in a north-south direction across

the area depositing sand—, gravel—, and warp-sediments. The loose sediments of the buried river valleys hold a great deal of water which seeps southwards, the supplies of ground water coming from the north. This ground water is of great importance, for its quantity and favourable chemism make irrigation possible in an area of 50 000 ha meeting industrial— and drinking-water demands at the same time. The surface relief of the region consists of flat areas formed of middle-pleistocene and holocene river sands, while infusions of loesses, sand — loesses or loess-sands appear on the margins of the region and wind-formations (dunes, ridge-remains etc.) are formed moreover of lake-sediments of clay and warp, too. The surface is incised with old erosion channels in which melt- and precipitation waters are seeping towards the main sewer built at the turn of this century. Among the sand-ridges, alkaline hollows and lake depressions are to be found.

Although sand covers only one-third of the surface yet in the point of view of agricultural specialization, the main characteristics of the Nyirség region are determined by this soil. Besides rye which is the characteristic cereal on sand, special crops such as potato, tobacco, sunflower, vine and fruits (mainly apple) are the high-class forms of land utilization on sand areas in the Nyirség region.

Whereas there are some tectonic and relief differences between the northern and southern parts of the Nyirség region — the latter being situated south of the region's main watershed which runs in a southeastern direction — yet the most important difference of agricultural value is a qualitative one, which concerns the sand soil of the northern and southern parts of the region. The acidulent sand of the northern part is rich in humus and possesses some loess-sediments; the dynamics of the evolution of sand-soils has often produced soil with a chernozem character. The following types of soil appear in the area: 1. the so called "brown earth", Ramann's brown forest-soil and 2. "rusty brown forest-soil" formed on loess-sand. Besides these sand-soils of good quality, adobe soils of chernozem type lying on loess and sand-loess and occupying a greater area than the former ones, are mainly wheat-maize-lucerne soils, but are also appropriate for the cultivation of the special plants of the region.

Vast areas of the southern part of the region are covered with sand of a skeleton type which is poor in humus, where crops such as vine's false acacia-trees and orchards help to bind the soil; smaller (0.5—1 km^2), still moving quicksand spots are to be found in the area as well. The rusty brown soil is by one or more thick strata of 300—400 mm situated in the acid soil and is saturated with ferrihydroxide containing abundantly a fraction finer than sand. It is rich in nutritive materials and

its waterholding capacity is higher than that of sand, thus amending considerably the economy of the water-supply in the soil. Wedged into the sand areas soils of an adobe of chernozem type appear also to a smaller extent in this part of the region. As a result, the soil conditions of the southern part of the Nyirség region are much more unfavourable and this is reflected in their yields per 1 ha of agricultural land. While in the northern part of the region, the accumulated gross yield per 1 ha of cultivated land amounts to 5—10 000 forints, average yields of only 5000—8000 forints prevail in the southern part.

A considerable increase in these values which is lower than the national average (national average is 7500 forints), is one of the most important targets of socialist agriculture. The only way of solving this problem is the utilization of the given physical conditions through appropriate areal specialization.

The most favourable aspect of the physical conditions is the climate. The Nyirség region is the most northerly and thus, the coolest region of the Great Plain. Its annual average temperature is 9.9°C as against the national average of 10.5°C. The 12.5°C average temperature for summer cereals (April-June), and the 17°C average temperature for ridged up crops (April-September) are 1°C lower than the national average. The average temperature of January is —2.5°C, that of July is 21°C. The precipitation of the region is higher than that of the Great Plain, since it is situated in the fore-land of the North-Eastern Carpathians, and in that narrow part of the Great Plain, which tends to channel the winds carrying precipitation. The annual average rainfall is 600 mm, whilst precipitation from April-September is 300 mm. This average is satisfactory also for crops which require higher precipitation, though annual fluctuations are very pronounced, 2 or 3 years out of every ten being drought years. Consequently up-to-date large-scale farming with a planned economy is not possible without irrigation. Abundant sunshine with an annual average of 2000—2100 hours favours fruit production especially, as it contributes to the increase of the unique sugar content flavour and vitamin level of fruits produced in this region.

Accordingly, the most important physical conditions in the areal specialization of agriculture are the natural effects of sandy soils and special climatic conditions. Actually from the point of view of structure, water economy and the content of nutritive materials, the sand soils of the region are much less suited to the production of crops needing large areas such as cereals, cereal-and rough fodders than the chernozem adobe soils of the region. The loose variants of the latter are, in fact, more appropriate for potato—, tobacco—, vine and fruit production. Nevertheless the highly valuable crops of the region utilize sandy

soils largely because the common sand crops produce very low average yields which show a considerable annual fluctuation, too. Thus, it is something of a paradox, that intensive production has first appeared over the sandy soils of the Nyírség region. The yields on sandy soils per unit area amounts now to double those achieved on chernozem and meadow soils. The Nyírség region belongs at present to one of the most intensive agricultural areas of Hungary. The micro-regions of Northern Nyírség rank among the 5—6 high standard agrarian micro-regions of the country. All of these may be regarded as the results of intensive utilization of the sandy soils.

As has already been mentioned, however, physical condtions are unfavourable in the South-Nyírség which has a low standard of agriculture. This phenomenon cannot be explained by physical conditions alone, for a high standard of sand utilization should find favourable conditions here, too. The investigated village of Nyíradony is by its physical conditions a typical village of the southern part of the region. But then, the recent development of this village and of its state farm particularely proves that a high standard of intensive land utilization can be realized. Thus, this study does not aim in this village to present an example of steadfast land utilization, but intends to show how the region has developed under the present conditions of Hungarian agriculture. Why Nyíradony and especially the new mode of land utilization on its state farm which is still developing forecasts the system of land utlization for the whole region.

2. ECONOMIC AND POPULATION CONDITIONS

Within the present administrative boundaries Nyíradony was a village of medium— and large farms before the liberation (1945). Its areal distribution of farm sizes is as following: under 3 ha — 5.5%; 3—30 ha — 30.1%; 30—50 ha — 7.9%; 60—300 ha — 16.0%; 300—600 ha — 31%; above 600 ha — 37.4%. 51 per cent of the area of above 600 ha is covered by forest. Large farms managed a more effective farming in 1935 farms of above 60 ha occupied 45% of the arable land, yet 80% of the wheat, 56% of the rye, 54% of the maize, 48% of potatoes and 89% of rough fodder crops were produced by them. Small farms — in proportion to their areas — produced a higher share of stock, especially of poultry. Areas of better quality soils were occupied by medium— and large farms, while peasants suffered either from land-hunger or from poor quality land.

Liberation produced a radical alteration in ownership relators. Agrarian reform — which left state forests — granted allotments of

4.5 ha on an average for more than 700 farmer families. After the land reform the distribution of farms was as following: under 3 ha — 9.1%; 3—6 ha — 19.8%; 6—12 ha — 25.1% 12—30 ha — 5.46%, a state farm of 600 ha, and a state forestry area of 1600 ha were established in an area which covered 21.6% of the area within the village boundary.

In the 1950-ies the collective movement developed at a relatively slow pace. The "Progression" cooperative farm occupying 240 ha altogether was dissolved in the counter-revolution of 1956. It was reorganized in 1960 with an area of 180 ha. In 1961 Nyiradony became a collectivised village. This year two collective farms, and two cooperative groups were established covering now 69.6% of the agricultural land. 89% of the village land belongs now to the socialist sector.

The denographic and occupational structure of the population of Nyiradony agrees in its main features with development of population in the whoe region. The changes in occupation structure i. e. a relatively high increase in industrial-traffic— and „other" occupations — are due to the settlement status of the village and its local junction character, respectively.

In the course of a century the number of village population has more than doubled. The population increase is shown by the following data: 1869—1301; 1900—3536; 1920—4530; 1930—5425; 1941—6019. 1949—6722 1960—7325 inhabitants. In 1960 the density of population was 75.8, the number of women being 105.3 for 100 men. The natural growth of population was 24% between 1949 and 1959 which corresponded to the growth of population of the region being high as regards the national average of 9.5%. The actual increase of population is, however, only 9% which hardy exceeds the national average of 8%. This great difference is caused by a vigorous emigration. Between 1949 and 1959 1007 inhabitans, 15% of the total village population emigrated from the village. This rate of migration exceeds even that of the Nyirség region of 13% which is itself one of the highest in comparison to the national average. The high rate of migration is to a certain extent a reflection of the region's very high density of agricultural population. The share of one person gainfully occupied in agriculture is 2.57 ha of the total cultivated land, while 3.49 ha may be considered as an average for Hungary. A further cause of the high rate of emigration is the fact, that the Nyirség region is one of the least industrialized regions of the country. Consequenly, the number of village "commuters" is high. Twelve per cent of the village inhabitants gainfully occupied in industry (156 persons apart from building industry) are daily commuters (at a distance of 36 km on an average). 74% of them commute at longer intervals to

their work. Thus, only 14% of the village population gainfully occupied in industry are working in the area of the village.

The last decade has brought about important changes in the occupation structure too. These changes are represented in the following table:

Table 1

The occupational structure of population

Specification	% of the total population	
	1949	1960
I. Distribution of inhabitants by occupation		
1. Occupied in agriculture	89.4	67.3
2. Occupied in industry and building industry	5.1	14.4
3. Occupied in trade and credit	1.3	1.8
4. Occupied in communication	0.8	8.1
5. Inhabitants of other occupations	3.3	8.4
II. Distribution of the gainfully occupied population		
1. Gainfully occupied from the total population	39.7	47.1
2. Gainfully occupied in agriculture	89.0	73.8
3. Gainfully occupied in industry and building industry	5.1	11.4
4. Gainfully occupied in commerce and credit	1.5	1.7
5. Gainfully occupied in communication	1.2	5.2
6. Gainfully occupied in other industries	2.9	7.9

The number of inhabitants gainfully occupied in agriculture is now by about 300 persons higher than it was in 1949. The number of persons occupied in industry has shown a more considerable increase. When taking into account commuting — the number of commuters is increased by those of gainfully occupied in transport and in "other" jobs. Some account should be given of the development of settlement functions in the village. As a producing community the village has an almost entirely agricultural character: as a settlement it shows, however, the character of a residential community for as well, about 15% of its gainfully employed inhabitants work in the town of Debrecen. The main agricultural function of the settlement is at the same time shown by the high percentage of so called outskirts population. The village has 27 outskirts settlements altogether. In 11 settlements the number of inhabitants exceeds 100 persons, in 4 it exceeds 200 persons, the number of inhabitants of the largest outskirt settlements is 585 persons and 435 persons, respectively. There are only 4 solitary farmsteads of less than 10 inhabitants.

The number of outskirst population is 3090, amounting to 40,8% of the total population, this percentage is one of the highest both in the

region and in the whole country. 82.7% of the outskirts population was also in 1960 gainfully occupied in agriculture.

In connection with agricultural population another problem should be emphasized. A relative „senescence" can be observed among the total inhabitants. This phenomenon presents to a greater extent itself in the category of people gainfully occupied in agriculture. While the share of persons above 50 years is 18.5% of the total inhabitants, 31.2% of the persons gainfully occupied in cooperative groups and 55.7% of those of the cooperatives belong to the older age group. This distribution of occupation by ages reflects the most serious demographic problem of Hungarian agriculture which is more serious here than is average in the rest of the country.

3. BRANCHES OF CULTIVATION OF AGRICULTURAL LAND UTILIZATION

The changes in land utilization may be characterized chiefly by the relative and absolute decrease of arable land and by the considerable increase of gardens and orchards: the share of forests had also increased. (Table 2).

Table 2

Land utilization

Specification		Arable land %	Gardens and orchards %	Vineyards %	Meadows %	Pastures %	Forests %	Reeds %	Built-up area and waste land %	Total %
	1935	70.3	0.4	1.1	6.2	1.1	16.6	0.5	3.8	100.0
	1955	69.5	0.6	0.9	5.3	1.8	16.3	0.5	5.1	100.0
	1960	61.6	4.3	2.8	5.1	0.5	19.6	0.1	6.0	100.0
Hungary	1960	57.8	1.9	2.3	5.4	9.9	13.7	0.3	8.7	100.0

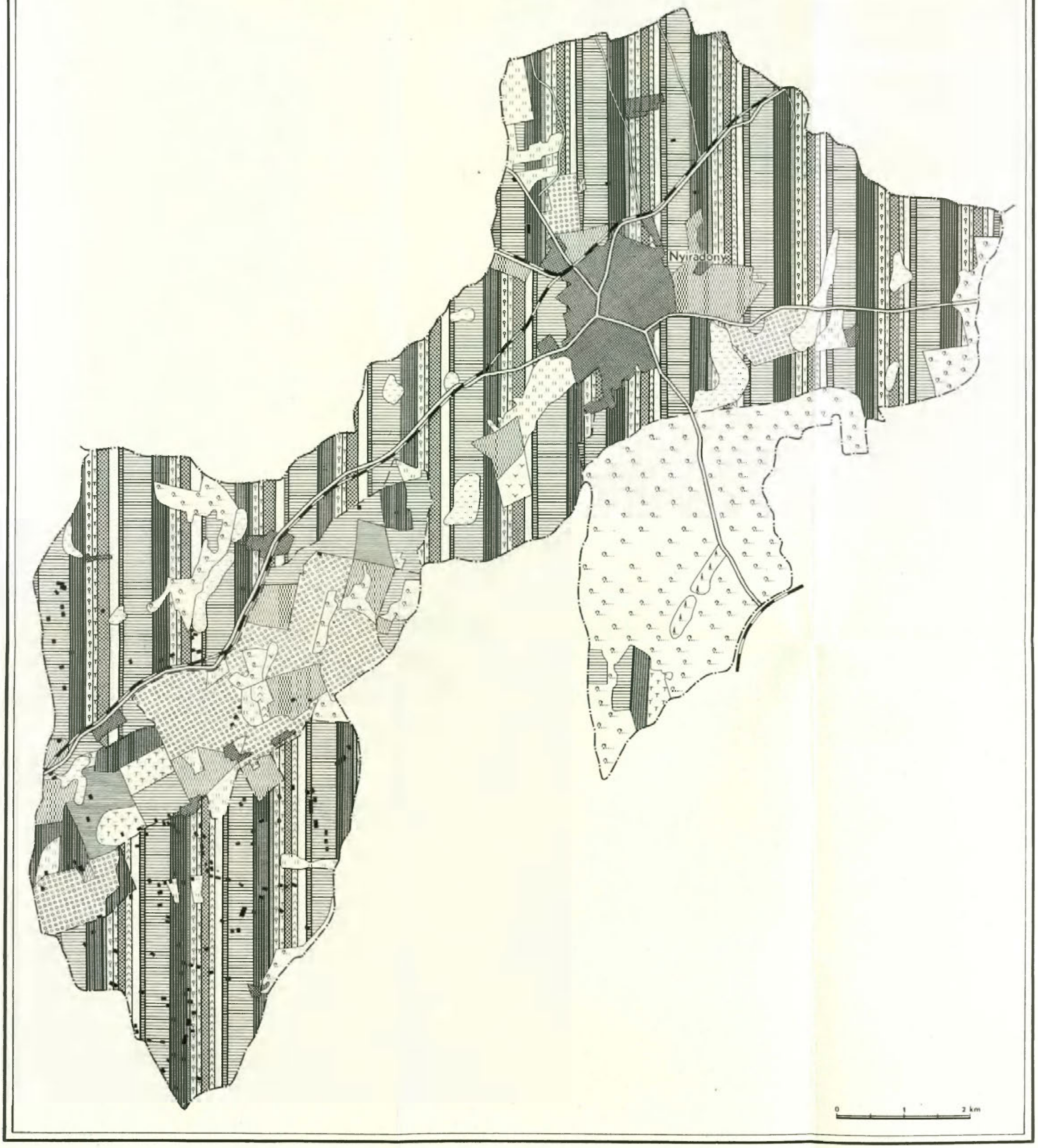
This table illustrates the different periods of development: irrespective of the revolutionary land reform the proportions between various land uses or branches of cultivation hardly changed in the 20 years between 1935—1955, but in recent years an actual revolution in the branches of cultivation has come about. Among the reasons for this development should be stressed the peasants greater ambition to work as a result of confidence, strengthened by the quelling of the counter-revolution as well as by the elimination of sectarian faults in the agricultural policy. This development was not even slowed down by the temporary difficulties of the 1961 collectivization of agriculture. Since 1961, development has tended toward the trend mentioned earlier, e. g.

in 1962 the new collectives had already planted new orchards on 85 ha. This development is entirely in accord with development plan for the whole Nyirség region. The Nyirség region now a world-famous apple--producing region possessed in 1959 only 14 000 ha of apple-orchards (less, than a half of which as yet produced fruit) in 1962, however, the area already covered 23 000 ha and the plantation of an up-to-date large-scale apple-orchard of 58 000 ha is the target for 1970 according to plans. It is the farm-unit of the state farms that is in the vanguard of development. In 1959 the state farm as yet possessed no vineyards, and its up-to-date, but only one year old orchard only covered 128 ha altogether. At the end of 1962, however, its area of orchards already occupied 300 ha and its vineyards now cover 100 ha, 30 per cent of which consists of an up-to-date nursery. It was the Nyiradony state farm that planned on 20 ha, the first large-scale raspberry-field. At the end of 1962 the surounding collective farms had planted raspberries on more than 200 ha as a result of the state farms successes. The state farm organized a peach-plantation, too. In these ways it was contribution to the transformation of the South-Nyirség into a region of mixed fruit-production based on already existing small-scale traditions.

The vines of the Nyirség region are of inferior quality, (they comprise 12 000 ha altogether). It has been proved by the Nyiradony state farm as well as by some villages of the South-Nyirség that it is possible to produce full yielding grapes, as well as wine-grapes on barren, feebly lime— or acid sandy soils. In the state farm new plantation is proceeded by very detailed soil-investigations. Apples are planted on soils with only a small or medium humus content and in some cases on quicksand — with excellent results. Vines are produced on similar soils, but they are also planted on adobe soils. Raspberries are planted on soils of marsh origin formed on sand and loess — the sands being alkali below the surface (above 8.5 pH); peaches are planted, however, on free sand soil containing very little calcium carbonate, but with sufficient quantities of physiological lime.

The state farm of Nyiradony with 45% of its total area covered by vineyards and orchards and with its proportion of cultivation branches attains the intensive land utilization of the nationally famous state farms of the North-Nyirség. This fact of great significance, proves that the unfavourable soil conditions of the South-Nyirség are also very suitable for the domestication of these most intensive cultures, that increase by from 14—20 fold the customary yields, obtained from the unit area.

The role of meadow and pasture cultivation has always been unimportant. Although the meadows and pastures are of medium quality in



Map 1. The collectivized village of Nyiradony. Land utilization map

relation to national standards, they are far behind the North-Nyirség meadows which are of excellent quality. Grass-yield is low consisting mainly of sedges. Meadows are found in deep-lying marshy areas, pastures on soils with a thin humus horizon, poor in lime and sometimes on barren quicksand. The latter soils, however, are more appropriate for afforestation.

The proportion of forest-cultivation exceeds the national average, but in this region it is particulary high. 95% of the forests is part of a contiguous, large woodland area which extend to the neighbouring village boundaries, too. This is a remnant of the contiguous woodland that once covered the whole Nyirség region. Its structure has been transformed by up-to-date forest-economy. False acacia occupies 17% of the forest within the boundary of Nyiradony village. Other species occupy. oak — 17%, poplar — 3%, pine — 3%, other trees — 2%. Glades, clearings, and allotments cover 26% of the area. Annual yields of the carefully treated forests are; firewood — 3500 m^3, timber — 4300 m^3.

4. ARABLE LAND (PLANT PRODUCTION)

The unfavourable features of soil conditions of the area are directly reflected in arable land cultivation. Those sandy soils, poor in nutritive materials, without any structure, and having a low water-holding capacity — give low yields in customary utilization. The term customary is used when utilization meets the requirements of small-scale-small plotted farm enterprise. The small-scale farm can realize a rational specialization only on a fraction of its area, for 90—95% of its area is occupied by indispensable bread-grains, fodder crops, potatoes and oleaginous crops, depending on local conditions. These mass-crops give low yields in Nyiradony village, and this is why the result-indices of land utilization of arable land are very low. The crop structure and yields of the arable land are represented in Table 3:

Conclusions drawn from the former table [1].

1. A high proportion of bread-grains, the main reason of which is the physical conditions which favour rye. The nutritive value and yields of rye are low, meeting the demands of self-supplying small-scale farms only on large crop areas. The area under rye is on the other hand, increased by that fact, that rye is sown as green manure in the young orchards and on arable land as well — next to lupine which is the main green manure — while small proportion of it was used for forage.

[1] Using Polish methods the orientation in the utilization of arable land in Nyiradony may be determined as rye-maize one ($E_2ry + I_2mz$) (Editor's comment).

Table 3

Share of the sowing area and average yields

Specification	1925		1949		1960		Hungary 1960	
	%	q/ha	%	q/ha	%	q/ha	%	q/ha
Wheat	4.0	9.5	6.6	10.5	5.7	14.5	21.3	19.2
Rye	25.0	7.9	34.7	8.7	34.8	11.5	7.2	12.5
Bread-grains	29.0	—	41.3	—	40.5	—	28.5	—
Barley	0.5	14.5	0.8	14.0	2.6	18.5	10.1	14.5
Oats	0.5	9.5	0.2	8.5	0.2	15.5	3.0	14.5
Maize *	15.0	12.8	24.1	25.5	22.3	26.0	27.1	16.5
Cereal fodder	16.0	—	25.1	—	25.1	—	40.2	—
Oleaginous crops	0.5	—	11.7	—	9.5	—	2.3	—
Leguminous crops	0.2	—	0.2	—	0.3	—	1.4	—
Fibre crops	0.0	—	0.1	—	0.1	—	0.6	—
Sugar beets	0.3	105	0.5	192	0.3	236	2.2	245
Tobacco	3.0	10.5	4.0	13.5	5.1	14.5	0.4	12.7
Industrial crops	4.0	—	16.5	—	15.3	—	3.5	—
Potatoes	11.0	106	9.3	110	9.2	122	4.8	118
Vegetables of arable land	0.4	—	0.6	—	1.4	—	2.6	—
Lucerne	—	—	0.5	35	0.4	37	4.2	34
Clover	—	—	0.5	34	0.4	37	4.4	31
Silage-maize and green maize	—	—	—	—	0.6	290	2.5	275
Other fodders	—	—	4.0	—	2.9	—	1.5	—
Total of the arable mass-fodders	10.9	—	6.0	—	4.1	—	12.6	—
Other arable crops	8.0	—	0.7	—	2.9	—	5.9	—
Unsowed arable land	20.5	—	1.0	—	1.5	—	1.9	—
Total	100.0		100.0		100.0		100.0	

* grains

2. The area under industrial and cash crops is relatively high, four times higher then it was before the liberation. The production of industrial and cash crops as well as potato — the latter is produced in South-Nyirség also for industrial and partly for forage purposes — are the main trends of arable land specialization, in the Nyirség region, being here the most economic form of arable land utilization. The Nyirség region itself provides half of the tobacco needs of the country, a quarter of its potatoes, and nearly a quarter of its sunflowers.

3. Fodder production on the arable land is very low, especially that of rough-succulent fodders. This is not in proportion to the amount of stock-raising in Nyiradony at all. The increase sown with vegetables laggs behind the national average.

4. Finally, it must be mentioned, that plant production on arable land, produces very low yields, by unit areas, while the proportion of

the so called intensive cultures is relatively high. For example, as against the national average of plant production value of 4760 forints per 1 hectare, the arable land of Nyiradony village produced in 1960 a value of only 2900 forints. This production value is very low in relation to the Nyirség region, for the plant production value per 1 ha in South-Nyirség was 5000 forints on an average. The North-Nyirség produced, however, a value of 6800 forints per 1 ha an outstanding result even on the national scale.

The state farms manages a more up-to-date and intensive arable land cultivation. Rye is produced on 40% of its arable land, the total yield of which are used for cultured seeds. The state farm — for example — produces asparagus on 15 ha, realizing 34 000 forints per 1 ha. The green fodder production of the state farm is also high producing lucerne on 10%, and tobacco on 7% of the arable land.

The state farm is well supplied with stable manure and artificial fertilizers and it even purchases farmyard manure. The same cannot be said of the collective— and private sectors which amount to 90% of the total area. Whereas the supply of farmyard manure is much the same as the national average, for area does not satisfy the higher needs for organic matter on the sandy soils. The use of artifical fertilizers, however, has developed at a more rapid pace since 1960.

The proportions of mechanisation is similar in the two sectors. All important tillage work is mechanized on the state farm both on the arable land — for harvesting, threshing, foraging and seed-clearing — and in the orchards and vineyards. Mechanization is limited mostly to arable land in the so called council sector. In 1960 the proportion of mechanization was as following: ploughing — 80%, hilling — 15%, harvesting — 60%, ensilage — 100%, fodder-collecting — 50%, tobacco plantation — 20% and threshing — 100%. In 1960 the share of normal cadestral yokes per one tractor unit was 95 in the state farm: 141.6 in the council sector; the output of normal cadastral yokes per one tractor unit was 910 on the state farm, and 650 normal cadastral yokes in the council sector.

Since 1960 the standard of mechanization has increased by 35—40% on an average.

5. LIVESTOCK RAISING

The main characteristic feature of stock-raising in Nyiradony village, is the density of animals which approximates to the national average, and the very poor fodder-basis which meet only 50 per cent of the needs of stock-raising. The village covers its fodder needs partly by

purchase. The main trend of Nyiradony stock-raising is for slaughter poultry-raising is also mainly for meat-production. In addition to providing the still necessary, but small, draft animal's power, the state farm specializes in bullock-fattening, and sheep-raising for wool; hogs are not raised at all.

In 1960 the village comprised 2979 big animal units[2] in the following proportions: cattle — 52.6%, hogs — 26.6%, horses — 12.6%, sheep — 9.2%. The stock also included 28 000 heads of poultry of which chickens were 86%, geese — 8%, ducks — 3%, and turkeys — 3%. The structure of stock approximates to the national average. The share of sheep is higher as a result of specialization on the state farm. The higher share of poultry is, however, due to extensive raising on the council sector.

Because of the lack of a local fodder basis the stock suffers from strong fluctuations. The cooperative data of stock-raising are indicated in table 4.

Comparative data of stock-raising Table 4

Animals per 100 ha of agricultural land	Number of big animal units		Number of animals	
	Village	Hungary	Village	Hungary
Total of big animal units	52	62	x	x
Cattle	25	34	34	46
Pigs	14	13	81	76
Horses	8	11	11	15
Sheep	5	3	60	35
Poultry	.	.	480	390
Cows from cattle	21.0%	48.2%		
Sows from pigs	11.1%	8.5%		

Stock-breeding is of a mixed-type. Cattle breeding — the main trend of stock-raising before liberation — was followed by an increase in the number of hogs and poultry following the development of stock-raising throughout the country. The predominance of slaughter-cattle is shown by the fact that the proportion of cows does not reach even half the national average. The milking average is low (1450 litres per year from each cow) as a result of the lack of protein content in the forages. 80 eggs a year per hen is again somewhat lower than the national average.

The main problem of stock-raising is the poorness of the local fodder-basis. Fodder from the arable land even together with that from meadows and pastures meets only 37.8% of the starch — and 27.3%

[2] Calculated in Hungarian units.

of the protein-needs. Potatoes used in large quantities for forage together with maize-stalks, brans, oleaginous industrial products as well as the precisely registered purchases of the state farm cover a further 20% of the protein-needs. Thus 42% of the starch and 53% of the protein is missing. A great proportion of this lack is covered by purchased fodders. Because of the relatively high fodder costs stock-raising is not economic. It is the value of fodder alone which is completely recovered in the high sums, obtained by stock-rearing, while the exchange value of the high expenditure of operating labour is recovers, however, only 60—70 per cent. The maintainance of the stock-raising standard is however also necessary, being justified in the point of view of land utilization by soil-power supply.

6. DEVELOPMENT OF LAND UTILIZATION IN VALUE INDICES

Table 5 represents the share of accumulated gross value of production in Nyiradony village in one of the years between the two World Wars (1929) and in the last year of small-scale agriculture developed under socialist conditions (1960).

In addition to table 5 it must be mentioned first, that in the case of plantations it does not give a complete indication of value. That is to say, it is only the products that appear in the values calculated here, but when the orchards and vineyards become fruitful they will by more than 10% increase the values realized on the total cultivated agricultural area. More than 25% of the total production value will then be in grape- and fruit-production even in the case of a standstill in the present production level. This fact should be considered in the investigation of the orientation of specialization.

Determining the orientation in specialization, Hungarian researchers (Erdei, Enyedi, Bernát, Csete, Márton, Sárfalvi, Simon) consider those branches of production as special which represent at least 20% of the accumulated gross value of production. When no branch reaches this share, it depends always upon the concrete situation as to what group may be considered the main orientation of specialization in the branches of production. If we aim at determining the areal types of production, this process is perfectly sufficient. When, however, land utilization has to be planned under socialist conditions, the following factors should be taken into account: both the trends of development and the economic factors necessary for an accurate estimation of the actual situation. The consideration of economic factors refers also to an assessment of physical conditions, and how similar physical conditions can be utilized in different ways.

A detailed analysis of these considerations is not given in this paper, we only intend to point out the most important patterns.

1. From among the most general characteristics of both the development and the actual situation the following may be emphasized: a) the development of about 83% of the total agricultural land is significant; exceeding twice the rate of national development, approximately; b) the plant production yield of arable land is insignificant, the yield of arable land is well below the national average; c) according to the results obtained hitherto, the 150% development of fruit- and vine production is outstanding; d) the development of stock-raising being poor

Table 5

Distribution of accumulated gross output

Branches of cultivation	1925	1960	Hungary 1960
Accumulated yield per 1 ha of agricultural land in Forints	4922	9022	7730
	in %		
Wheat	2.8	1.3	8.3
Rye	12.4	6.2	1.6
Bread-grain	15.2	7.5	9.9
Maize	11.8	9.9	15.0
Total cereal fodders	14.3	11.5	18.5
Potatoes	12.3	11.8	8.0
Industrial crops	2.8	3.9	3.2
Vegetables (of arable land and of market-garden)	1.5	4.3	4.5
Fruits	1.3	4.8	2.7
Grapes and wine	4.1	8.8	5.8
Fodder with meadows and pastures	4.1	1.9	7.3
Cattle	18.1	13.4	12.7
Pigs	11.5	15.8	14.5
Horses	0.5	0.3	0.3
Sheep	1.9	1.4	1.2
Poultry	10.8	14.6	11.4
	in Forints		
Accumulated plant output per 1 ha of arable land *	2349.—	2962.—	4965.—
Accumulated yields of stock-raising per 1 ha of fodder-land	3367.—	12860.—	5492.—
Accumulated yields per 1 ha person gainfully occupied in agriculture	15750.—	23135.—	30950.—

* Using Polish methods the agricultural productivity in Nyíradony has been calculated to over 31 grain units per 1 ha of agricultural land (therein over 22 grain units of plant production and about 9 units of animal production) — (Editor's comment).

of fodder, is much higher and will be proceded in pace only at that time, when vineyards and orchards will turn into fruiting. The production value per one person gainfully occupied in agriculture — though lower than the national average — has increased somewhat faster than the national average, but this increase of 47% hardly amounts to half of the areal result value. Thus, the increase of the productivity of labour is not satisfactory — although it is more significant, than other factors as a reason for development.

2. There is not any definite orientation [2] in areal specialization. Two main orientations — namely, fruit- and vine-production as well as stock-raising with a main trend of hog- and poultry-raising are, however, becoming apparent and we can also speak of a main orientation of potato- and industrial crops in arable land production, too. Although we cannot afford to analyse these main orientations either from the point of view of expenditure — value relations, or from the point of view of economy, yet the proportions of value and the comparison of these with national proportions, especially the tendencies of development represent these groups of land utilization, not only as characteristic areal types, but also as the most rational trends of development.

The highest areal productivity can be obtained through fruit- and vine-production, with the help of favourable physical conditions. It is undoubtedly profitable when using up-to-date agrotechnics, and it meets the intersts of the people's economy and exports as well.

Where arable land cultivation is at a low level, conditions for industrial crops are most favourable.

The problem of fodder supplies seems to be a grave counter-argument to the development of stock-raising. Though existing physical conditions are not favourable — it may be possible to enlarge fodder production. However, the problem of fodder cannot be solved economically either by purchase or by local production. Taking into account all these factors, the economy of stock-raising in this region laggs behind the national average. This is to say, if fodder-yields amounts to 60% of the accumulated yield of stock-raising — on a national average — the same amounts to 80% in Nyiradony village, as a consequence of fodder-purchase. But in this case, also the village value of 2600 forints is contrary to the unaccumulated stock-raising value of 2200 forints per 1 ha; thus, the areal productivity is still higher than the national ave-

[2] Using Polish methods the farming orientation in Nyiradony may be determined as a vegetable, food-fodder, rye-maize with pork stock-breeding, medium productive one — $3 \times V_3 (a_1 ry + f_1 mz) A_1 (pk) m$ (Editor's comment).

rage. There is no doubt, that such economic stimulatives prevail in the trends of development. On the other hand, in the interests of the people's economy and population (an extremly high density of agrarian population) a vigorous development of stock-raising is required.

To sum up, the areal specialization in three orientations is not the only obviously ascertainable tendency of development.

* * *

Finally, we intend to make some comments of the attached map. Topographic representation is given only of the cultivation branches of meadows, pastures, orchards, vineyards, forests and durable human establishments. The crop areal distribution of arable land is shown according to its proportions, with two exceptions: 1) We give a topographic representation of arable land production on the state farm, but orchards and vineyards planted since 1960 are also represented here, because in 1960 these were already under preparation (soil preparations, green-manuring, etc.). 2) We do not give a schematic illustration of the percentage distribution of arable land cultures, they are differentiated according to the type of soil. Therefore the different soils are denoted in writing.

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GEOGRAPHIA POLONICA 5, 1965

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THE VILLAGE OF CSEPREG IN WESTERN HUNGARY

1. GEOGRAPHICAL SITUATION

The village Csepreg lies in West Hungary, near the Austrian-Hungarian frontier, in the north-western corner of Vas county in the Szombathely district. The area is crossed by the Répce, a large tributary of the Rába river most aboundant in water, with its source in Austria. Because of its situation near the national boundary the conditions of communication are rather unfavourable. Its is accessibly only by one of the branch lines of the railway connecting two towns of West Hungary, i. e. Szombathely and Sopron. The first town is at a distance of 31 km, the second one at 47 km from the village in question. As far at its accessibility by highways is concerned, the situation is not much better, because the village is situated far from any main thorough-fares. In its immediate proximity there is only a small town, Köszeg, but the village has no important economic connection with the latter.

The surface area of the village measures 5813, the number of its inhabitant is 4348; Therefore, according to the local conditions of West Hungary, it represents a settlement with large area and population. However, considered on a national scale, it proves to be of middle size in both respects.

2. PHYSICAL CONDITIONS

The western frontier region of Hungary where the village Csepreg is situated represents the south-western marginal area of the Little Hungarian Plain. During Pleistocene times the brooks and smaller rivers issuing from the western spurs of the Alps into the Little Plain built up a very extensive gravelly alluvial fan. Owing to the subsidence

of the central portion of the Little Plain which is still in process, this uniform alluvial surface has gradually been dissected by rivers into a number of valleys.

During the Last Glaciation the abundant precipitation and solifluction did not leed to the formation of loess, but resulted instead in the formation of clayey forest soils resembling loamy loess.

The land relief of the area of the village — and naturally of its surroundings as well is complex. The entire subalpine region slopes from the northwest to the south-east, and this direction is followed by the valley of the Répce river, too. On the other hand, the surface of the alluvial fan slopes from the south- west to the south-east, i.e. towards the centre of the Little Hungarian Plain. SW of the Répce valley, the average height a. s.l. reaches 200 to 250 m, while, towards the north-east, it measures only 170 to 180 m.

The area of the village comprises three different soil types: farming is carried out on both the middle-fixed loam in the north and on sandy loam in the south-west. These two soil landscapes are separated by the narrow clayey loam belt of the alluvium of the Répce river. Genetically, all three soil varieties are of alluvial origin. They have been developed on Quaternary fluviatil deposits, i.e. on sands and gravels. The wind-blown dust which had been deposited during Glaciation became brown soil on humid hill ridges covered by forests. This brown soil has been humified to such a degree that it differs from chernozem only in its lack of lime. The water regime of these soils of high fertility is fair; tillage does not require any special techniques. The chemistry of the middle-fixed soils which have been developed on the surface of the forest commonly show values of about 5.

Although structurally Csepreg is a part of the Little Plain, in climatical respects it belongs to the peculiar climatic area of West Hungary, more precisely to that of the subalpine region, which in Hungary is most abundant in precipitation. Here the winters are mildest, the summers coolest and the climate is most temperate, i.e. chiefly oceanic factors prevail. The annual rainfall amounts to about 730 mm, being about 40% higher than in the central part of the Great Hungarian Plain.

In West Hungary the crop year begins with the autumnal (or second) rainfall peak reflecting mediterranean influences. In the rainy months of September-October (130 mm) the temperature is as low as 12.4°C on account of which only 50 to 60% of the precipitation is able to evaporate. As a consequence of the abundant precipitation and the low temperature, the soils become highly saturated with moisture and, at the same time the vapour content of the air is also relatively high. This is the only area of the country where the degree of evaporation

never reaches the amount of precipitation. The mild winter is followed by a cool spring and summer. The peak rainfall period comes during July-August. Only in the mountainous regions are March and April cooler than in this region, while between May and August this region proves to be the coolest region of Hungary. It can also be seen from this analysis that the number of hours of sunshine is extremely low, averaging only about 1800 per year, whereas during the growing season it is low as 1260. The average rainfall of the summer half-year amounts to 450 mm, but the amount of precipitation to be expected on a 75% probability basis for the growth period is not lower (as indicated by the averages of 50 years) than 400 mm.

The main river of the village area is the Répce into which flow many brooks and streamlets. The Répce flows in a regulated channel, and there is in addition in its valley a drainage-canal too joined to an extensive drainage system. Problems as to how to drain the aboundant precipitation often arise, for the valley floor is periodically flooded and as a consequence the ground water table is also rather elevated.

As opposed to the Little Plain where most of the agricultural area is subjected to regular crop growing, the surroundings of Csepreg, already represent forest and grassland farming characteristic of the subalpine region. This is above all, the area of growing plants which exhibit rather moderate requirements as to temperature and high demands upon rainfall. Wheat, oats, malting barley, sugar-beet, all varieties of roughage and the early ripening variety of maize offer a good yield.

3. GENERAL FEATURES OF AGRICULTURE OF THE BROADER ENVIRONMENT OF THE VILLAGE

This western landscape is the most highly developed agricultural district of Hungary. Because of the rational utilization of the climatic and soil conditions, the farming is commonly characterized by yields which exceed the national average. The percentage of crops in the field under coarse grains and roughages is very high, providing a basis for prosperous livestock breeding. The considerable livestock assures, at the same time, the provision of sufficient organic manure, which is an important factor in effective plant growing. The character of livestock farming is dominated by cattle breeding for several purposes, as the latter represents 70 to 80% of the livestock expressed in animal units. About 47 animal units of cattle fall to 100 ha. of arable land, grassland and pasture. Pig breeding is a less important branch of production, though sheep-rearing is rather intensive. In relation to West Hungary

viticulture was earlier of some importance, and fruit-growing, especially of apples, is highly developed even today.

As is common in West Hungary, the property conditions were before the Liberation (1945) rather polarized in the area of Csepreg village. The percentage of holdings smaller than 1/2 ha was as high as 2.9%, as opposed to 2% for the whole country. The percentage of the dwarf holdings smaller than 0.5 to 3 ha amounted to 14% (10.2% on national scale). The percentage of farms in the category of 3 to 30 ha coincided with the figure for the whole country (35%), while the categories of 30 to 60 ha with 4.3%, that of 60 to 300 ha with 10%, and that of 300 to 600 ha with 5% were inferior to the national averages (6.3%, 14% and 8% respectively). The holdings larger than 600 ha had again a higher percentage amounting to 28.8%, as opposed to the national 24.3%. Thus, a preponderance of the dwarf holdings and large landed estates was characteristic. In 1930, 34% of the agricultural labourers were represented by farmhands constantly employed in large estates and 5% were dwarf farmers.

After the Liberation the agrarian reform of 1945 eliminated the most striking disproportions, while some of the large estates were transformed into state farms. During 1959 to 1960, farmers cooperatives were stablished in Csepreg and as a result of their rapid development the total area of the village belongs actually to the socialist sector. At present 2 enterprises of the Csepreg State Farm and 2 farmers cooperatives as well as one enterprise of the State Forestry share in the area of the village.

4. GROWTH OF THE POPULATION AND ITS PROFESSIONAL DISTRIBUTION

The population of the village had exhibited a normal increase between 1860 and 1910, whereas since 1910 its growth has become extremely slow.

Table 1

Growth of the population during 1869—1960

Years	Csepreg	Szombathely district	Vas county
1869	3273	35 446	179 701
1890	3843	40 464	216 055
1910	4103	44 299	260 379
1930	4135	46 020	281 738
1949	4251	48 290	282 958
1960	4348	47 667	282 656

Accordingly, the growth of the population of Csepreg shows a divergent trend as compared to its immediate and broader environment where the absolute number of the population has decreased.

The density of population measures 76.2/km², i.e. it is as low as two thirds of the figure for the whole country. During the last decade the natural increase amounted to 7.7%, while the percentage of emigration was 5.7%. This emigration (1949 to 1959 = 230 persons) is the basic reason for the slow growth of population; 61% of the inhabitants are of productive age; percentage of 0 to 14 years old inhabitants = 24.1%; 15 to 39 = 36.4%; 40 to 59 = 24.4%; over 60 = 15.1%.

Table 2

Professional structure of population in 1960

Specification	Population %	Active number	%
Agriculture	55,3	1098	50,4
Industry	15,9	379	17,4
Building	4,4	79	3,6
Transport, Communication	3,4	62	2,8
Commerce	4,3	92	4,2
Other branches	16,7	470	21,6

The industrial workers are partly craftsmen producing for the population of the neighbouring localities, while the greater part of the industrial workers are employed in Kőszeg, Szombathely and Sopron.

The labour of the village Csepreg must be analysed separately for the state sector and for the so called „council" sector, i.e. the combined sector including both farmers cooperatives and private holdings.

1098 active agricultural labourers are living in the village, but every year on the average 1170 persons participate in the agricultural production. Those hired from other places are employed exclusively by the state farm. Only a half of the adults capable of earning their living are now working in agriculture. These are, above all, the old men and the female population. Peculiar evidence of the ageing of the agricultural labourers is the fact that — considering the composition according to age and sex — 1100 labourers are equivalent to only about 750 man workers of full capacity.

As can be seen from the tabulation, the manpower utilised by the state and the „council" sectors for 100 ha of area (as well as the livestock density in animal units exhibit no essential differences). At the same time, there is a considerably divergence in the degree of mechanization in favour of the state farm. However, it must not be ignored that the farmer's cooperatives, and even the private farmers

themselves, make good use of the machine stock of the Machine and Tractor Station (MTS) as well. In the „council" sector 95% of the ploughing, 60% of the cultivation, 80% of the harvesting, and 100% of the threshing is effected by mechanical means. In the state farms all the aforementioned operations are completely mechanized. It is to be noticed that the agriculture of the Little Hungarian Plain and of West Hungary which was the first to change over to collective farming plays a leading role concerning the level of mechanization too.

5. LAND UTILIZATION

As is common throughout Hungary, the changes in the proportions of different land uses are characterized, in the area of Csepreg too, by the rapid growth of varieties of intensive farming which proceeds parallel to the shrinking of grass-land, and pasture and arable area.

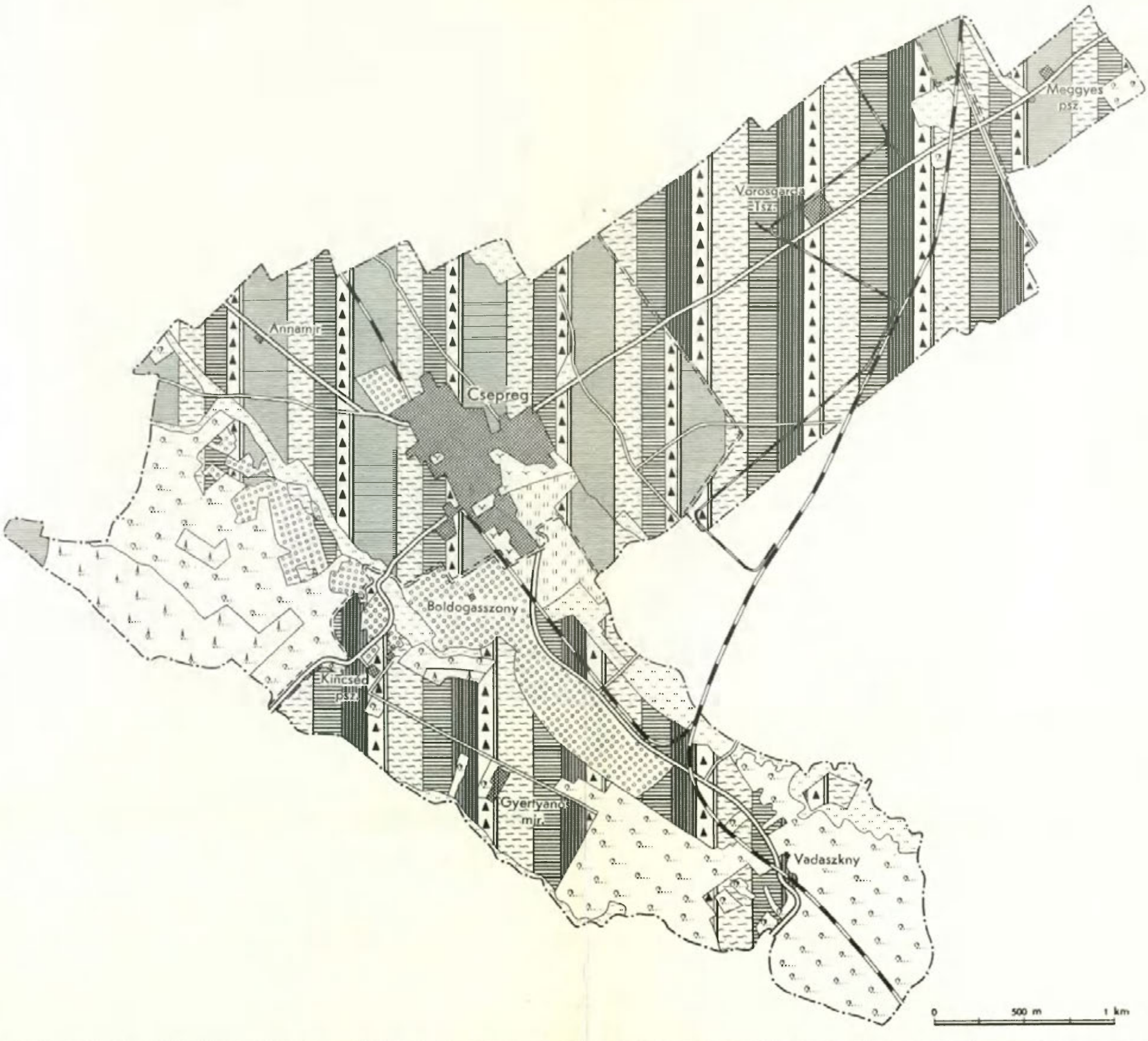
The percentage of arable land is considerably higher than the national average. During the last century arable land grew considerably to the detriment of the forest, but the last few years have seen a considerable decrease in arable land which was naturally, not used for afforestation, but for planting orchards.

The area under gardens has redoubled since 1935, while the vineyards have disappeared almost completely, being reduced to only half a hectare by 1960. In the last century viticulture was important, but during the last 3 decades the vineyards planted on the south-eastern, and eastern slopes and even on the north-eastern ones have been replaced by orchards.

Thus the orchard is essentially a quite recent farm of utilization in the area of the village. Locally most important in the gardens and the old vineyards, are the mixed orchards, whereas the most recent plantations, 9/10 of which are owned by the state farm, consist exclusively of apple trees. They are planted especially in arable areas which were developed on the sites of cleared forests where grave damage has been caused by soil erosion which has set in under tillage because of the lack of forest cover.

In 1935 the percentage of grass-land exceeded the figure for the whole country, but by 1960 it was reduced to hardly a half of its former extent, as a considerable part of it had also been planted with orchard. Grass-lands are actually confined to the alluvium of the Répce, and their grass yield is rather high (34 q/ha).

The pasture area has decreased to negligible degree. Although it furnishes grass of good quality, it does not play any important role



Map 1. State and Collective Farms of Csepreg. Land utilization map

in livestock breeding, as compared to the fodder growing on arable land (8.5 q/ha).

Table 3

Distribution of the area, of labour and of the mechanic and animal forces by sectors

Specification	Total area ha	Arable land ha	Average number of labourers	Tractors	Horses	Agricultural area in ha falling to 1 labourer*	Arable area in ha falling to 1 tractor	Labourers (falling to 100 ha of arable land)	Tractor units (falling to 100 ha of arable land)	Horses (falling to 100 ha of arable land)	Animal units	Animal units falling to 1 labourer
State sector	3751	1942	620	46	78	3.8	42	32	2.4	4	1563	2.5
„Council" sector	1952	1700	550	11	159	3.4	154	32	0.6	9	1341	2.4
All together	5703	3642	1170	57	237	—	—	—	—	—	2904	—

* Agricultural area = arable land + garden + orchard + vineyard + grass-land + pasture

The forest area has remained completely unchanged. About 18% of the forests found in the area of the village are pine-forest, the rest being oak forest. The annual yield of logging amounts on the average to 2400 m³ of industrial wood and 1900 m³ of firewood.

Table 4

Proportions of the different utilization in the area of Csepreg between 1935 and 1960

Utilization	1935		1960		
	ha	%	ha	%	Hungary %
Arable land	3780	66,3	3642	63,8	57.8
Gardens	74	1,3	135	2,4	1,9
Orchards	—	—	325	5,7	
Vineyards	40	0,7	—	—	2,3
Grass-land	383	6,7	158	2,8	5,4
Pastures	81	1,4	70	1,2	9,9
Reeds	—	—	—	—	0,3
Forest	1175	20,6	1175	20,6	13,7
Unproductive area	170	3,0	198	3,5	8,7
Altogether	5703	100,0	5703	100,0	100,0

6 STRUCTURE OF FIELD PRODUCTION

Because of the existence of the temperate, humid climate without any extremes, the field production of West Hungary in general, and especially that of Csepreg, exhibits some peculair features:

a) Whereas the fodder crops comprise national scale more than a half

Table 5

Percentage distribution of crops in the area of Csepreg

Years	1960 Council sector			1960 State sector			1960 Hungary		Csepreg 1930—1935
	ha	%	q/ha	ha	%	q/ha	%	q/ha	%
1. Wheat	332	19,5	21,2	500	25,7	32,2	19,8	16,9	20
2. Rye	20	1,2	16,0	—	—	—	5,7	11,8	7
1 — 2 Cereals	352	20,7	—	500	25,7	—	25,5	—	27
3. Winter barley	13	0,8	23,3	80	4,1	31,8	9,6	19,5	15
4. Spring barley (malting barley)	347	20,4	21,0	120	6,2	32,9			
5. Oats	62	3,7	17,7	40	2,0	30,5	2,7	14,4	7
6. Maize	276	16,2	22,4	210	10,8	48,5	26,4	25,0	12,3
3 — 6 Grain fodder	698	41,1	—	450	23,1	—	38,7	—	34.3
7. Rape	—	—	—	80	4,1	14,0	—	—	—
7. Oil-seeds	—	—	—	80	4,1	—	1,8	—	—
8. Pea for seed	14	0,8	8	—	—	—	—	—	—
9. Fodder pea	—	—	—	29	1,5	13,9	—	—	—
10. Soya bean	—	—	—	20	1,0	10,5	—	—	—
8 — 10. Leguminous	14	0,8	—	49	2,5	—	1,5	—	0,5
11. Fibre plants	—	—	—	—	—	—	0,7	—	0,5
12. Sugar beet	91	5,4	186	215	11,1	348,2	2,5	254	4,0
7 — 12 Industrial and cash crops	105	6,2	—	294	15,1	—	4,0	—	5,0
13. Potato	72	4,2	157	—	—	—	4,8	105	4,5
14. Green pea	2	0,12	30	1	0,05	35	—	—	—
15. Green paprika	3	0,18	108	1	0,05	122	—	—	—
16. Comon white cabbage	4	0,24	188	1	0,05	261	—	—	—
17. Onion	1	0,06	87	—	—	—	0,1	—	—
18. Tomato	2	0,12	178	1	0,05	209	0,3	148	—
19. Other green stuff	3	0,18	—	1	0,05	—	0,1	—	—
14 — 19 Greens and Vegetables (grown in field)	15	0,9	—	5	0,30	—	—	—	0,5
20. Lucerne	55	3,2	39,1	184	9,5	39,3	5,4	30,0	4,0
21. Red clover	74	4,4	27,2	29	1,5	32,7	3,3	29,0	7,0
22. Leguminous grass mixture	—	—	—	147	7,6	29,6	—	—	—
23. Birds foot trefoil	32	1,9	26,5	—	—	—	—	—	—
24. Jerusalem artichoke	3	0,2	29,6	4	0,2	30,1	—	—	—
20 — 24. Biennial fodder crops	164	9,7	—	364	18,8	—	—	—	11,0
25. Mixture of oat and vetches	47	2,8	41,9	21	1,1	59	1,0	33,2	3,0
26. Italian millet	7	0,4	21,0	—	—	—	—	—	1,0
27. Vetches	19	1,1	—	—	—	—	—	—	1,0
28. Autumn fodder mixture	—	—	—	31	1,6	157	—	—	—
25 — 28. Annual fodder crops	73	4,3	—	52	2,7	—	—	—	5,0
29. Turnip	26	1,5	303	—	—	—	0,9	290	1,5
30. Green maize, silo maize	154	9,0	205	227	11,7	241	2,5	275	2,5
29 — 30. Succulent fodder crops	180	10,5	—	227	11,7	—	—	—	4,0
20 — 30. Total fodder crops	417	24,5	—	643	33,2	—	—	—	20,0
31. Other crops	41	2,4	—	—	—	—	5,9	—	8,7
32. Total arable area	1700	100,0	—	1942	100,0	—	100,0	—	100,0

of the total arable area, their share in the area of Csepreg exceeds even 60%.

b) It may also be ascribed to the climatic conditions that although maize has the largest crop area throughout the country here it is relegated to the background. For in the area of Csepreg it is only third in importance, being preceded by wheat and barley.

c) Within the group of the industrial and cash crops the areal proportion of the sugar beet is strikingly high, while that of the oil seeds requiring much heat and sunshine is quite insignificant.

d) The field production of greens and vegetables is here much smaller than the national average.

The favourable climatic conditions, irrespective of their influence on the distribution of crop areas, are of course reflected in the average yields as well. Practically all the plants, but especially the fodder varieties requiring much rainfall, yield crops exceeding the national average.

On the other hand, considerable difference show themselves between plant growing by the state sector and by the "council" sector. The production trend of the state farm is oriented towards grain production and animal breeding, while the alloted special line of the farmers cooperatives involves milk and meat production. These two types of farming are strongly evident in the crop percentage too.

The state farm produces cereals in amounts exceeding even the national average. It grows Soviet and Italian varieties of wheat which offer higher yields than Hungarian ones. The crops are used above all for seed. On the other hand, the farmer's cooperatives utilize over 40% of the arable area for growing grain fodders to be used for fattening, and half of this area is sown with barley.

The sown area under industrial and cash crops is two and a half times larger in the state sector. 1/4 of the sugar beet crop serves for the purpose od seed production.

Finally, as far as the growing of roughage and succulent fodders is concerned there appears, again, a large difference in favour of the state farm where the importance of these crops is far and above that of coarse grains. Green fodder serves for the purposes of stock breeding, while fattening is only an accessory branch of farming. In addition, the roughage grown for seed production have a great importance as they comprise 1/6 part of the area sown with fodder [1]

[1] The orientation in the utilization of arable land may be determined here as follows:

a. Council Farming — as barley, wheat, maize one (F_3bl, $wh\ I_3mz$)

b. State Farming — as wheat — maize with lucerne and fodder mixture — ($E_2wh\ I_2mz\ S_1\ 1c$, mx) — (Editor's comment)

Table 6

Recovery of soil fertility (1960)

Specifikation	1 ha. of arable land receives		1 ha. of orchard		1 ha. of grass-land
			receives		
	manure q	fertilizers kg	q manure	kg fertilizers	q manure
Farmer's collectives	250.	130	80	—	5
State farm	280	400	200	300	13

7. LIVESTOCK BREEDING

The western territories represent parts of the country showing the greatest livestock density. On the average 55 animal units, i. e. 50 cattles, and 74 pigs fall to 100 ha of agricultural area. The livestock density of the area of Csepreg is even higher than that of its surroundings. In this village 67 animal units, i. e. 59 cattle and 94 pig ones fall to 100 ha of agricultural area. Although the livestock density expressed in animal units shows similar values in both sectors, the composition of the livestock is somewhat different in these two sectors. In the farmer's cooperatives, more precisely in the personal plots, the breeding of pigs is very intensive, comprising 50% of the pig stock of the whole village, and together with the collective pig stock of the cooperative, it amounts to 68%. On the other hand, the animal husbandry of the state farm is dominated by the cattle stock representing 56% of that of the whole village. Because of the lower level of mechanization in the "council" sector, the keeping of horses is there more important, while the sheep stock belongs totally to the state farm.

Table 7

Distribution of the livestock
31. VIII. 1961

Specification	Cattle		Pig		Horse		Sheep	
	heads	animal units	heads	animal units	heads	animal units	heads	animal units
State farm	1440	1152	1280	154	80	60	1970	197
„Council" sector	1107	886	2790	334	160	120	10	1
Total	2547	2038	4070	488	240	180	1980	198

Distribution of the livestock expressed in animal units (290 units): cattle 70.2%, pigs 16.8%, sheep 6.8% and horses 6.2%. The high per-

centage of the cattle stock, as compared to the national average, is a peculiar feature of agriculture in the western areas.

In addition to the livestock, 15 000 heads of poultry are reared exclusively in the "council" sector, i. e. the poultry density for each 100 ha of agricultural area amounts to 335. The poultry stock consists almost completely of hens, the total proportion of other birds does not reach even 3%.

Table 8

Comparative data of animal breeding

Animal units to 100 ha. of agricultural area:	Animal units		Heads	
	Csepreg	Nat. average	Csepreg	Nat. average
Total animal units	67	36,5		
Cattle	47	21,5	59	25,8
Pigs	11	7,0	94	63,0
Horses	4	6,0	6	7,2
Sheep	4	2,0	46	2,4
Poultry	—	—	335	390
Cows	—	—	38,6%	48,2%
Sows	—	—	7,4%	8,5%

The cow stock is markedly small, especially if considering that we all dealing here with a farm type possesing a sufficient fodder basis, the alloted orientation of which is livestock breeding. This is due to the fact that the most important objective of the state farm is to rear the stock for breeding purposes, while the dairy farm plays but a subordinate role. This results in the fact that in the state farm only a third of the cattle stock is represented by cows, the greater proportion consisting of young cattle. However, if we do not take the cattle stock of the state farm into consideration, the cow proportion of the village amounts to over 43%.

Nevertheless, milk production is not a negligible branch of farming either. In the dairy farm of the state enterprise the annual average milk yield by cow is 3615 l (average for 1957—1960). The milk productivity of the "council" sector is considerable lower, but still exceeds the national average. It amounts to 2564 l by cow. Among the other animal products, the egg yield and the wool production are worth mentioning. The egg yield by hen is 94 eggs. Consequently, it is somewhat higher than the national average (88). The annual wool yield of one sheep is 4.7 kg, being superior to the national average (3.9).

The provision of the livestock is assured completely by the local fodder production. Moreover, Csepreg and even all West Hungary belong to those exceptional districts of the country which commonly possess surplus fodder.

8. STRUCTURE AND CHARACTER OF THE AGRICULTURAL PRODUCTION AS REFLECTED BY PRODUCTION VALUES

It has become obvious even in view of the quantitative indices (utilizations, sown areas, distribution of the livestock by animal units) that the state and the "council" sectors have different objectives of production in spite of the fact that the physical conditions are roughly the same in both cases. Therefore, the sets of production value data of these two sectors will not be combined, but they will be considered separately.

The Hungarian method of determining the orientation of production considers those branches of production, the quota of which, in the cumulative gross production value, is higher than 20%, provided that the production value is not excessively fractionized over many branches of production, i. e. that the process of specialization has not already reached a certain level.

In the case of Csepreg the areal specialization appears to include in both state and "council" sectors cattle breeding based upon local fodder production and directed not only towards meat production, but also the rearing of breeding stock and accessory milk production. The cattle breeding character of the area in question, including the broader environment of Csepreg, is revealed, in a cattle density which considerably surpasses the national average. Additional evidence is the fact that 32.1% of the gross production value of the state sector and 24.6% of that of the "council" sector are furnished by this branch of production. When considering also the production value of the fodder basis, this proportion will amount to over 48%, or 35%, respectively. In addition to the prime importance of cattle, pig breeding based upon the production of coarse grains appears to play a considerable role an to be in close cooperation with the latter in many respects. This branch of production provides an additional 20% or 28%, respectively, of the cumulative gross production value.

These two branches of animal breeding — combined with the fodder growing which provides their basis — give altogether 67.1% of the production value in the state sector, and 63.5% of it in the "council"

Table 9

Distribution of the cumulative gross production values

1960	State farm	Council sector	Hungary
Cumulative gross production value falling to 1 ha of agricultural area Forints	15,110	10.100	7.730
Wheat	11,3%	5,8%	8,3%
Cereals	11,3	6,8	9,9
Maize	6,1	6,2	15,0
Total coarse grain	10,6	16,4	18,5
Potato	—	8,1	8,0
Industrial and cash crops	7,5	4,7	3.2
Greens	0,1	2,0	4,5
Fruit	7,9	5,2	2,7
Fodder, grass-land, pasture	16,0	11,2	7,3
Cattle	32,1	24,6	12,7
Pig	8,4	11,3	14,5
Sheep	1,6	—	1,2
Poultry	—	7,5	11,4
Other products	4,5	2,2	6,1
Value of plant production falling to 1 ha. of arable land	7.400.—	6.960.—	4.965.—
Cumulative animal breeding value falling to 1 ha. of area furnishing fodders	9.550	7.520.—	5.492.—
Cumulative production value falling to 1 agricultural labourer	57.420.—	34.540.—	30.950.—

sector. Such a character of production is well adjusted to the physical conditions and the agricultural traditions of the region.

Using Polish methods the orientation in both State and Council farming in Csepreg may be determined as follows:

a. State Farming — highly productive, vegetable, fodder-industrial, maize—sugar beet with dairy cattle breeding orientation — $5\,x\,V_3(f_1mz + i_1bs) + A_1(cd)1m.$

b. Council Farming— fairly productive, vegetable, fodder, maize with pork stock and dairy cattle breeding orientation — $4x\,V_3(f_2mz) + A_1(pk + cd)m.$

The differences in agricultural productivity and labour efficiency between state and council farming are not very great. In state farming the production

per ha of agricultural land slightly exceeds 48 grain units (about 38 units of plant and over 10 units of vegetable production), and per 1 person employed in agriculture is over 180 grain units. For council farming respectively the agricultural productivity is over 40 grain units (27 of plant production and over 13 units of animal production), and the labour efficiency about 150 grain units per 1 person employed in agriculture. (Editor's comment).

In the map representing land utilization the production on arable land is divided into 4 areal units. The two enterprises of the state farm — which differ from one another even concerning the structure of production — as well as the two farmers' cooperatives of the village — which do not have quite the same physical conditions and exhibit differences in crop percentage too — are represented separately. The territorial distribution of the different utilizations with the exception of arable land is shown topographically.

9. ORIENTATION AND STRUCTURE OF COMMERCIAL PRODUCTION

The chief emphasis of agriculture in the areas of West Hungary has become clear already during the analysis of the structure of production; viz: cattle breeding based upon local fodder resources and characterized by both meat and milk production. The structure of commercial production, roughly conforms to the proportions of the productions in general. As a matter of course, there is a difference between the state and the "council" sectors in this connection too.

Animal breeding plays a leading role in commercial production in both state farm, and farmers' cooperatives. It furnishes 47% of the total value of commercial production in the former, and over 65% of it in the latter. Accordingly, the value of plant production is considerably higher in the state sector (53%) than in the "council" sector (almost 34%). The important differences in the structure of commercial production have 3 principal reasons:

1. State farms commonly play an important role in the provision of the country with cereals — and so does the state farm of Csepreg — and they put their wheat crop almost completely on the market, while in the farmers' cooperatives this is not the case.

2. The considerable fruit output of the state farm also accentuates the importance of the plant production within the total amount of products put on the market.

3. In the state farm the cattle stock chiefly serves the purposes of rearing breeding stock, while the milk and meat production plays only a subordinate role which must not however be underrated.

Structure of commercial production (1960) Table 10

	State sector %		„Council" sector %	
Breadgrains	19.5		11.3	
Barley	3.5		2.3	
Oats	0.3		0.5	
Maize	5.2		0.6	
Total cereals		28.5		14.7
Sugar beet	6.5		9.8	
Fibre flax			0.02	
Rape	2.3			
Total industrial and cash crops		8.8		9.82
Potato			3.9	
Greens and vegetables			3.2	
Total potato and greens				7.1
Sugar beet seed	3.2			
Seeds of lucerne, red clover and grass	0.5			
Total seed crops		3.7		
Total field crops		41.0		31.62
Apple	12.0		2.1	
Other fruits			0.8	
Total fruit crops		12.0		2.9
Eggs			2.6	
Milk	13.7		20.5	
Wool	2.3		0.03	
Total animal products		16.0		23.13
Fattened pig, commercial hog	12.3		11.9	
Beef and veal	14.0		30.3	
Other meat	0.7		0.15	
Total meat		27.0		42.35
Young bulls	2.2			
Heifers	1.6			
Tegs	0.2			
Reproducing part of stock breeds		4.0		
Total livestock breeding		47.0		65.48
Total production for the market %		100.0		100.0
Forints		33,800.000		6,100.000
Products sold from each 100 ha of area:				
Fattened cattle	89 q		76 q	
Fattened pigs	137 q		49 q	
Milk	525 hl		246 hl	
Eggs	—		8 400	
Bread grains	560 q		144 q	
Sugar beet	3 855 q		996 q	

If we consider the absolute value of the products put on the market as well as their proportion to the total production, it will of course be obvious that the role of the state farm is more considerable than that of the „council" sector which has to meet the requirments of the peasants themselves.

In 1960 the state farm produced merchandises having the value of 33.800.000 Fts, i. e. the value of the products from each hectare corresponded to 10.100 Fts. The value of the commercial products of the "council" sector was 6.100.000 Fts in the same year, and so the quota per hectare was as low as 3300 Fts.

The state farm puts on the average 96 to 97% of its annual production on the market, while in the "council" sector this figure is as low as 32%.

10. FURTHER DEVELOPMENT OF THE AGRICULTURE IN THE AREA OF CSEPREG

In the future, no great changes in the structure of agricultural production are expected, nor are such changes desirable. As far as the forms of land utilization are concerned, the area of the orchards might be increased which would lead to a decrease of arable land and grass-land. Further measures must be taken in connection with the extension and development of the current irrigation and drainage system, in order to increase the security of tillage and grassland farming.

The principal objective of livestock breeding will remain unchanged viz: to rear breeding stock, and to produce meat, but milk production should see an increase, firstly by enlarging the cattle stock, and secondly — particularly in the "council" sector — by raising the average milk yield per cow.

The water-supply of the livestock — irrespective of drink water — is assured actually by 2 dwarf waterworks, both being owned by the state farm. Their total output amounts to 8000 m^3 of water, the pipe network is 2 km long. Further increase of the livestock would necessarily involve enlargement of the waterworks themselves.

GEOGRAPHIA POLONICA 5, 1965

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AN ATTEMPT TO DETERMINE THE GEOGRAPHICAL TYPES OF AGRICULTURE IN EAST-CENTRAL EUROPE ON THE BASIS OF THE CASE STUDIES ON LAND UTILIZATION

1. EXTERNAL CONDITIONS OF DEVELOPMENT

The external conditions of the development of agriculture [1] mean, on the one hand, the natural conditions and, on the other, the state of the productive forces and the relations of production created in the process of historical development, that is to say the level of technique and the economic and social relations dominant in the area.

The 15 case studies on land utilization and agriculture presented in this volume concern 44 economic units in Poland, Hungary, Bulgaria and Yugoslavia which are situated between latitudes 42° (Barsko Polje) and 54° 08 (Miłogoszcz) north and longitudes 14°15' (Podgorje) and 24°15' (Dermantsi) east. The very variations in the geographical situation point to the differences of natural conditions which may occur in such circumstances.

While on the Polish Baltic sea coast (Milogoszcz) the mean annual temperature is about 8°C and the mean temperatures of the coldest months (January) and the warmest ones (July) vary between about —1,0° to about +17.0°, on the Danube plains (Békéscsaba, Nyiradony, Ritopek, Dermantsi) the mean annual temperature rises to + 10—12°C and reaches + 16°C on the Montenegro Adriatic coast (Barsko Polje) where the mean July temperature is + 26°C and that of January + 8°C.

[1] Discussion on the subject of criteria of geographical typology of agriculture, see J. Kostrowicki. The Geographical Typology of Agriculture, Principles and Methods. An Invitation to Discussion. Geographia Polonica 2 (1964) pp. 159—168 and by the same author: Geographical Typology of Agriculture in Poland, Methods and Problems. Geographia Polonica 1 (1964) pp. 111—146.

The climatic differences resulting from geographical situation are modified by altitude above sea level and by the topography of the areas examined. As a result the climate of certain areas situated at higher altitudes (Cergowa, Trebijovi, Petarch) is much more severe than might be expected from their geographical situation while, at the same time, areas protected from the north by mountain ranges enjoy a much warmer climate than adjacent areas (Cergowa, Petărch). As a result variations of several degrees are found in the Barsko Polje area where the mean annual temperature varies from 14—16°C, mean of July + 23 to + 26°C, mean of January + 6 to + 9°C, depending on the situation.

The proximity of the sea has also some bearing on the amount of warmth, particularly in the vegetation season. This particular influence accounts for the fact that the Baltic sea coast (Milogoszcz) exposed to masses of sea-polar air driven eastward from over the Atlantic ocean along with cyclonic depressions, is much cooler in summertime and warmer in wintertime than the Augustów plain (Hruskie) situated in the same geographical latitude but further inland, in the latter areas mean annual temperature is 1°C lower, its mean January 3.5°C lower and its mean of July 1°C higher than on the Pomeranian Sea coast.

Singularly high summer temperatures ranging from 21 to 23°C are also characteristic of inland localities which are situated on the plains along the Danube and which are protected all around by mountain ranges (Békéscsaba), or, of localities situated at the foot of the surrounding mountains inclined towards those plains (Csepreg, Nyiradony, Ritopek, Dermantsi). The frost free season is also linked with geographical situation and with altitude above sea level. Its length varies from over 150 days (Hruskie), 150—180 days (Czersk, Kruszwica, Cergowa and Petarch), 180 to 210 days (Miłogoszcz, Nyiradony, Csepreg, Békéscsaba, Ritopek, Dermantsi), 210 to 240 days (Podgorje), 240 to 270 days (Trebijovi), 270 to 300 days (Barsko Polje). While in the north snow cover lasts for over 40—50 days a year (Czersk. Cergowa, Kruszwica) and even longer than 50 days (Hruskie) it does not last more than 30 days on the plains along the Danube and drops down to under 5 days a year on the Montenegro Adriatic sea coast.

The high temperatures of the vegetation season mean that the importance of rainfall in the south is reduced owing to increased evaporation. In consequence, with an annual rainfall of the order of 600—700 mm the Baltic sea-coast is sufficiently wet to makes it possible the cultivation of a number of crops particularely adapted to an oceanic climate and to harvest a fair hay crop without irrigation, while investigated areas in Bulgaria (Petărch, Dermantsi) with an equivalent amount of

rainfall, or even slightly higher rainfall, are dry and call for extensive irrigation in order to extend the variety of crops cultivated. Even more acute in this respect is the situation on Yugoslavia's Adriatic sea coast (Barsko Polje 1000—1200 mm annual rainfall) or in its coastal mountains (Trebijovi 1500—1600 mm annual rainfall) which despite a very high rainfall are extremely dry regions where the water supply determines not only crop yields but also, to some extent, the land utilization systems and orientations.

This situation is explained by the fact that while in the north the maximum of rainfall occurs in summertime and a shortage of water usually in springtime, a much greater amount of rainfall on the Adriatic sea coast falls in wintertime and the scanty summertime rainfall quickly evaporates. In such circumstances one or another method of preserving the wintertime rainfall for its subsequent utilization in spring or summertime is imperative and, for that matter, has been in use for centuries (dry farming, irrigation). The methods, however, and the possibilities of widening their range have evolved along with the development of technology.

There are many divisions of Europe into climatic regions. On their basis one can distinguish in the area of this study three major climatic entities:

1. Central-European climate, transitional zone between the oceanic climate of Western Europe and the continental climate of Eastern Europe, temperate with a warm summer and cool winter and a maximum rainfall in the summertime which is more advantageous for root crops, than for grain crops. This climate is still, to a considerable extent, under the influence of oceanic air masses driven eastward, their influence however varies in intensity and in principle looses its vigour farther to the east (Miłogoszcz, Kruszwica, Czersk, Cergowa, Borysówka, Hruskie and in part also Csepreg and Podgorje).

2. Danubian climate, also temperate, but warmer and more continental where the Atlantic air mass do not exert any major influence. In wintertime it is affected by the high pressure from South Eastern Europe while in summertime by the Azores high pressure reaching this area from across the Mediterranean. Maximum rainfall here occurs in springtime which provides favourable circumstance especially for grain crops. Weather fluctuations here are less distinct than in the North (Nyiradony, Békéscsaba, Ritopek, Petarch, Dermantsi and to some extent also Sebeborci, Csepreg and Trebijovi).

3. Mediterranean climate — warm, subtropical, characterized by distinct seasonal changes, with a dry Summer and the rainy season in Winter (Barsko Polje, partly Trebijovi).

The above mentioned climatic differences, differences in the altitude above sea level, in the relief and the underlying geological substratum, provides the basis for a differentiation of the areas covered by this study from the viewpoint of vegetation and types of soil.

On the glacial sediments, in the North under the cover of coniferous forests (bor) there have developed various kinds of podsolized soils (Grodzisko, Borysówka, Czersk, Cergowa) although brown forest soils are also present there, especially in the western and northern sections (Milogoszcz, Cergowa). Under the cover of leafy forests these have developed from morainic sediments of the last glaciation which contain still considerable amounts of unleached calcium carbonate, from loess and prequaternary formations. Various alluvial soils (Czersk), black earths (Kruszwica) and marshy soils (Miłogoszcz, Hruskie) have been also formed here and there from various Holocene sediments.

Brown or grey-brown forest soils developed under the cover of beech or oak forests are also found to the south of the Carpathians (Nyiradony, Csepreg, Podgorje, Sebeborci, Ritopek, Petärch, Dermantsi).

Characteristic of the Danubian plains, however, are various types of chernozem soils which have been produced on different foundations. but mostly on Tertiary sea and lake sediments and also on Quaternary alluvia and delluvia, under the cover of steppe or forest-steppe vegetation (Békéscsaba, Petärch, Dermantsi). Alkali soils typical of the dry steppe, solonetz and solonetzlike alkali soils, are also found in scattered areas (Békéscsaba).

Shallow skeleton soils prevail on the slopes of the Mediterranean coast. They have developed from the various rock formations that are present there, but in the main from flysh sediments or limestones, under the cover of evergreen Mediterranean vegetation (Trebijovi, Barsko Polje). In the basins (*polja*) one encounters black soils, marshy soils, and also various gravel and sand soils which have developed on alluvial formations (Barsko Polje). Terra rossa soils also appear in the Karst depressions (Trebijovi, Velembusi).

All those natural differences bring about differentiations first of all, of the kinds of plants cultivated in the areas covered by this study. Thus, for instance, in the relatively cold and wet climate of Poland, on the acid, podsolized, largely light soils, rye and potato crops prevail, among the field crops, subsituted on less acid and more compact soils by wheat and sugar beets, though not always so. Apple, pear, cherry and plum trees dominate among perennial crops which as a rule occupy small areas. To the South of the Carpathians where summer temperatures are higher, the vegetation season longer and the climate on the whole more dry; here wheat dominates among extractive crops substi-

tuted by rye only on stretches of the most sandy soil (Nyiradony) or in mountains. In the group of intensifying crops potatoes are supplanted by maize. Of the group of structure forming plants serradella and lupine disappear altogether, while clover is rare, being cultivated mostly on the higher terrain (Podgorje, Sebeborci, Velembusi). Usually it is replaced by lucerne which is more resistant to drought but avoiding acid soils. To the North of the Carpathians it is only rarely cultivated on distinctly non-acid soils.

At the same time to the South of the Carpathians there is a marked increase in the share of perennial crops, particularly of more thermophilous such as peaches, apricots and mulberries, walnuts and vine. The role of perennial crops becomes even more prominent on the Adriatic sea coast where very often they become the dominant element in agricultural production. Also, their variety is extended to include such warm climate plants as fig trees, pomegranates, olive trees and such fruit trees as orange, lemon and persimmon which have been transferred from distant and different climatic conditions.

The share of permanent grasslands and forests also depends to a large extent on the natural conditions but even more so on topography and water conditions than on climate itself. Almost everywhere in the areas covered by this study centuries of pressure on land by the population, has resulted in forcing the forests, meadows and pastures on to lands which, for a number of reasons, are not suitable for cultivation without considerable additional investment, as for instance on to mountains with their steep slopes, shallow skeleton soils, climate that is either too wet and too cold (Cergowa, Podgorje) or too dry (Trebijovi, Dermantsi, Petarch), on to so far unmelicrated, covered with marshy soils, pradolines (Hruskie) or river valleys (Pleśnia, Ostrówik, Borki) or, finally, on to loose sands which only forest vegetation is capable of holding immobile (Coniew).

The historical past of the countries which have been embraced by this study bears heavily on the present day agriculture and its level. None of those countries were independent states at the beginnings of capitalist development, on the contrary all of them were subordinated to various occupying powers. The level of economic development of each of the occupying countries differed very much. The earliest and most vigorous development of capitalist economy was observed in Germany which before the World War I included both the Pomerania and Kujawy regions (Miłogoszcz, Kruszwica). A little later it emerged in the territories of Austria or the Austro-Hungarian empire (Carpathian, Slovenian and Hungarian villages). Tsarist Russia to which belonged the areas of Central and Eastern Poland (Borysówka, Hruskie, Czersk)

was still an economically backward country before the World War I. Of all the occupying powers, however, most backward socially, economically and culturally was Turkey and therefore the areas under its occupation (Bulgaria, Serbia and partly Montenegro) bear evidence of this occupation even up to the present day. As a matter of fact, the development of the various parts, under the occupying powers themselves, was uneven too. Industrialization as well as the of urbanization in the western provinces of the German Reich, particularly after its reunification created a highly absorbing market for agricultural products, the main supply of which was forthcoming from the poorly industrialized eastern provinces. As a result however farmers of the Poznań region (Kruszwica) and of Pomerania (Miłogoszcz) found it profitable to intensify farming, and to introduce modern (based on scientific foundations) organisational and technical ways and methods of farming which resulted directly in increased productivity, labour efficiency and marketability. Leading in this respect were the large landed estates especially privileged in this area. The progress also affected a considerable number of peasant farms which were not burdened, as was the case elsewhere, with surplus manpower, for here it found for itself an outlet in the developing industrial and urban centres.

The state of affairs was quite different on the areas under Russian occupation where agriculture saw little development resulting not only from economic, and technical backwardness of Russia itself but also from the competition on the underdeveloped internal market of the Polish territories, of grain and animal products, obtained by cheap methods of extensive farming used on the southern chernozem and steppe expanses of the Empire.

This poor development was true of both big landed estates and even more so, of the peasant farming with a relatively short (since the years 1861—1864) record of independent existence still in the fetters of remains of the feudal restrictions. In consequence the agriculture of the Polish Kingdom (Czersk, Hruskie) and still more that of the western provinces of the Empire (Borysówka, Grodzisko) overburdened with surplus manpower was even inferior to that on the territory of some genuine Russian or Ukrainian provinces of the Empire. This accounts for the fact that old fashioned farming methods i.e. three field system elsewhere given up, have been preserved there for a long time and at places even until today.

The particular parts of the Austro-Hungarian Empire also witnessed a highly diversified rate and level of economic development. The Austrian provinces which included Slovenia (Podgorje, Sebeborci) attained a relatively higher level of agricultural development to which

the large market to the quickly growing capital of the Empire — Vienna, and to a lesser degree-also other Austrian cities have contributed.

Hungary, while more backward socially and economically, where the large landlords controlled both the political and economic scene, constituted an area where owing to excellent natural conditions, agriculture saw extensive development supplying at a low cost considerable quantities of farm products not only for better industrialized Austria and Bohemia but also for export.

Situated on the periphery of the Empire and almost totally deprived of industry, with its under-developed towns Galicia (Cergowa) was a region with a highly overpopulated countryside, the resultant subdivision of farms, the size of which grew smaller from generation to generation meant that in many cases, they were less than the minimum necessary to feed their owners. Marketable surpluses were provided almost exclusively by the big landed estates.

A still more backward situation existed in Bosnia and Hercegovina freed from under Turkish occupation and then annexed by the Austro-Hungarian monarchy (Trebijovi). In the tough natural conditions of the mountains with a total lack of any prospects for development, there survived old-fashioned social and economic relations, and technically primitive, almost subsistent, farming. Only with vast outlays of labour and resources and by taking under cultivation even the smallest cultivable bits of land scattered as a rule all over the mountain depressions (polje) situated at various altitudes, this agriculture was capable of securing but poor results which were further reduced by the high and ever growing overpopulation of the villages. Considerable stretches of mountainous lands that were obviously uncultivable, were utilized for the transhumance of sheep and goats and less frequently for that of cattle. The centuries long, excessive grazing expanded along with the growth of population, kept steadily reducing the pastureland yield, and ravaged the remnants of forests thereby bringing about a deterioration in climatic conditions and, having an adverse effect on the quantity and quality of the fodder crop harvested. Very similar conditions existed in Montenegro which only in this area managed to retain to a lesser or larger extent — its independence. Agriculture in the country's coastal zone, which was annexed to Montenegro only in 1878 (Barsko Polje), recorded relatively higher productivity and marketability on account of both, of its better natural conditions, and its contacts with neighbouring countries more advanced economically.

In the course of the 19th century first Serbia (Ritopek) and then Bulgaria (Petarch, Dermantsi) managed gradually to be liberated from Turkish domination. In both countries the invaders had driven the local

population into less accessible mountainous regions, hardly favourable for agriculture. It was only after independence was regained that the Turkish landlords, especially numerous in Bulgaria, gradually left the countries, and their estates were divided among the local peasantry. Since that time in these countries slowly developing agriculture had a markedly smallholding character; in both countries, too, in view of the lack of any outlets for surplus manpower, population in the countryside has been still on the increase bearing heavily on the agriculture; again in both countries an overwhelming number of farms followed primitive and old fashioned methods of field work hence agricultural productivity was low and marketability insignificant. By and by Bulgarian agriculture enjoying more favourable natural conditions reached a slightly higher level of development.

The first world war resulted in great political change in the areas embraced by this study. The Polish state was reborn from the territories that were captured by Germany, Austria and Russia; Hungary becomes an independent country, while reunification of the South Slovonic territories seized at different times by Turkey, Austria and Hungary, created Yugoslavia.

The inter-war period did not result in any major economic development and the progress made by agriculture was insignificant. The cutting off of markets with which the agriculture was traditionally associated had its repercussions in its extensification in many parts of those countries (Greater Poland, Slovenia). In view of slow development of industry and urban centres overpopulation in the countryside increased. The world economic crisis, whose effects were felt until the last years of the interwar period, also took its toll on agriculture in these countries.

The 2nd world war left these countries badly ravaged. Movements of the battlefront, guerilla fighting, repression and looting by the occupant forces which were inflicted upon Poland and Yugoslavia, fighting on the side of the Allies resulted in heavy losses in life and property. Forced to take part in the war on the side of Germany and Italy, Hungary and Bulgaria managed, at first, to escape major destruction, however, they too, experienced mounting economic difficulties and the fighting which in the last phase of the war, went on in their territory, brought great havock. Thus in all these countries the major effort in the first post war years was directed to rebuilding the countries. This is why only several years after the war the prewar level of agricultural production was reached.

The conditions in which the countries were liberated from under nazi or fascist occupation involved a change of the economic and social

system in all of them. The four countries embraced by this study like the other countries in this zone are now socialist countries. Still, the development of the socialist economy as far agriculture is concerned has been fairly different. Agricultural reform has been carried through in all of them and as a result the big landed estates, very numerous especially in Hungary, less so in Poland, few in Yugoslavia and very few in Bulgaria were abolished and the land which they owned either distributed among peasants or used to form state farms. Within a few years after the war these countries started to organize, at a different pace, collective farming.

Table 1

The share of agricultural land under socialist farms in the countries of East-Central Europe

Countries	1950	1955	1957	1961
Bulgaria	59,1	63,3	85,4	87,6
in that state farms	1,2	3,8	3,7	6,3
Hungary	11,0	32,0	29,0	93,4[1]
in that state farms	4,8	12,6	12,6	33.0
Poland	10,4	22,7	14,6	13,3
in that state farms	8,6	13,5	13,4	12,1
Yugoslavia	20,9	7,2	9,7	13,8[1]
in that state farms	3,0	4,3	5,4	6,5

[1]) 30 march 1962,

Sources: Razvitie ekonomiki stran narodnoi demokratii. Moscow 1961. B. Stružek: Rolnictwo europejskich krajów socjalistycznych. Warszawa 1963.

As a result, while in certain countries (Poland, Yugoslavia) small scale peasant farming is predominant with various kinds of socialist or transitional forms of farming (state farms, collective farms, cooperatives) existing side by side with it, in others (Bulgaria, Hungary) individual farming tills only an insignificant part of agricultural land, the overwhelming majority of land being utilised by large scale collective farms (usually the former peasant villages) or state farms (usually the former landed estates — table 1). Some of these countries (Bulgaria) have moved in recent years to the next stage of collectivisation, that is combining the collective farms which corresponded to the former settlements, into bigger units. Owing to this reform the overall number of collective farms in that country has been reduced by two thirds.

The long period of agricultural underdevelopment in the countries covered by this study account for the fact that inspite of having scored an undeniable progress in the post-war years, the agriculture of East-Central Europe continues to be retarded in its development both, from the point of view of farm structure (Poland, Yugoslavia) and the

organizational and technical measures undertaken (manuring, mechanisation, scientific bases of farming methods, productive orientations as well as productivity, labour efficiency and marketability). The socialization of farming and the organization of the large scale socialist farms is meant to enable these countries catch up with the time and, particularly, to modernize and rationalize the methods and orientations of farming, to boost productivity, labour efficiency and marketability of agriculture.

2. INTERNAL CHARACTERISTICS OF AGRICULTURE

a. Social and Property Features of Agriculture

This study has covered all social-and-property forms of agriculture which are encountered in the countries under study. Of the 44 units examined 31 were individual villages, 5 collective farms and 8 state farms. In countries where, like in Poland and Yugoslavia, individual farms prevail they naturally were the main object of research although 6 state farms in Poland and 1 state farm in Yugoslavia were also included into the analysis. In Bulgaria where collective farms dominate they have been studied while 3 collective farms and 1 state farm were examined in Hungary.

However, within the framework of the three groups of farms there appear substantial differences, particularly as regards size.

Though following the land reform agriculture in all three countries turned first into small scale peasant farming yet the different conditions existing in the particular areas as well as the varying amount of land from the big estates to be distributed accounted for the fact that the size of individual farms greatly differs. While in Kujawy and Pomerania and in Slovenia (Kruszwica, Milogoszcz, Podgorje, Sebeborci) farms which are relatively large or medium scale predominate (7—20 ha); in Central and Eastern Poland (Czersk, Borysówka, Grodzisko), only medium or small (2—7 ha) farms prevail. Subdivision of land is particularly striking in the Carpathian villages (Cergowa) where farms of 2—5 ha are dominant in size and also in Serbia, Hercegovina and Montenegro villages. Although the average size of farms in some (Trebijovi) is quite large, most of their land represents non-agricultural land or dry rough pastures with low productivity. A particularly extensive sub-division of land is to be found in the Montenegro villages (Barsko Polje) where over 90% of the farms have under 2 ha of land. It is only vast expenditure of labour and, intensive utilization of every bit of land fit for cultivation mostly of perennial and annual crops together that can safeguard the minimum of means for subsistence. The situation is

further deteriorated by fragmentation and dispersion of fields and, also, impossibility of introducing any after-crops without irrigation, because of summer droughts.

Differences as regards the size of villages and the socialized farms have also been recorded. In Poland both individual villages and the collective farms created on their basis as well as state farms created on the basis of the former landed estates are rather small. The size of the majority of the individual villages in Poland that have been covered by this study is between 100 and 500 ha. In only three cases (Cergowa, Sławsko, Czersk) are they larger. At the same time in four cases

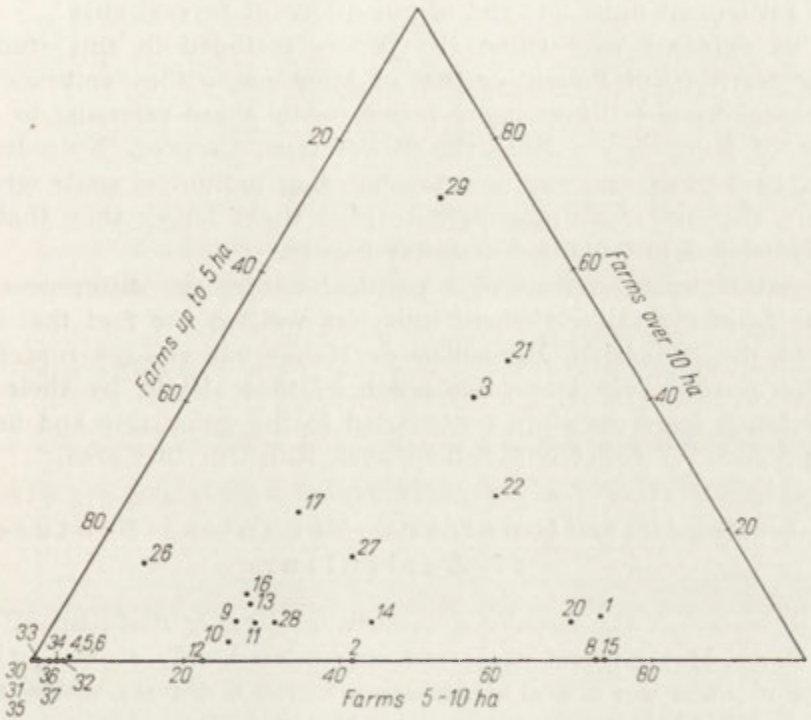

Fig. 1. Size of individual farms in percent of total number of farms
Figures shows particular units of study, see enclosed list

(Rzepiszyn, Brzumin, Borki and Kępa Radwankowska) the units concerned were mere hamlets with only 45—80 ha of land. The size of the state farms in Poland is also smaller. The area of the 5 state farms covered in this study ranges from 300 to 500 ha.

The settlement units in Slovenia that were encountered in this study were not very large either (500 to 700 ha) while the settlement

units in Montenegro under study are very small indeed and even after several of them are combined into one administrative unit they rarely exceed more than 100 ha. It was only in two cases that the area of such combined administrative units (Bjelisi-Polje and Zaljevo-Podi) exceeded this limit.

The situation in this respect is quite different in the countries along the Danube. With the exception of the mountainous areas, large settlement units with a population of several thousand and several thousand ha of land prevail. The size of some of the units that have been examined in this region, ranges from 1700 ha (Ritopek) to over 9600 ha (Nyiradony), and it must be borne in mind that these are the basic settlement units and not combinations of several ones.

This explains why when the papers included in this study refer to the territory of Poland or that of Montenegro they embrace several settlement units (villages, state farms) while those referring to the territory of Hungary or Bulgaria (Bekescsaba, Csepreg, Nyiradony, Petärch, Dermantsi) are confined to analysing individual units whose size is four, six and sometimes eight to nine times larger than that of the units analysed in Polish or Yugoslav papers.

Apart from differences of a political nature the differences in size of the fundamental settlement units (as well as the fact that a major part of the Bulgarian, Rumanian or Hungarian villages represent the results of relatively late colonisation of those lands, by their present inhabitants) have certainly centributed to the quick rate and unhampered progress of collectivisation of agriculture in this area.

b. Organizational and Technical Features of Agriculture

Almost all of the examined units were largely made up of agricultural land. Major forest areas are encountered only at Podgorje while Trebijovi owns considerable areas of degraded forests which are currently utilized as pastures.

There is a much more marked diversification as regards the share of arable land in agricultural acreage depending on the proportions of permanent grassland (Hruskie, Trebijovi) or perennial crops (Czersk, Ritopek, Barsko Polje). Utilization of arable land in the agricultural units examined also differs very much, as regards both ways and orientations of their utilization. Naturally, the most striking differences are observed between the individual and socialized farms. In the former land, cultivation techniques ranges from primitive manual cultivation with the use of hoe or a wooden plough or even an ard (Barsko Polje,

Trebijovi) drawn by oxen or cows through cultivation with the use of a horsedrawn iron plough and other horse drawn implements, very common in peasant farming in all this area, to a more mechanized peasant farming to be found in Greater Poland, Pomerania and Slovenia. In the state and collective farms, farming is mechanized although, it has to be admitted, their level of mechanization varies considerably. In peasant farming dung manuring prevails; its amout is closely linked with the number of livestock, not always sufficiently large to

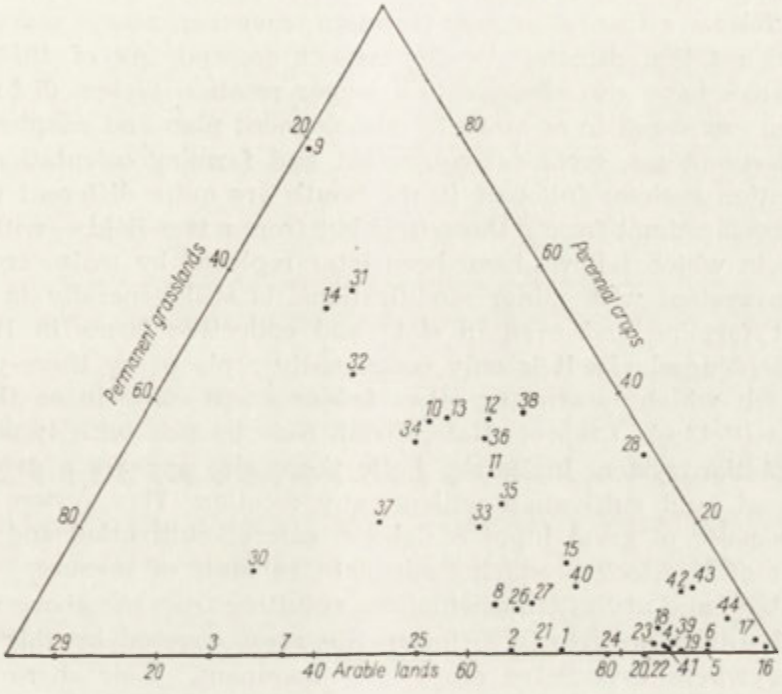

Fig. 2. Land utilization percent of total agricultural land
Figures show particular units of study, see enclosed list

ensure adequate maintenance of land fertility. Major quantities of artificial fertilizers are used only by individual farms in Western Poland and Slovenia. Considerable quantities of artificial fertilizers and correspondigly less manure per 1 ha are utilized both by collective and by state farms. However, generally speaking both the level of mechanization and the extent of manuring observed in these areas, in the majority of cases falls far short of the level in West European countries.

As far as rotation systems are concerned there is a large variety of

them [2]. A three-field-system in a more or less modified form has been preserved in the North-East (Borysówka, Grodzisko, Hruskie). Peasant farming in Central Poland, Southern Poland and Pomerania follows a three year rotation without fallows on looser soils, (Coniew, Czersk, Podgorje) and a not too-strict four year rotation similar to the Norfolk system on more compact soils (Cergowa, Miłogoszcz). An intensive two--year rotation is frequently encountered in suburban zones (Kępa Radwankowska, Królewski Las, Ostrówik) under which half of the arable land is occupied by potato and vegetable crops and half by grain crops. Farmers in Greater Poland (Kruszwica) and Slovenia (Podgorje) follow either a regular rotation covering many years or an optional rotation directed to the market demand. As of 1956 Polish state farms have also changed to a longer rotation system (5 to 8 year rotation) envisaged in advance by management plan and adapted to the natural conditions, technical equipment and farming orientation.

Rotation systems followed in the South are quite different for they have developed not from a three-field but from a two-field — with-fallow system in which fallows have been later replaced by maize crop. This rotation system with minor modifications, is still generally in use, in peasant farming and even in state and collective farms in Hungary, Bulgaria, Yugoslavia, it is only occasionally replaced by three-year rotation ich which lucerne or other fodder crops come in as the third element (Petarch, Csepreg State Farm). Side by side with typical two-year rotation system in Barsko Polje there also appears a garden-like system of land cultivation without any rotation. This system is possible because of great input of labour, careful cultivation and a large number of livestock producing adequate amounts of manure.

Arable Land utilization orientations resulting from the above methods of land utilization greatly differ in the areas covered by this study [3].

Everywhere exhaustive crops are dominant, their share in the villages of Northern Poland (Borysówka, Hruskie, Jasionka, Gąski, Kładno, Śmiechów and also Sebeborci in Slovenia) exceeding even 60% of the total crop area. Their share drops to over 40% only in some state farms (Cergowa, Gąski, Pleśnia) where they are overtaken by structure-forming crops, and in the Warsaw suburban zone (Coniew,

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[2] Crop rotation systems in Poland see J. Kostrowicki The Agricultural Problems Involved in the Polish Land Utilization Survey. Land Utilization. Methods and Problems of Research. Warsaw 1962 pp 75—84.

[3] The method of grouping of crops, see introductory article to this volume and first of all J. Kostrowicki: The Geographical Typology... op. cit.

[4] The method of defining orientations of arable land utilization see above.

Ostrówik) where intensifying crops are more prominent. The share of exhaustive crops is fairly low, dropping down to 40—50% and even under 40%, in certain Bulgarian (Petärch), Hungarian (Csepreg State Farm), and Yugoslav farms (Ritopek and Trebijovi, particularly in the Barsko Polje area where they rarely take more than 10% of the total area under crops. It is only at Zaljevo-Podi and Velembusi that this

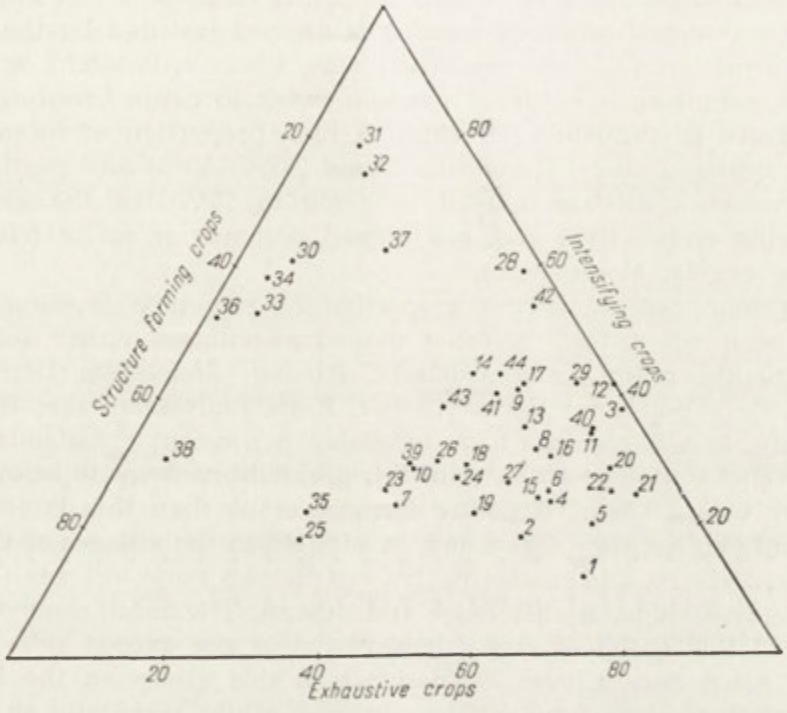


Fig. 3. Arable land utilization percent of total sown land. Figures show particular units of study see enclosed list

limit is exceeded, however, even there, too, they do not occupy more than 18 and 27%.

Among the exhaustive crops group in Poland, particularly on the poorer land of the peasant farms, rye dominates whereas on better soils, particularly in state farms, wheat is more important (Cergowa, Kruszwica) while in a very few cases, at places where it is grown for industrial purposes, barley is as important as rye or wheat (Sławsko, Rzepiszyn, Kładno State Farm). On very poor soils in the mountain regions or in North Eastern Poland (Królewski Las, Ostrówik) oats co-dominates with rye.

Wheat is by far the most important crop in this group south of the Carpathians. Only in the case of very poor soils it is superceeded by rye (Nyiradony) or even equalled (Sebeborci). Again, as in the North, in areas specializing in the growing of malting barley, the barley crop is as important as wheat (Csepreg Collective Farm).

The share of intensifying crops does not exceed 10% throughout the area of the classical three-field system (Borysówka) and ranges between 10 and 20% in Eastern and Central Poland. It reaches 30 and sometimes 40% where intensification of farming is deemed justified by the proximity of a market (Warsaw sub-urban zone, Ritopek, Petărch) or where intensive manuring is rendered possible owing to cattle breeding based on extensive pasturelands (Hruskie). A high proportion of intensifying crops is typical also on Hungarian farms (40 to 50%) and particularly on Yugoslavia's Adriatic coastal zone (50 to 75%). In the group of intensifying crops either potatoes prevail (Poland) or maize (Hungary, Bulgaria, Serbia, Montenegro).

Even more varied is the proportion of structure forming crops. It has been noted that in some individual villages either following predominantly grain farming (Gąski, Kładno, Śmiechów, Dermantsi) or in some sub-urban villages (Czersk, Kępa Radwankowska, Ritopek) or, finally, in villages that have extensive permanent grasslands (Hruskie, Trebijovi) the overall share of this group drops down to below 10%. A higher proportion of structure forming crops than this is characteristing only on the state farms and, in addition in the villages of Coniew, Podgorje, Petărch, and in the majority of Barsko Polje villages (Velembusi, Tomba-Čeluga, Bjeliši Polje and others). The most common proportion of this group of crops, however, does not exceed 20% of the total of sown area. Clover is dominant in this group on the heavier soils in Poland, less frequently so lucerne while serradella or lupine prevail on the lighter soils. In the other countries lucerne and less frequently clover prevail.

This kind of crop pattern accounts for the fact that in the units examined we deal most frequently with a two-directional orientation of arable land utilization which is determined by exhaustive and intensifying crops (cereal—ridged up crop or ridged up — cereal orientations). It is only in some units, mostly socialized ones, that the share of structure-forming crops (mostly fodder crops) is sufficiently high to be taken into account when establishing orientation. Even less frequent are the one-directional orientations connected with a strikingly one-sided utilization of arable land in the given unit.

Arranging the above mentioned orientations of arable land utilization they can be grouped in the following manner.

I. Specialized orientations

1) highly grain orientation, rye (E_4ry) (Borysówka) which appears on the three-field-with-fallow area,

2) highly ridged up crop orientations, maize (I_4mz) Stari Bar, Zaljevo-Podi,

3) highly ridged up crop orientation, maize-vegetable (I_4mz, vg) — Bartula.

The two latter orientations in Barsko Polje area.

II. Cereal — ridged up crop or ridged up crop — cereal orientations

4) rye-potato orientations with a larger or smaller prevalence of exhaustive over intensifying crops — Hruskie ($E_4ry + I_2pt$), Borki, Czersk ($E_3ry + I_2pt$), Podgóra ($E_3ry + I_1pt$), Gąski, Śmiechów ($E_4ry + I_1pt$) — typical for most of Poland.

5) Oats-rye-potato or potato-oats-rye orientations with a balance between exhaustive and intensifying crops — Królewski Las ($E_3ot, ry + I_2pt$), Ostrówik ($E_2ot, ry + I_3pt$) which are connected with poor soils or with a shorter vegetation season. In both cases the proximity of a market (suburban zone) is demonstrated through a higher proportion of intensifying crops (potatoes and vegetables).

6) rye — wheat (or wheat — rye) — potato orientations with a smaller or larger prevalence of exhaustive over intensifying crops — Kładno ($E_4ry, wh + I_1pt$), Jasionka ($E_4wh, ry + I_1pt$), Cergowa ($E_3wh, ry + I_1pt$), Brzumin and Kępa Radwankowska ($E_3ry, wh + I_3pt$) which may be encountered on better soils or in regions with a long tradition of wheat growing.

7) wheat orientation with potatoes Lipowica ($E_3wh + I_1pt$) which appears just as those above

8) wheat-barley-potato — or barley-potato orientations Rzepiszyn ($E_3bl,wh + I_3pt$), Sławsko ($E_3bl,ry + I_2pt$), prevailing over areas which specialize in Poland in growing barley for brewing

9) barley-wheat-maize orientation Csepreg collective farm ($E_3bl, wh + I_2mz$), a Hungarian parallel of the former orientation.

10) wheat-maize or maize-wheat orientations with various proportions of exhaustive and intensifying crops: Dermantsi ($E_3wh + I_2mz$), Békescsaba, Trebijovi ($E_3wh + I_3mz$), Ritopek ($E_2wh + I_3mz$) which are typical of the Danubian countries. The higher proportion of intensifying crops is a result of its placing in respective suburban zones.

11) rye-maize orientation — ($E_3ry + I_3mz$) Nyiradonyi which is a parallel to the former orientations only on poor soils.

12) wheat-rye orientation with potatoes and maize — ($E_4wh, ry + I_1pt, mz$) Sebeborci which is transitional between the rye-potato and wheat-maize orientations.

III. Cereal-leguminous orientations

13) rye orientation with clover — Grodzisko ($E_3ry + S_1cv$), which is found in areas which originated from the three—field system where, depending on soil conditions, clover, serradella or lupine are grown on former fallow field.

14) wheat-barley-rye orientation with clover or lucerne — Rożniaty State Farm ($E_3wh, bl, ry + S_1cv, lc$) which is one of the orientations of state farming adopted for land with good soil.

15) crop mixtures with rye orientation — Pleśnia State Farm ($E_1ry + S_3mx$) — a transitional orientation adopted when the basic orientation is being changed.

IV. Ridged up crop — leguminous orientations.

16) maize — lucerne or lucerne — maize orientations — Bjeliši Polje, Tomba-Čeluga ($I_3mz + S_3lc$), Burtaiši ($I_3mz + S_2lc$), Topolica ($I_2mz + S_4lc$) characteristic of the intensive farming at Barsko Polje.

17) vegetable orientation with lucerne ($I_4vg + S_2lc$) adopted on land belonging to the town of Novi Bar.

V. Mixed orientations: cereal — ridged up crop — leguminous

18) rye — lupine orientation with potatoes — Coniew ($E_2ry + I_1pt + S_2lp$) common on the light soils of Central Poland.

19) wheat orientation with potatoes and clover — Gąski State Farm ($E_2wh + I_1pt + S_2cv$), Kładno State Farm ($E_3wh, bl + I_1pt + S_1cv$), characteristic of state farming on heavy soils in the wet climate of Pomerania.

20) wheat orientation with potatoes, sugar beets and lucerne ($E_3wh + I_1pt$, $bs + S_1lc$) — Kobylniki State Farm, characteristic of productive state farms in Poland working on good soils, rich with calcium carbonate and in a relatively dry climate.

21) wheat — clover orientation with rapeseed ($E_2wh + I_1rp + S_2cv$) — Cergowa State Farm, characteristic of state farme in the midcarpathian valley.

22) clover orientation with wheat and maize ($E_1wh + I_1mz + S_3cv$) Velembusi on the slopes of Barsko Polje valley.

23) wheat orientation with potatoes and lucerne ($E_3wh + I_1pt + S_1lc$) Podgorje at the foot of Slovenian Alps.

24) wheat — maize — lucerne orientation (eventually with mixtures) Petärch ($E_2wh + I_1mz + S_1lc$) Csepreg State Farm ($E_2wh + I_2mz + S_1lc, mx$) in the hilly fringes of the Danubian plains.

Though perennial crops, are present almost throughout all the units covered by this study, in the North however, they are represented in most cases only by small orchards and farm-yard gardens where farmers grow several fruit trees and shrubs along with vegetables to meet their own needs. Wherever there occurs a degree of farm subdivision connected with a high population density, this kind of orchards tend, mostly in some sub-urban areas, to become larger farm gardens and orchard units which yield some marketable production. Where there exists a big market demand or other circumstances which favour the growing of definite perennial crops, considerable commercial orchards develop distinctly aimed et market production (commune of Czersk, Ritopek). To a lesser degree and rather in the form of interrow cultivation some annual crops are grown in such orchards. It is in this direction that goes the typically Mediterranean (Barsko Polje) mixed intercalary cultivation *(coltura promiscua)* of numerous kinds of fruit trees and bushes, vines as well as vegetables, bashtani [5], maize and

[5] The term *bashtani* (Russian *bakhcheviye)* includes a whole series of crops which are of similar agrotechnical and economic importance as watermelons, musk melons, pumpkin, calabash and sometimes eggplants, paprika, tomatoes

even grain, lucerne and so on, which being, frequently disorderly inter-cultivated cover considerable areas of land. Side by side with the mixed cultivation the uniform plantations of some crops, as for instance, olive trees, citrus fruit trees and vineyards are since long ago in Mediterranean lands. Often these are terraced.

As a matter of fact, intercultivation is not, a characteristic only of the Mediterranean countries. It was and is until present widespread in peasant farming of Yugoslavia, Bulgaria and Hungary.

In addition to arable land predominating there and farm-yard gardens and orchards every farmer owned one or more plots of perennial crops in a detached section where he was free to grow whichever kind of fruit trees or, shrubs or vines he liked as well as vegetables, bashtani, maize, wheat, lucerne and so on.

This system of land utilization tends to have disappeared along with the progressing socialization of farming and to be replaced by bigger and more uniform orchards, vineyards, fruit-shrub and strawberry plantations and so on. Nevertheless, intercultivation of vegetables and bashtani continues to be generally practiced, although on a much smaller scale and in a more uniform way, mostly in young orchards (Dermantsi, Csepreg).

Growing of vegetable and even grain but most frequently of green leguminous mixed crops between the rows of perennial crops, young orchards especially, is also a common practice in Poland where, in the Warsaw sub-urban zone, to the South of the city (Czersk), perennial crops take up a percentage of land equalled by that encountered in the Mediterranean countries. Along-side uniform orchards and plantations of fruit shrubs and strawberries the intercultivation of various combinations of those crops in found there.

Apart from farm-yard orchards, which often happen to be fairly neglected, the larger areas or perennial crops found in the regions covered by this study were, usually, carefully looked after (soil scarification, manuring, trimming down, insecticide spraying and so on). The exception to this rule are the olive tree groves at Barsko Polje which are more exploited than taken care of.

Depending on the predominance of this or that species among the perennial crops one can distinguish various orientations in perennial crop growing. This task, however, is rendered difficult by the intermingling of particular elements which, has the results that instead of reporting the respective crop area (not possible at all in the case of

and so on. It is a highly useful term allowing a joint discussion of the group of plants grown'en masse in the fields which distinctly differ from vegetables and other fodder or intensifying crops.

intercultivation) statistics quote most often the number of trees and shrubs and only sometimes giving areal data for uniform plantations. Since the area of land occupied by particular trees or shrubs of the various kinds of perennial crops differs, there cannot be devised any common measurement unit such as the area of sown land represents in case of arable land.

Reducing on many various ways the species of those crops to a common denominator it was possible to distinguish-throughout the area covered by this study the following perennial crop orientations:

1. apple tree (Czersk, Coniew)
2. apple — and — pear tree (Kobylniki)
3. apple — and — cherry tree (Królewski Las, Ostrówik)
4. cherry — and — apple tree (Brzumin)
5. apple — plum — cherry tree (Borki, Podgóra, Kępa Radwankowska)
6. apple — plum tree — vineyard (Dermantsi, Sebeborci)
7. apple tree — vineyard (Nyiradony)
8. vineyard — cherry — apricot tree (Ritopek)
9. vineyard — orange tree (Novi Bar)
10. orange tree (Topolica)
11. fig — olive tree (Bjeliši-Polje)
12. olive tree (Tomba-Čeluga, Zaljevo-Podi, Burtaisi, Bartula, Stari Bar, Velembusi).

In the areas concerned permanent grasslands occupy, as a rule from 10 to 30% of agricultural land. It is only on the fertile Kujawy and the Hungarian plains (Kruszwica, Csepreg, Nyiradony) as well as in some over—populated villages of the mid — mountain valleys (Jasionka, Lipowica) that this proportion was smaller, showing less than 10% of the total agricultural land. Permanent grasslands absorb 30% of agricultural land in the pradolines (Hruskie) and in river valleys (Pleśnia, Ostrówik, Borki) or, finally, in mountainous areas (Trebijovi, Zaljevo-Podi). Depending primarily on natural conditions, on irrigation in the first place — but also on the social form of farming, the grasslands are either mown or else utilized as pastures. The largest stretches of mown meadows are to be noted there where permanent grasslands appear on inundated sites with either organic soil, which means bog meadows (bielawa), or mineral soil which means inundated meadows (łęg) — (Hruskie, Rzepiszyn, Sebeborci, Nyiradony, Borysówka, Grodzisko, Sławsko, most villages in the commune of Czersk and others).

By far the largest areas of pastures can be found in the mountains, on the post forest sites of grond or regel type of mountain meadows (Cergowa, Lipowica, Cergowa State Farm), on natural alpine meadows or, finally, on the sites of natural or secondary associations of xerothermic vegetation (Trebijovi, Velembusi, Zaljevo-Podi, Stari Bar,

Bartula). They can also be seen in places where owing to adequate rainfall the post-bor pastureland becomes fully utilizable (Gąski State Farm, Kładno State Farm, Gąski). It has been also established that under the same natural conditions because of less pressure on land state farms tend to have, as a rule, more pastureland and less meadows than the individual peasant farms do.

A balance between the amount of meadow- and pasture-land is typical for state farms of Kujawy and Pomerania, of the Danubian lands (Békéscsaba, Csepreg, Dermantsi) and the units situated an the bottom of the Bar basin (Burtaiši, Bjeliši Polje, Topolica).

An attempt at comparison between the degrees of intensity of farming in the areas concerned is by no means an easy one. Adopting the simplest method of symptoms of intensity [6] would make it possible to accept the share that intensifying crops have in the sown land as an index. This method, however, is not adequate unless the intensity of cultivation of the crop dominant in this group is similar. Thus, for instance, the share of the group of intensifying crops in Poland — where potato is the major item in this group — turns out to be a fairly good symptom of intensity of farming. This is valid, of course, only in so far as arable land is concerned.

A comparison between the respective proportions of this group in various parts of Poland reveals, for instance, that of the farming units examined the most intensive utilization of arable land is that in the villages of Brzumin, Kępa Radwankowska and Ostrówik, all of them located in the Warsaw sub-urban zone, as well as in the villages of Rzepiszyn and Hruskie (ever 35% intensifying crops). On the other hand, the lowest degree of intensity of arable land utilization has been noted in the villages of Borysówka, Grodzisko and Pleśnia State Farm (under 20% intensifying crops). These estimates could be considered as acceptable. However, if those result are confronted with ones scored by farming in countries where maize is the main component of the group of intensifying crops, a crop which cultivation in principle is less intensive than potato, than the results of the confrontation are disappointing. The share of intensifying crops, mostly maize in those countries, is much higher than the one in the potato zone and almost all farming units that were examined showed over 35% of intensifying crops. Again, however, if the farming units of this zone separately are compared with each other we may get reliable results. They will indicate that the highest intensity of arable land utilization in this zone (over 50% intensifying crops) is scored in Barsko Polje villages, with the exception of

[6] see note No 1.

Velembusi, and in the Hungarian villages, in Ritopek and Dermantsi (40 to 50% intensifying crops). Accordingly, the lowest intensity of found in Topolica, Velembusi and Trebijovi (20 to 30% intensifying crops) which, again seems to tally with the facts.

The conclusion which may be derived from the above is that the share of intensifying crops as a symptom of intensity is not an index that could be succesfully employed for drawing larger comparisons between areas with various structure of crops in the group. The resultant differences, as a matter of fact, could be levelled by the employment of the co-officients of intensity of cultivation of the particular crops, — a method widely used especially in German studies —. However, attempts to employ them in special studies of larger areas have revealed shortcomings not so much in the method itself as in the coefficients which, apart from ignoring the fact that one and the same plant can be cultivated more or less intensively, seem to reflect mostly the expenditure of labour, rather than the total of means-and-labour outlay.

The adoption of the method of intensity co-officients for the purposes of spacial research into intensity of agriculture should, in this situation, be closely re-examined, particularly so as the method itself is rather labour absorbing. This study, on the other hand, without attempting to capture intensity as a whole, has adopted the method most frequently used in Soviet studies, i. e. the method of several selected indices of intensity. The material compiled made it possible to use indices reflecting the following outlays:

1) outlays of labour per area unit expressed in the number of employees per 1 ha,

2) outlays of means per area unit expressed in the number of draft animals per 100 ha of arable land (or agricultural land),

3) outlays of means expressed in the amount of manuring which is measured according to the number of big animal units per 100 ha of agricultural land,

4) index of means outlays, otherwise very good, expressed in the number of tractors (convertible) per 100 ha of arable land, was not applicable in this case due to the fact that in the area covered by this study tractors are owned almost exclusively by state and collective farming.

As regards the number of people employed in agriculture there are considerable differences observed in the areas in question, first of all, between large scale state and collective farming and small scale peasant farming. But there are also territorial differences even within the framework of each of the two groups of farms. In the individual farms

of Barsko Polje the number of people employed in agriculture ranges between 100 and 150 persons per 100 ha of agricultural land. This quota is much lower only at Novi Bar. In the Carpathian villages in Poland (Cergowa commune) there are also more than 100 people employed in agriculture per 100 ha of agricultural land. On the other hand, in the villages of Eastern and Central Poland (Borysówka, Grodzisko, Czersk commune and so on) the number of people employed in agriculture amounts to only 40—60 persons per 100 ha of agricultural land, while in the villages of Western Poland (Sławsko, Gąski, Śmiechów) of Slovenia (Podgorje, Sebeborci) and in the collective and state farms of Hungary (Csepreg, Nyiradonyi, Békéscsaba) and Bulgaria (Dermantsi) there are only 20—40 people employed per every 100 ha of agricultural land. The lowest employment figures of between 20 and 15 persons per every 100 ha of agricultural land are characteristic of the Polish state farms (Kobylniki, Rożniaty, Gąski, Kładno, Pleśnia and so on). Large areas of extensively utilized meadows and pastures result in an artificial reduction of this index (Hruskie, Cergowa State Farm, Trebijovi) creating a pretence of the low intensity of the agriculture. In such cases a much more appropriate index would be one concerning cultivated land, that is to say arable land and perennial crop land. Adoption of this index might reveal a high intensity of agriculture in such villages as Hruskie and Trebijovi where the amount of actually cultivated land is very small.

There are similar variations observed in the numbers of draft animals per 100 ha of arable land. The lowest index of under 10 heads per 100 ha is reported from the Polish state farms (Kładno, Gąski, Kobylniki, Rożniaty), then from Petărch and the Hungarian farms (Csepreg and Békéscsaba) and from Topolica. Relatively higher index figures are found in the Barsko Polje villages where hoe cultivation is widely practiced, and singularly in Stari Bar where oxen and cows are the basic draft animals rather than the small Montenegran horses which are used rather for transport purposes. Somewhat higher indices were found in the individual villages of Greater Poland (Sławsko, Rzepiszyn), in the Carpathian villages (Cergowa commune), and in Sebeborci and Nyiradonyi (10—20 heads per 100 ha of arable land). As many as 20 to 30 heads of draft animals per 100 ha of arable land were found in the villages of Białystok and Pomerania regions, in the villages of Warsaw area and in Yugoslavia (Borysówka, Grodzisko, Hruskie, Czersk commune, Ritopek, Trebijovi).

This particular index appears invalid whenever one is faced with various kinds of work animals at the same time, with animals of varying size and strength and utilized either for draft or transport purposes,

(i. e. as mount or pack animals). This index is also invalid there where cows are utilized partly as draft animals since they are not considered in statistics as such and, finally, where there is little arable land. Evidence of this may be found in the Barsko Polje area where this index shows substantial variations. Thus per 100 ha of arable land there are about 7 heads at Novi Bar (only horses) and Stari Bar (only oxen), about 13 heads at Burtaisi (only horses), about 20 heads at Bjelisi — Polje and Tomba — Čeluga (half oxen, half horses), over 35 heads at Velembusi (in that number more than 20 oxen), about 60 heads at Zaljevo — Podi (in that number 45 oxen), and about 100 heads (of which more than half are oxen) at Bartula, a village which has as little arable as only 13 ha of land. Although acceptance in such cases of an index per 100 ha of cultivated land (arable land and perennial crops) or agricultural land would result in the reduction of those disproportions (from 1—4 heads ad Stari and Novi Bars to over 30 heads at Bartula and Zaljevo — Podi) it would hardly be justified. After all draft animals are but rarely used for the purposes of intercultivation among perennial crops, while olive groves not cultivated for years, do not call for any expenditure of live animal work at all.

It is an interesting observation that while species of productive animals stay almost unchanged all over the area concerned and only the number per area unit, proportions and breeds change, it is not so at all with work animals, where both the species and its purpose are liable to change. While in the North the horse is the only draft animal that is used also for transport purposes, in the Danubian countries it is reinforced with ox and in Bulgaria even with the buffalo. This differentiation increases even more in the Mediterranean zone where along with horses, used almost entirely for transport, donkeys and mules are also used as pack or mount animals, on the other hand cattle (oxen and cows) are used for field work.

The third of the above mentioned indices of intensity of agriculture, expressed in the extent of dung manuring seems to be more representative with the only reservation that it is better to introduce the so called "dung animal units" rather than big animal units which are more suggestive of animal weight.

The highest intensity of manuring was observed in the Barsko Polje villages, then successively in the sub-montane and mountainous villages of Slovenia (Sebeborci, Podgorje), the Carpathians (Lipowica and Jasionka) and in the suburban villages (Czersk, Borki, Petarch). Accordingly, the lowest indices were those on the Polish state farms. (State Farms Plesnia, Rozniaty, Gaski and Kładno) and in those farming units which have large areas of extensively utilized pasturelands (Trebijovi,

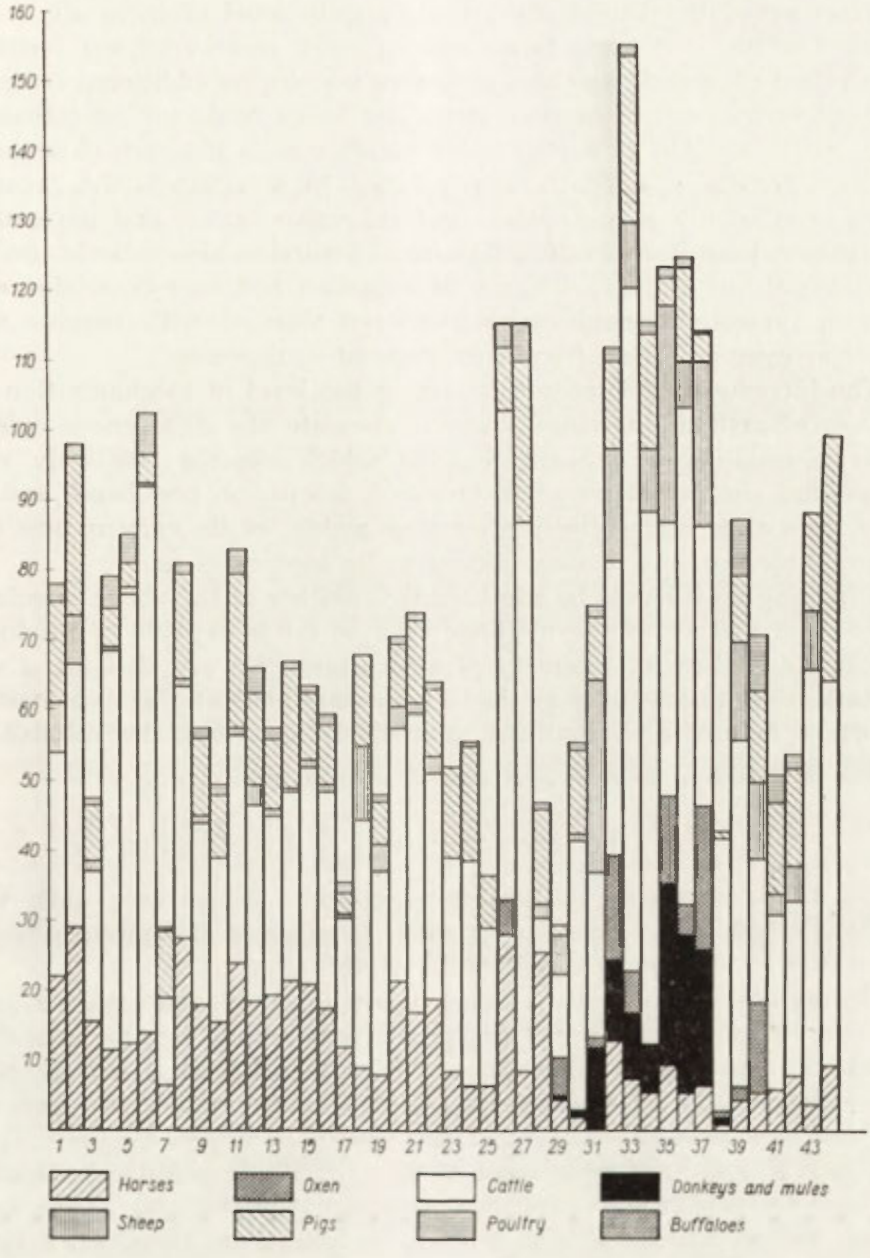


Fig. 4. Livestock breeding (Number of big animal units)
Figures show particular units of study, see enclosed list

Hruskie). Representative of both the characteristics Cergowa State Farm recorded the lowest manuring intensity level of them all. It goes without saying that State farms use up much more artificial fertilizers than private farms do and this may give a welcome additional indicator. Without further data, however, this extra index could not be introduced here. All in all this manuring index yields results that are close to the index of density of agricultural population by pointing to the generally lower level of intensity on state and collective farms, and particularly the former, than in individual farming. This index also reflects the higher intensity of individual farms in suburban and over-populated areas than in typically agricultural regions not worried with surplus man-power or even suffering from a shortage of man-power.

The introduction of indices reflecting the level of mechanisation and the use of artificial fertilizers would alleviate the differences existing between small scale peasant farming which absorbs relatively more labour and simpler forms of mechanized labour, on one hand, and the large scale state and collective farming which, of its very nature uses up much more of mechanized labour in its higher forms.

Summing up it has to be admitted that neither of the above mentioned indices and neither of the methods used so far is capable of producing a clear cut picture of intensity of agriculture. We are still faced with the task of working out a method of measurement of this typologically important feature of agriculture, a method that would be suitable for spatial research.

3. Economic Features of Agriculture

The reduction of agricultural production to comparable units with the help of grain units made it possible to estimate the productivity of agriculture in the area covered by this study.

The highest productivity of agriculture (over 42 and even 48 grain units per 1 ha) in the areas concerned was scored by the urbanized units or located in sub-urban zones of big cities (Czersk, Brzumin, Kępa Radwankowska, Petărch, Stari Bar). Remarkable productivity was also observed in some well managed state farms (Komorniki, Csepreg, Topolica, Rożniaty) as well as in some villages of Western Poland (Sławsko, Rzepiszyn) which enjoy favourable natural conditions and where, agriculture has maintained a high level for a long time. However, agricultural productivity in most units examined in this study ranges between 30 and 40 grain units per 1 ha.

The lowest productivity of agriculture (under 24 grain units per 1 ha) was noticed in units which either included considerable areas of extensi-

vely utilized and little productive meadows or pastures (Trebijovi, Hruskie, State Farm Cergowa) or followed backward farming systems (Borysówka, Velembusi).

The problem of productivity looks somewhat different if one approaches its two integral parts, that is crop productivity and productivity of livestock breeding, separately. In fact in both cases the lowest indices (for identical reasons) were observed in the same units as before, however, the particular units on higher-up positions were rearranged as far as animal production is concerned. Most dominant here were the

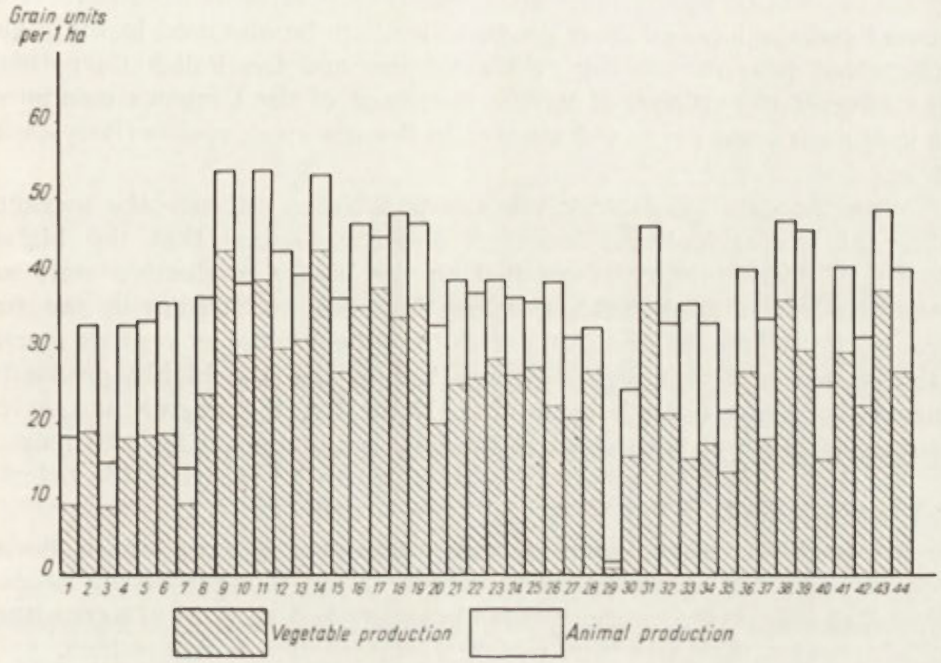


Fig. 5. Agricultural productivity in grain units per 1 ha
Figures show particular units of study, see enclosed list

submontane and mountain villages of Slovenia, Montenegro, and the Polish Carpathians (Bjelisi - Polje, Burtaisi, Podgorje, Petărch, Lipowica, Cergowa) which have adopted a largely dairy cattle orientation. At some distance they are followed by sub-urban villages and the above mentioned state farms.

The important index of effectiveness of agriculture is represented by productivity or efficiency of labour estimated approximatively in grain units of agricultural production per 1 person employed in agriculture. The existing differences in this respect are quite considerable ones

and they reflect, to a high extent, both the level of mechanization of agriculture, and the subdivision of peasant farms as well as over-population of the villages. The top labour productivity is displayed by state and collective farms in Poland (Kobylniki, Rożniaty, Cergowa, Gąski, Kładno, Pleśnia) between 200 and 300 units per on person employed, in Hungary between 90 and 200 units (Bekescsaba, Csepreg, Nyiradony) and in Bulgaria (Dermantsi, Petărch) about 70 grain units.

As regards individual farming the indices generally oscillate between 40 and 100 grain units per one person employed, they soar above the upper limit only in some highly productive villages of Greater Poland (Sławsko) and of the Warsaw suburban zone (Ostrówik, Czersk). On the other hand the lowest labour productivity is to be observed in the highly subdivided peasant farming of Montenegro and the Polish Carpathians (majority of the villages of Barsko Polje and of the Cergowa commune), as well as in some backward villages in the Białystok region (Borysówka, Grodzisko).

With the data available it was not possible to estimate the marketability of the agriculture, however, one can assume that the highest degree of marketability is reached on the highly productive state and collective farms (Kobylniki, Csepreg, Topolica and others in the first group, and Békéscaba and Csepreg in the other) while as regards marketability per area unit, in this group belong also the highly productive sub-urban farms (Czersk commune). Naturally, the degree and extent of marketability of both plant and animal production differ still more.

The last economic feature of agriculture to be raised is the orientation of farming [7].

Before the dominant orientations are discussed at some length, however, it might be well worthwhile to give some thought to the proportions that exist between the various branches and sections of agriculture, which provide the basis from which the orientation is determined.

In an overwhelming majority of the units that have been examined within the scope of this study, plant production prevails over animal production often constituting as much as 60—80% of the gross production. It was only in four villages (Rzepiszyn, Brzumin, Ostrówik and Ritopek) that it was seen to have exceeded the upper figure of 80% of the total gross production, whereas only in two cases (Trebijovi, and Bjeliši Polje) was animal production bigger than plant production. Plant production and animal production were about equal only in seven cases (Cergowa, Jasionka, Lipowica, Borysówka, Grodzisko, Podgorje and Bur-

[7] Cf. the introductory article to this study as well as the items mentioned in note No 1.

taisi). It need not be said that these proportions would have been different had we taken as a basis the net production.

Assuming that entire fodder crop is fed to livestock on the spot, which is likely only for individual farming and particularly low com-

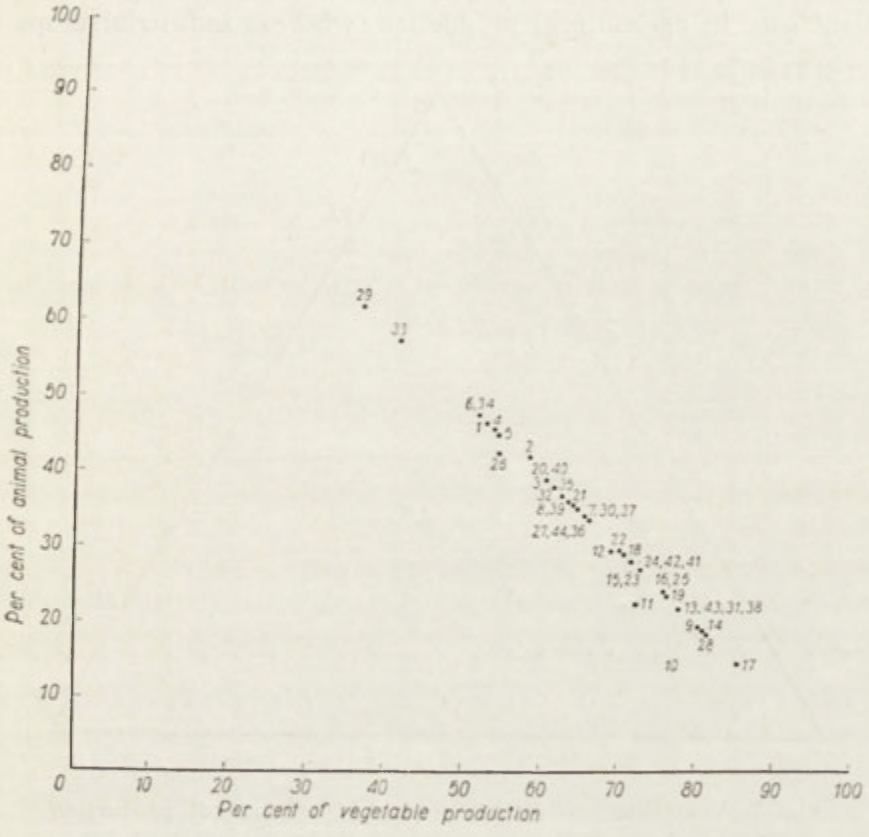


Fig. 6. Gross production in grain units
Figures shows particular units of study see enclosed list

mercial farms, and comparing what was left of plant production with animal production one find that plant production predominates only in 22 out of the 44 cases examined. These are, first of all, sub-urban villages (almost entire Czersk commune, Ritopek) and most of the villages of Barsko Polje (with the exception of Bjelisi Polje, Burtaisi and Topolica), hence everywhere where perennial crops play a major role, as in both the individual and state farms of Kujawy and the villages of the great Pannonian plain and its borderland (Csepreg State Farm, Nyiradony, Sebeborci). Moreover, plant and animal production are balanced in Bekescsaba, Csepreg State Farm, Dermantsi and Borki, — that

is to say in units that are of a similar type. On the other hand a high prevalence of animal production is typical of villages in North-Eastern Poland, of highly specialized state farms (Cergowa, Pleśnia, Topolica) and of Trebijovi and Bjeliši-Polje.

A relative prevalence of fodder crops over food crops is the most frequent case in agricultural production, whereas industrial crops seem

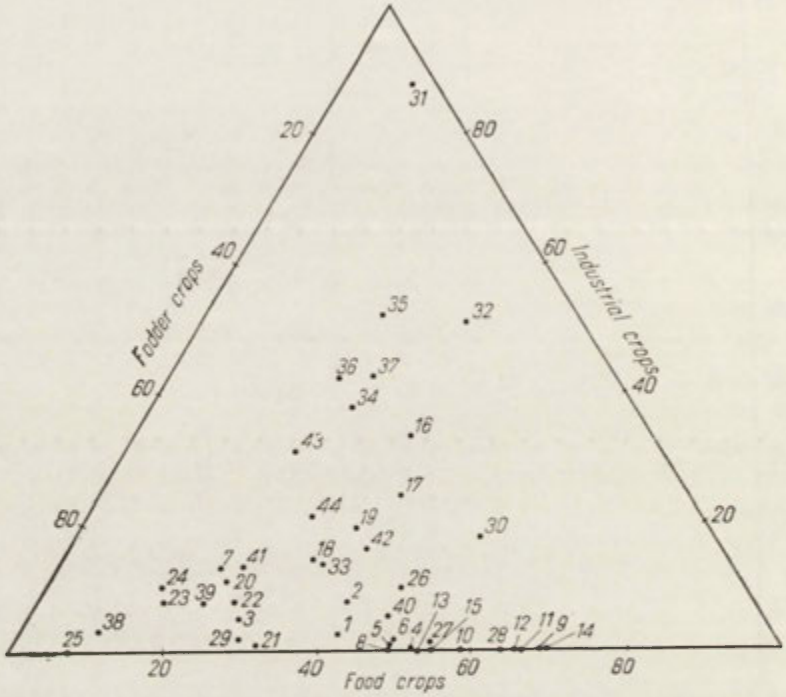


Fig. 7. Vegetable production, percent of total plant production
Figures shows particular units of study see enclosed list

to play the least important role in an over-whelming majority of the units examined.

Food crops represent usually 20—40% of plant production while this percentage drops down to under 20% only in several more specialized state farms (Pleśnia, Gąski, Kładno) and soars to over 40% only in sub-urban (Ostrówik, Kępa Radwankowska, Coniew, Czersk, Brzumin, Podgóra, Ritopek, Novi Bar) or sub-montane villages (Cergowa, Lipowica, Sebeborci).

Fodder crops constitute usually 30—50% of plant production. This percentage stays under 30% only in 3 villages of Barsko Polje specialising in the growth of olive trees (Stari Bar, Bartula, Velembusi) and

exceeds the upper limit of 50% in areas which have considerable stretches of permanent grasslands (Trebijovi, Cergowa State Farm, Hruskie and others) or in a number of socialized farms (Pleśnia, Topolica, Gąski, Kładno and Kobylniki State Farm as well as in Petarch and Bekescsaba) with a distinct cattle breeding or fodder crop production orientation,

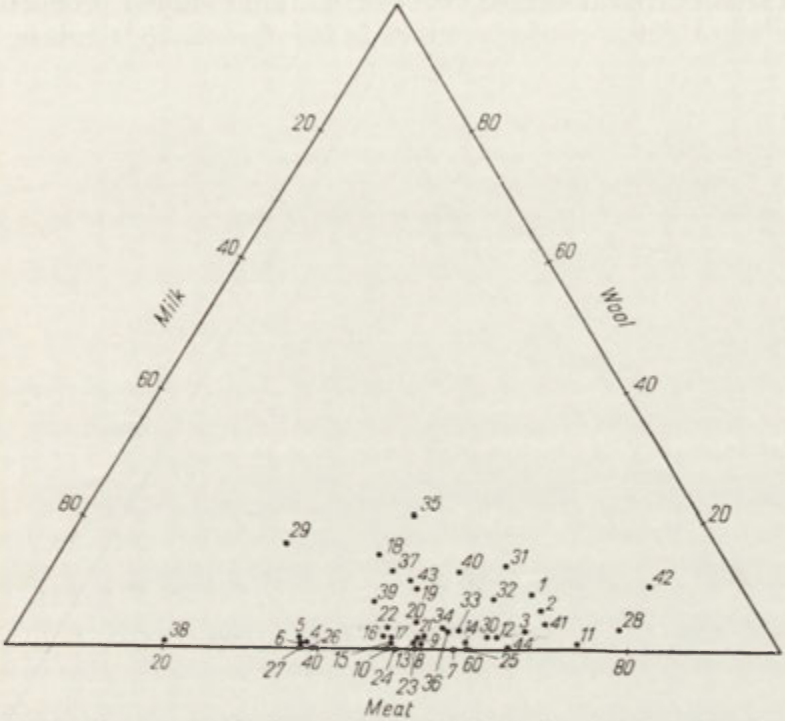


Fig. 8. Animal production I. Percent of total animal production
Figures show particular units of study, see enclosed list

or finally in individual villages with a distinct livestock breeding orientation.

Industrial crops do not usually surpass 10% of plant production and if they do, it is mostly in the socialized farms where they reach anything between 10 and 20%. A rather larger production comes only from regions with olive tree plantations as well as from several units which specialize in sugar beet and the growing of malting barley (Csepreg, Sławsko, Rzepiszyn).

As far as animal production is concerned there is relative prevalence of meat which amounts to 40—60% of the total. Milk production usually represents 30 to 50%, wool less than 10% and eggs up to 20%.

Topolica is the unit with the most distinctive specialisation in milk

production (77% of the total) and it is followed by mountain or sub-montane villages of Poland and Slovenia (Cergowa, Jasionka, Lipowica, Sebeborci).

In some sub-urban villages (Ritopek, Czersk, Stari Bar), in villages of North Eastern Poland (Borysówka, Grodzisko, Hruskie) in Bekescsaba and Dermantsi milk represents less than 30% of animal production.

Production of meat exceeds 60% of the total animal production only in a few units which specialize either in pig (Grodzisko, Hruskie, Czersk,

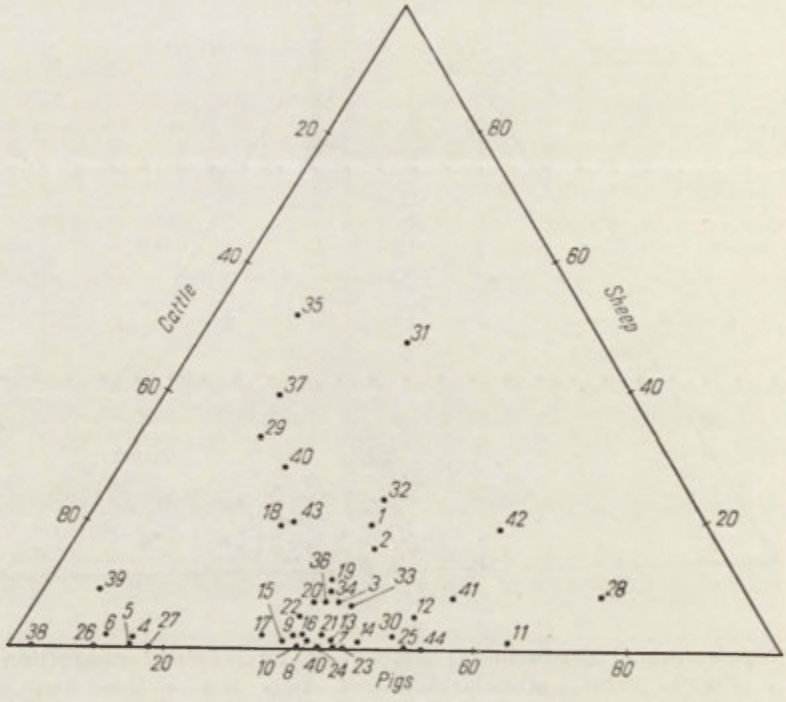


Fig. 9. Animal production II. Percent of total animal production
Figures show particular units of study, see enclosed list

Csepreg Collective Farm, Nyiradony) or in beef cattle and sheep (Trebijovi) breeding.

The highest proportion of wool (over 10%) in animal production is recorded in Kobylniki and Csepreg State Farms as well as in Stari Bar, Velembusi, and Zaljevo-Podi — i.e. in localities which used to rear considerable numbers of sheep.

As far as egg production is concerned Ritopek and Békéscsaba are definitely predominate in this field (over 20% of the total animal production) and they are followed by Nyiradony and Dermantsi as well as by the Carpathian and several of the sub-urban villages in Poland

(Brzumin, Coniew, Kępa Radwankowska). It should be pointed out finally, that in the Bulgarian villages production of honey is also of major importance.

A major part of animal production is provided by cattle (40—60%), a little less by pigs (30—50%), while sheep give under 20% and poultry also less than 20%. The variations in the share of the different kinds of livestock animals, in the total animal production, and even some degree of specialization, are on the whole quite distinct.

Thus, for instance, cattle represents more than 60% of the animal production especially in the sub-montane areas of Slovenia and the Polish Carpathians (Podgorje, Sebeborci, Lipowica, Jasionka, Cergowa). Apart from this some degree of specialization in cattle breeding is noticeable in Petărch and especially in Topolica where it provides over 80% of the total animal production.

Specialization in pig breeding is observed, first of all, in the villages of the sub-urban zones (Czersk, Ostrówik, Kępa Radwankowska and Ritopek) and in the Hungarian collective farms (Csepreg Collective Farm, Békéscsaba, Nyiradony).

Sheep breeding provides the largest part of animal production in the villages of Montenegro, Hercegovina and Bulgaria (Stari Bar, Velembusi, — over 40%, Zaljevo-Podi, Trebijovi, Dermantsi, Petărch 30 to 40%). Those areas are followed (20—30%) by the Białystok region villages connected with the three-field system, by Kujawy state farms with thoroughbred sheep orientation, and by Csepreg State Farm, Nyiradony and Bartula.

It is only in Ritopek and Bekescsaba that poultry breeding takes up more than 20% of animal production, although in the Carpathian, Warsaw zone and Pomeranian villages as well as in Dermantsi and Nyiradony poultry breeding also constitutes a considerable part of the animal production.

Dermantsi is also the only village where a considerable part of animal production (meat and milk) is obtained from buffalo breeding.

An analysis of the above mentioned proportions within the framework of the particular units makes it possible to group them in the following way:

I. Highly vegetable orientations
  A. Food, fruit with fodder orientations
    1) apple with potato and meadow hay, highly productive — $5 \times V_4 (a_2 ap + f_1 pt, mh)$ Ostrówik, Warsaw sub-urban zone,
    2) apple with potato, highly productive, $5 \times V_4 (a_2 ap + f_1 pt)$ — Brzumin, Warsaw sub-urban zone,
    3) apricot — grape with maize, medium productive $3 \times V_3 (a_2 at, v + f_1 mz)$ — Ritopek, Belgrade sub-urban zone,

B. Food — fodder — industrial orientations

4) wheat-potato-mixtures-sugar beet, fairly productive
$4 \times V_4 (a_1wh + f_1pt, mx + i_1bs)$ — Rzepiszyn, Kujawy plain, Greater Poland, a small village inhabited mostly by non-farming or part-time farming population.

II. Vegetable orientations

A. Food — fodder orientations

a) fruit — fodder or vegetable-fodder with milk-meat or meat production orientations,

5) apple with potato, meadow hay and dairy cattle, fairly productive,
$4 \times V_3 (a_2ap + f_1pt, mh + A_1 (cd) lm$ — Coniew, Warsaw sub-urban zone,

6) apple with potato and dairy cattle, fairly productive
$4 \times V_3 (a_2ap + f_1pt + A_1 (cd) lm$ — Królewski Las, Warsaw sub-urban zone,

7) apple with potato and pig breeding, highly productive
$5 \times V_3 (a_2ap + f_1pt) + A_1 (pk) m$ — Czersk, Warsaw sub-urban zone,

8) strawberry-wheat-rye with potatoes, mangolds, pigs and dairy cattle, fairly productive,
$4 \times V_3 (a_2wh, ry, sw + f_1pt, bf) + A_1 (pk + cd) m$ — Kępa Radwankowska, Warsaw sub-urban zone,

9) vegetables — grapes — lucerne with pigs and dairy cattle, medium productive
$3 \times V_3 (a_1vg, v + f_1lc) + A_1 (cd + pk) m$ — the town of Novi Bar in the Barsko Polje basin, Montenegro.

b) grain — fodder with milk-meat or meat orientations

10) wheat — lucerne with dairy cattle, highly productive
$5 \times V_3 (a_1wh + f_1lc) + A_1 (cd) lm$ — Kobylniki State Farm, Kujawy plain, Greater Poland,

11) rye-wheat-lucerne with dairy cattle, fairly productive
$4 \times V_3 (a_1ry,wh + f_1lc) + A_1 (cd) lm$ — Rożniaty State Farm, Kujawy plain, Greater Poland,

12. rye with potato, meadow hay and dairy cattle, fairly productive
$4 \times V_3 (a_1ry + f_1pt, mh) + A_1 (cd) lm$ — Borki
$4 \times V_3 (a_2ry + f_1pt,mh) + A_1 (cd) lm$ — Podgóra
small villages in the Warsaw area, with an orientation that is characteristic of Central Poland,

13. rye-wheat-potato-meadow hay with dairy cattle, fairly productive
$4 \times V_3 (a_1ry, wh + f_2pt, mh) + A_1 (cd) lm$ — Kładno, Baltic Coastal Plain of Pomerania,

14) wheat-rye-meadow hay with dairy cattle, medium productive
$3 \times V_3 (a_1wh, ry + f_1mh) + A_1 (c_1d) l$ — Sebeborci, Slovenia

c) grain-fodder with meat production orientations

15) rye-maize with pigs, medium productive
$3 \times V_3 (a_1ry + f_1mz) + A_1 (pk) m$ — Nyiradony, a large collective farm in the north-eastern part of the Great Hungarian Plain,

16) wheat-maize with wool-mutton sheep and dairy cattle, medium productive
$3 \times V_3 (a_1wh + f_1mz) + A_1 (swm + cd) m$ — Dermantsi a very large colective farm at the northern foothills of the Balkan mountains.

B. Food-fodder-industrial crops with milk-meat orientations

17) rye-mixtures-sugar beet with dairy cattle, fairly productive $4 \times V_3 (a_1ry + f_2mx + i_1bs) + A_1 (cd) lm$ — Sławsko, the Kujawy Plain, Greater Poland.

C. Food-industrial crops with meat orientation

18. pomegranate-olive with dairy cattle and pigs, medium productive $3 \times V_3 (a_1pg + i_1ol) + A_1 (cd + pk) m$ — Bartula, Barsko Polje.

D. Fodder orientations

a) fodder crops with milk-meat or meat orientation

19) potato-mixtures-pasture with dairy cattle, medium productive $3 \times V_3 (f_2pt, mx, ps) + A_1 (cd) lm$ — Gąski, Baltic Coastal Plain of Pomerania,

20) meadow-mixtures with dairy cattle, fairly productive — $4 \times V_3(f_2mh,mx) + A_1(cd)lm$ — Śmiechów, Baltic Coastal Plain of Pomerania,

21) clover with dairy cattle, fairly productive — $4 \times V_3(f_2cv) + A_1(cd)lm$ — Gąski and Kladno State Farms on the Baltic Coastal Plain of Pemerania,

22) maize-lucerne with dairy cattle, fairly productive $4 \times V_3(f_2mz,lc + A_1(cd)lm$ — Petarch collective farm, Sofia sub-urban zone, Sofijsko Polje, Bulgaria; — $4 \times V_3 (f_3mz_2lc_1) + A_1(c_1d)l$ — Topolica experiment station, Barsko Polje,

b) fodder crops with meat orientations

23) maize with pigs, fairly productive — $4 \times V_3(f_2mz) + A_1(pk)m$ — Békescaba collective farm in the southern part of the Great Hungarian Plain.

24) maize with pigs and dairy cattle, fairly productive — $4 \times V_3(f_2mz) + A_1(pk + cd)m$ — Csepreg collective farm on the Hungarian western borderland,

25) fodder mixtures with dairy cattle and pigs, fairly productive — $4 \times V_3(f_3mx) + A_1(pk + cd)m$ — Pleśnia State Farms on the Baltic Coastal Plain of Pomerania,

26) clover with dairy cattle, medium productive — $3 \times V_3(f_2cv) + A_1(cd)m$ — Cergowa State Farm, the Polish Carpathians,

27) potato-meadow hay with dairy cattle, little productive — $2 \times V_3(f_2pt;mh) + A_1(cd)m$ — Hruskie, Augustów Plain, Biebrza river pradoline, North-Eastern Poland.

E. Fodder-industrial with meat-milk or meat orientation

28) maize-sugar beet with dairy cattle, highly productive — $5 \times V_3(f_1mz + i_1bs) + A_1(cd)lm$ — Csepreg State Farm on Hungarian western borderland,

29) maize-lucerne-olives with dairy cattle, fairly productive — $4 \times V_3(f_1mz,lc + i_1ol) + A_1(cd)m$ — Tomba-Čeluga, Barsko-Polje,

30) maize-olives with dairy cattle and mutton sheep, medium productive $3 \times V_3(f_1mz + i_1ol) + A_1(cd + sm)lm$ — Zaljevo-Podi, Barsko-Polje,

F. Industrial crops with meat or milk-meat orientation

31) olives with mutton sheep, fairly productive — $4 \times V_3(i_3ol_3) + A_1(sm)m$ — Stari Bar, Barsko Polje,

32) olives with mutton-wool sheep, low productive — $2 \times V_3(i_1ol) + A_1(sw, m)l$ — Velembusi, Barsko Polje.

III. Vegetable — animal orientations

A. Food-fodder crop-milk orientation

33) potato-clover-dairy cattle, medium productive $3 \times V_2(a_1pt + f_1cv) + A_2(c_1d)l$ — Cergowa, Jasionka, Lipowica in the Polish Carpathians,

34) potato-meadow hay-lucerne-dairy cattle, fairly productive — $4 \times V_2(a_1pt + f_1mh,lc) + A_2(cd)l$ — Podgorje in the sub-alpine zone of Slovenia.

B. Food-fodder crop-meat orientations

35) rye-meadow hay-clover (or lupine) — dairy cattle — pig, medium (or low) productive — $3 \times V_2(a_1ry + f_1mh,cv) + A_2(cd + pk)m_1$ — Grodzisko; $2 \times V_2(a_1ry + f_1mh,lp) + A_2(cd + pk)m_1$ — Borysówka, both Podlasie Lowland, North-Eastern Poland.

C. Fodder-milk-meat or fodder-meat orientations

36) maize-lucerne with dairy cattle, fairly productive — $4 \times V_2(fmz,lc) + A_2(c_1d)m_1l_1$ — Bjeliši-Polje, Barsko Polje bottomland,

37) maize-lucerne with dairy cattle, medium productive — $3 \times V_2(fmz,lc) + A_2(c_1d)m_1$ — Burtaiši, Barsko Polje bottomland.

IV. Animal orientations

38) dairy and beef cattle with pastures, low productive — $1 \times V_1(fps) + A_3(c_1db)l_1$ — Trebijovi, mountain karst area of Southern Hercegovina.

3. TYPES OF AGRICULTURE

Since no precise methods of integration of the typological features of agriculture have been as yet devised anywhere and since their elaboration would call for another studies and a series of tests that would clearly exceed the frame work of this study [8], no claim is made, of course, to having made a final and precise list of the types of agriculture encountered in the area under study. A comparison of the typological features as discussed above provided however the basis for the following considerations and conclusions:

In the socialist countries at present a mixed social-property structure exists in which by side, in various proportions, are individual, collective and state farms. Furthermore, in certain countries individual farming is prevalent (Yugoslavia, Poland) although it also exists to a smaller or larger extent in the remaining countries (Bulgaria, Hungary) where state and collective farming is distinctly dominant. Individual farming, despite all the transformations it has undergone in recent years, represents — as regards the productive, technical and organisational as well as the social-property features — the continuation of the types of agriculture which developed in this region as far back as capitalist and even feudal times. The case with state and

[8] Cf. J. Kostrowicki. The Typological Geography... op. cit.

collective farming is however different one, here a radical change of the social-property relationship has been followed by a number of changes of an organisational-technical and productive nature.

Despite those important differences the state and especially collective farming, too, has not been able to break off from the ways and orientations of farming which developed in this area over the centuries, to raise radically the productive effects, to ignore the natural conditions nor, in its fundamental mass to break off with the general level of science, technique and economics of the given time and place.

It has to be granted, of course, that socialized agriculture follows more scientific farming methods, more advanced technique, uses more artificial fertilizers and less human labour per area unit and production unit, and as a result obtains a higher labour efficiency as well as marketability of agriculture. On the other hand much less distinct differences appear in the field of productivity, and farming orientations, of the socialized and privately owned farms which have either identical or similar external conditions (natural, historical, economic and so on). The differences that there are usually take the form of a higher proportion of plant production, a higher proportion of structure-forming crops, fodder crops, and industrial crops, and a smaller proportion of intensifying and food crops, in the state farming than individual farming.

Since, moreover, peasant and socialized farming in the area under study inevitably influence one another, since both state and collective farms and peasant farms are influenced by the socialist state in the form of direct or indirect planning (through obligatory farm product supplies, advance contracting and farm product price control), since, furthermore, the present social-property ralationsships in the socialist countries can be regarded as a transitional stage in the transformation of small-scale peasant farming into large scale socialized farming, this present mixed structure of the social-property relationships of agriculture in these countries can be claimed to be representative of socialist agriculture at the given stage of its development. Within this framework one can single out a number of types of agriculture of the lower order that are definable on the basis of their organizational, technical and economic (productive) features.

On the basis of the papers included in this volume one can trace the following types of agriculture in the are covered by this study, types which perhaps are not always of the same taxonomic level. The mutual relationships of the types, their further differentiation, and their range can be revealed through further study which should be based on more ample basic material though perhaps it does not need to be so detailed.

a. Central European Agriculture

This type of agriculture in the area under examination is derived from the peripheral form of West European agriculture and with regard to the latter it is marked by strong relics of feudal agriculture both in the field of social-property relationships (economic domination of landlord farming on the one hand, and the numerical domination of small scale peasant farming on the other, and all the contrasts involved) and in technical and organizational features, as for instance, prevalence of the traditional ways of farming over those based on modern science and technique, a prevalence which is on the increase further to the East and which is paralleled by decreasing productivity, labour efficiency and marketability. The introduction of the socialist system doomed the landlord large scale farming, and small scale peasant family farming became dominant. Inspite of considerable progress in recent years this peasant farming is still strongly overburdened with remnants of old traditional agriculture, and this is reflected in the extensive differentiation of its farming methods, intensity, productivity and marketability and farming orientations, between units situated in the West (Kruszwica, Slovenian villages) and those further to the East (Borysówka, Grodzisko, Hruskie, Cergowa commune).

The other external factor of agricultural diversification in this area is represented by the conditions of the natural environment and especially by the differences between the lowland areas which pursue a rather vegetable farming orientation and where animal production is mainly for meat, provided mostly by pig breeding, and the mountain areas, where side by side with lowland farming encountered in the mountain valleys and inter-montane basins, one can see a balance between vegetable and animal production, or even a prevalence of the latter, orientated towards dairy products.

Among the features of this type of agriculture as a whole, is the prevalence of medium sized (5—20 ha) and in the Carpathians small (2—5 ha) farms owned by peasants, and relatively small collective (70—200 ha) or state farms (300—500 ha). This is a result, of course, of the existence in this area of small settlement units. The proportion of arable land is relatively high in the lowland and somewhat lower in the mountainous areas, a low mechanization index with the horse as the main work-animal and, also further to the East, inadequate manuring much below the actual requirements of the soil are also common. Organic manuring and an irregular and short rotation of crops (3—4 years) prevail in peasant farming. On the other hand

there is a high mechanization level, with extensive mineral manuring and a long term crop rotation fixed in advance, in the socialized farming, especially on the state farms. Among other characteristics of this agriculture is a relatively high proportion of extractive crops (50—70% in private farms and 30—50% in state farms). Depending on the natural conditions, the level of agriculture and the size of the farms either rye or wheat prevails or less frequently oats or barley, together with a medium or high proportion of intensifying crops (10—40% in private farms and 15—30% in state farms) with usually potato, less frequently sugar beets dominating, and structure-forming crops (5—25% in private farms and 15—30% in state farms) with clover on heavy soils or sometimes lucerne or mixed crops, while on the lighter soils serradella or lupine dominate. The dominant arable land utilization orientations lies in two directions; ($E_{3\text{-}2}$ *ry(wh, bl, ot)* + + $I_1/_2$ *pt*) and less frequently in three + $S_1/_2$ *cv(lp, sr)*.

In the West, because of the longer vegetation season and the higher level of agriculture, after-crops are very popular (mostly mixtures of leguminous crops or grain-leguminous crops combinations). Permanent crops — among which apple-tress, pear trees, cherry trees and plum trees are most common do not play any major role. Permanent grasslands limited to areas which are not fit for cultivation, apart from mountain areas, yield worthwhile crops only if the water problem has been solved, that is to say if the land has been improved.

Plant crop represents 50—85% of the total agricultural production of which 25—50% in private farming and 10—35% in state farming are food crops, 30—65% and 45—75% respectively fodder crops, and 0—30% and 10—20% respectively industrial crops, largely sugar beet, malting barley, rapeseed and flax.

As regards animal production, much more extensive in the mountainous than the lowland sub-type, the dominant products are milk (25—55%) and meat (30—60%), milk prevailing in the mountain sub-type. The bulk of meat production is pork from pigs fed mainly on potato. Beef cattle breeding is almost non-existent and also sheep breeding is negligible both in the lowland and in the mountainous areas. In individual farms, eggs play an important role. Meat poultry breeding is feebly developed but locally geese flocks are popular. Mixed vegetable with animal or vegetable-animal orientation of farming are predominant the latter especially in the mountain sub-type and on private farms with prevalence of food-fodder, fodder or fodder-industrial crops production with dairy cattle and pig breeding, or-in the mountains-with dairy cattle only. The agriculture is medium or fairly productive (25—50 grain units per 1 ha), labour efficiency

and marketability is rather low in private farming and still on the decrease going to the East. At the same time it is fairly high in state farms (20—100 grain units per one person employed on private farms as against 200—300 grain units on state farms).

b. South-East European Agriculture

This type can, perhaps, be adequately called the Pannonian or Danubian agriculture. While the West European agriculture, and along with it also its Central European form, may be traced back to the three--field system which was dominant in the Middle Ages everywhere North of the Alps and Carpathians — the South Eastern agriculture has developed from the two-field-with-fallow system which was widespread, South of those mountains. Today, that latter system is almost as extinct as the three field system with fallow is in the North, for in time the fallow land was replaced by a maize field.

In a modified form however this system has survived until the present (Trebijovi, Ritopek) and is quite common even in the large--collective farming (Dermantsi, Bekescsaba, Nyiradony). Owing to the introduction of the third field of structure-forming crops this system has evolved in some places into a three-year crop rotation system (Petărch, Csepreg State Farm). Just as in the Central European agriculure there are various differences involved here which are connected with the natural conditions (lowland and mountain sub--types) social-property relationships as well as with the historical past and finally with the level of development of the agriculture in the various countries and regions. In fact, a spatial picture of this differentiation is much complex than in the North.

Among the salient features of this type of agriculture is the prevalence of small-family farms in individual farming assembled in very big, rural settlements, and thus very big (1500—9000 ha), collective and state farms. A further feature is the medium or very high level of mechanization in socialized agriculture while there is an almost total absence of any mechanization in private farming. Among draft animals, apart from horse, the ox, and in Bulgaria the buffalo play an important role. The intensity of manuring, with increasing use of mineral fertilizers. is not particularly impressive, however, in view of the very high natural fertility of the soil, it is often sufficient. In the lowland sub-type of this agriculture some 70—90% of the total land is used as arable land while in the mountain sub-type arable land is supplanted by dry, low yield rough pasturelands extending over considerable areas. In both sub-types agriculture is marked by a so-

mewhat lower share of exhausting crops (35—50%) than is common in Northern agriculture, with a marked prevalence of wheat (less frequently — of barley and in the mountain areas or on sandy soils — of rye). At the same time there is a much higher share of intensifying crops (30—50%) among which there is a striking prevalence of maize, very frequently, especially in peasant farming, inter-cultivated with pumpkin and beans. Bashtani and sun-flower crops play an important role; potatoes are grown higher up in the mountains or as vegetables in the gardens. The share of structure-forming crops is rather low in individual farming but clearly on the increase (5—30%) in collective and state farming. Lucerne prevails in this group and only gives way to clover at higher altitudes. The most common orientations of arable land utilization are two direction wheat- maize

$$E_3/_2\ wh(ry, bl) + I_2/_3\ mz.$$

After-crops are becoming more popular particularly green maize, green rye, and so on.

The share of perennial crops among which, in addition to apple and plum trees, there are many peach and apricot trees, walnut and chestnut trees and most important of all vineyards take up as much as 10% of agricultural land. Locally this percentage may be surpassed in specialized areas while in the mountain sub-type it frequently drops to nought. Plant production constitutes 60—80% of the gross production. Of this amount 20—40% in the socialized farming and 30—55% in individual farming represent food crops, 40—70% coonstitute fodder crops (mostly maize) and 5—30% in socialized as against less than 10% in private farming represents industrial crops. Locally, the share of industrial crops, chiefly of tobacco or sun-flower as well as sugar beet is often higher than this.

As regards animal production which is smaller in the lowland and higher in the mountain sub-types — meat is here the dominant item (40—70%). In the case of the lowland the primary of that production is pig herd fed on maize, whereas in the mountains, it is beef-milch cattle and sheep grazed on extensively utilized dry pastures. Transhumance was the most common system until recently and even today it is still practised in limited form. The share of milk ranges from 10 to 50% of the animal production and apart from cow's milk, sheep milk and in Bulgaria buffalo milk are also utilized. The share of wool in total animal production is rather high in the mountain sub-type. Of major importance in private farming is also poultry breeding mostly for eggs. This contrasts with the collective and state

farming where one can observe a rapid development of poultry breeding for meat (mostly chickens, sometimes turkeys, Guinea fowls and so on).

The dominant orientations are vegetable with livestock breeding, mostly food-fodder or only fodder one. Less frequent are the food-fodder-industrial crops combinations. In the lowland areas these orientations are combined with pig breeding or, less frequently, with pig-and-dairy cattle breeding and in the mountains with dairy cattle and mutton-wool sheep.

In the lowland sub-type productivity of agriculture is medium or fairly high (25—50 grain units per 1 ha) while it is much lower (15—40 grain units) in the mountain sub-type. Labour efficiency in socialized farming is slightly lower than in Central European agriculture (70—200 grain units) but individual farming is on the same level. The fairly low marketability of the individual farming is counterbalanced by the fairly high marketability of the socialized and particularly state farming.

c. Mediterranean Agriculture

It has yet to be established whether the mediterranean type of agriculture is merely a sub-type of South European agriculture or a separate and independent type of agriculture. Both the mediterranean and the South-East European agriculture follow genetically and qualitatively similar systems (a two year rotation pattern) and orientation in the utilization of arable land. Both types are familiar with the extensive utilization of dry pastureland through transhumance. On the other hand the mediterranean agriculture is marked by a particularly high share of perennial crops both in the area of agricultural land occupied, and especially in overall agricultural production. Among perennial crops there are extensive plantations of olive, fig, pomegranate and almond trees so typical of the mediterranean climatic zone, vine, peach, apricot and other trees known in the former type as well as citrus trees imported from beyond this particular zone. All these fruit crops are grown either in uniform plantations or according to a system called *coltura promiscua,* are intercultivated with various herbaceous plants (vegetables, maize, lucerne and so on).

The agricultural geography literature, does not give clear answer to the question posed above. Frequently when characterizing mediterranean agriculture, the area between the mediterranean zone *sensu stricto* and the North European zone of agriculture was simply ignored or included in some wider type, such as the "maize" type, along with the American corn belt etc. for the sole reason that here and there

maize plays an important role, inspite of the fact that all other typological features of the agriculture are totally different. The reason for the first practice is, perhaps, that in Western Europe, a region dealt with in most studies, there is nowhere such a wide zone dividing the typically mediterranean agriculture from the West European agriculture as can be found in Eastern Europe, where it stretches over considerable areas of the Danubian and the Black Sea plains including also the adjoining mountains. The second approach is erroneus due to one-sided criteria underlying such a classification.

Dealing with only one instance of what can be described as mediterranean agriculture (Barsko Polje) this study does not attempt any solution of the problem even with regard to Eastern Europe. This issue calls for more study.

At any rate, the quantitative and qualitative differences that exist between the agriculture of Danubian areas in Hungary, Yugoslavia and Bulgaria and the agriculture of the Adriatic zone of Yugoslavia justify a separate treatment of the latter.

First of all, agriculture in this zone is characterised by extensive subdivision of land (a predominance of farms with size from 0,5 to 2 ha) and although there are considerable variations in particular units, the proportions between arable land, perennial crops and permanent grasslands are almost equal. Arable land and perennial crops are in most cases utilized intensively, using up vast amounts of labour with little mechanization which, as a matter of fact, would be hardly possible in the prevailing *coltura promiscua* system. Oxen and cows are the main draft animals; while horses, mules and donkeys are used for transport. A large number or livestock grazed all over vast mountain pasturages or feeding on maize and lucerne allows abundant manuring of land, which makes, crop-rotation sometimes substituted by the system more reminiscent of gardening. There is a pronounced prevalence of intensifying crops (50—80%) mostly maize but also vegetables and bashtani. From 20 to 50% of arable land is taken up with structure forming crops (mostly lucerne, but also clover at higher altitudes). Extractive crops seem to play the least important role (5—20%) among which wheat dominates. Such a crop pattern accounts for the fact that the commonest orientations of arable land utilization is two-directional maize-lucerne $(I_2/_3)\, mz + S_2\, (_3/_4 lc)$. Still one may also encounter one-directional orientations, maize $(I_4 mz)$. More rare are three-directional orientations $(E_1/_2)\, wh + I_1/_2\, mz + S_3/_2\, lc\, (cv)$.

Perennial crops take up from 20 to 60% of agricultural land, the dominant species being olive trees, pomegranate and fig trees, or

orange trees and vines. The numerous other species of both fruit trees and shrubs play a less important role. This state of affairs means that plant production predominates (40—75%) of the total production (and that despite serious differences between the various units a balance is struck between food crops (mostly fruits), fodder crops (mostly maize and lucerne) and industrial crops (mostly olives). Meat constitutes the bulk (40—60%) of animal production and it includes pork, beef and mutton.

Milk (cow and sheep and goat) represents from 25 to 40% of animal production, the remaining quota being provided by wool and eggs. All in all from 20 to 50% of animal production is provided by cattle, 20—40% by pigs and about the same amount by sheep (and goats), the rest being contributed by poultry. The orientations which one can see there are either highly vegetable or vegetable, food-fodder, food-industrial or fodder-industrial with breeding of pigs, pigs-and-dairy cattle or cattle and sheep $V_4\,(a_2 + f_1/_2)$; $V_4\,(a_2/_1 + I_2/_3)$; $V_3\,(a_2 + f_1) + + A_1\,cd$ (*sm, sw, pk, etc.*), and others.

Productivity of agriculture is either medium or fairly high (40—55 units per 1 ha), efficiency of labour is medium or low (60—120 units per one person employed in agriculture), marketability is medium or fairly high.

d. Sub-urban Agriculture

Sub-urban agriculture can be regarded as the fourth type of agriculture appearing in the area under examination. This highly cosmopolitan type of agriculture, is closely linked first of all with supplying the neighbouring urban market with easily perishable food products or those which are difficult to transport. Among its features are greater subdivision of land, higher outlays of labour on the manuring and cultivation of land. The manuring involves mostly dung, but sewage and city garbage are also made use of. Painstaking. almost garden-like cultivation and plentiful manuring account for the fact that the problem of crop rotation is of secondary significance (there is either a 2 year intensive crop rotation or an optional one, orientated to market demand). Because of the specific kind of crops grown here, mechanization of field work is difficult but, a great number of draft animals are also used for transportation of farm products to the market.

Perennial crops and intensifying planta (vegetables and potatoes) take up a considerable percentage of the land; much less land is occupied by exhausting and structure-forming crops. As a result two directional orientations of arable land utilization are very common

with intensifying crops prevailing over extractive or structure-forming crops ($E_1/_2$) + $I_2/_3$ (*or* $I_3/_4$) + ($S_2/_1$). The latter group of crops as well as a high percentage of the intensifying crops (potatoes, maize) are utilized mostly as fodder.

Production mainly includes plant products, first of all food the bulk of which is made up with vegetables and fruits, together with fodder crops which serve as the basis for pig and dairy cattle breeding. One of the important objectives of livestock breeding here is dung production.

Productivity is fairly high as well as labour efficiency and marketability of the agriculture.

Territorial differentiation within the framework of the sub-urban zone of one town is, as a rule, much bigger than between sub-urban zones around different towns, even towns as distant as Warsaw and Belgrade. For that matter, the fundamental difference between the agriculture of Ostrówik and Brzumin on the hand, and Ritopek on the other lies in the fact that the first two produce mostly apples and potatoes whereas the latter grows apricots, grapes and maize which is, of course, conmected with the natural conditions. All other features are very similar. This contention is supported also in other, so for unpublished, studies of the Warsaw and Belgrade sub-urban zones.

Without attempting to determine the typological level of this classification it has been established that in the area covered by this study the following types or sub-types of agriculture appear:

I. Central European agriculture with its lowland and mountain variants (all Polish units concerned, Podgorje in Slovenia and to some extent Csepreg in Hungary).

II. South-East European agriculture with its lowland and mountain variants (Nyiradony, Békéscsaba, Dermantsi, but also in part Csepreg, Sebeborci, Petärch, Trebijovi).

III. Mediterranean agriculture (Barsko Polje, partly Trebijovi).

IV. Sub-urban agriculture (the majority of villages of Czersk commune near Warsaw, Ritopek, Novi Bar, partly Petärch).

It goes without saying, of course, that this and any typological classification should be viewed dynamically as a stage in the historical development of agriculture in the given area. It is also self-evident that in the course of this development new types or sub-types may emerge whereas the types which appeared in a distant past may tend to merge with one another.

The emergence of the socialist system, with agricultural reforms, and the process of transformation of small-scale peasant farming, into large scale collective or state farming brings about changes in a number

of features of the particular types of agriculture, features which developed in the course of the historical development of agriculture. Alterations in the social-property relationships are followed by changes in the organizational and technical features of farming which, in turn, bring about changes in productivity, efficiency, marketability and orientations of agriculture. This means ultimately changes in the types of agriculture.

Examination of particular features and defining the various types of agriculture, following changes and development that occur, then forecasting or programming further changes on the basis of the research work, in order to bring about the cultural, technical, and socio-economic types of agriculture, most suited to the given external conditions, are scientifically and practically important tasks of the geography of agriculture.

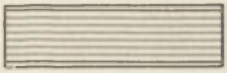
LIST OF UNITS STUDIED
(see figures 1—9)

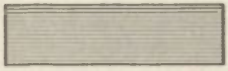
1. Borysówka
2. Grodzisko
3. Hruskie
4. Cergowa
5. Jasionka
6. Lipowica
7. Cergowa State Farm
8. Borki
9. Brzumin
10. Coniew
11. Czersk
12. Kępa Radwanowska
13. Królewski Las
14. Ostrówik
15. Podgóra
16. Sławsko
17. Rzepiszyn
18. Kobylniki State Farm
19. Różniaty State Farm
20. Gąski
21. Kładno
22. Śmiechów
23. Gąski State Farm
24. Kładno State Farm
25. Pleśnia State Farm
26. Podgorje
27. Sebeborci
28. Ritopek
29. Trebijovi
30. Novi Bar
31. Stari Bar
32. Bartula
33. Bjeliši Polje
34. Burtaiši
35. Velembusi
36. Tomba-Čeluga
37. Zaljevo-Podi
38. Topolica
39. Petarch
40. Dermantsi
41. Békéscsaba
42. Nyiradony
43. Csepreg State Farm
44. Csepreg Coll. Farm

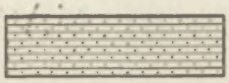
KEY OF SYMBOLS FOR BLACK AND WHITE MAPS
and
KEY OF SYMBOLS FOR COLOUR MAPS

KEY OF SYMBOLS FOR BLACK AND WHITE MAPS


wheat

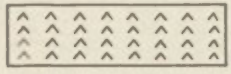

rye

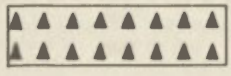

barley

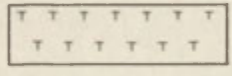

oats

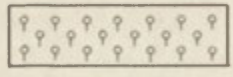

potatoes


maize

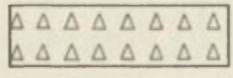

vegetables


sugar beets

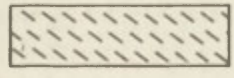

tobacco

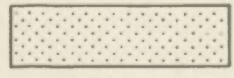

sunflower

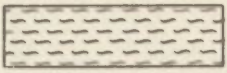

hemp

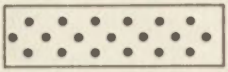

fodder beets

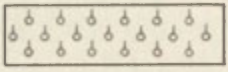

lucerne

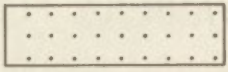

annual fodder

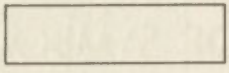

green pea


rough forage

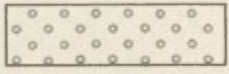

tomatoes


onions

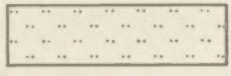

melons

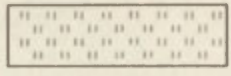

other

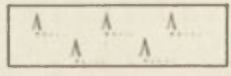

gardens

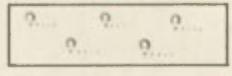

orchards


vineyards


meadows


pastures


coniferous forests


decidous forests


compact built up are


loose built up areas

Other symbols (boundaries, roads etc.)
see legend for colour maps

I. BOUNDARIES

A. Administrative

state

province (voivodship)

county (powiat)

commune (gromada)

B. Ownership

state

collective

private

other

C. Limits of main uses

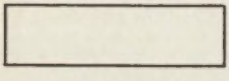
D. Other limits and boundaries

natural reserves

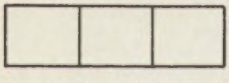
II. AGRICULTURAL LAND

A. Agrarian structure

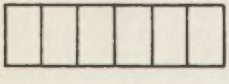
1. fragmentation of land holdings (farms)
average number of arable plots per 1 land holding (farm)



up to 5



5 to 10



over 10

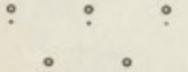
2. subdivision of land (percentage of agricultural area)
land holdings (farms) up to 5 ha

over 50 percent of agricultural land

over 25 percent of agricultural land

B. Arable lands

1. crop rotation



two-year with fallow

two-year without fallow

three-year with fallow

three-year without fallow

four-year

multi-course (5, 6, 7.....year) rotation

regular (4,5,6.....year) rotation

alternate grass-crop rotation (ley farming)

special rotation

voluntary rotation

monoculture

2. orientation in arable land utilization

a. exhaustive crops (mainly cereal)

exhaustive crops occupy more than:

20% 30% 40% 60% of arable land

with preponderance of:

wheat

rye

barley

oats

other cereals

b. intensifying crops (mainly root or ridged up)

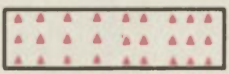
structure forming crops occupy more than:

20% 30% 40% 60% of arable land

with preponderance of:

potatoes

maize



sugar beets

oleaginous

fibre

vegetables

fodder roots

c. structure forming crops (papilionaceous)

structure forming crops occupy more than:

20% 30% 40% 60% of arable land

with preponderance of:

clover

lucerne

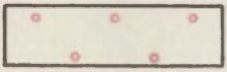
serradella

lupine

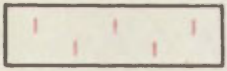
peas

beans

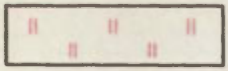
d. share of industrial crops
over 5 percent of the cropped area



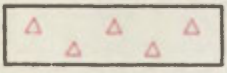
oleaginous –rape seed and agrimony



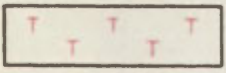
fibre plants–flax



–hemp



sugar beet



tobacco

3. gardens
home-yard gardens

with built up area

larger complexes of home-yard gardens

commercial gardens

heating installations

hot beds

green houses

4. idle land

non utilized

utilized for grazing

C. Perennial crops

1. orchards

home-yard orchards

with built up area

larger complexes of home-yard orchards

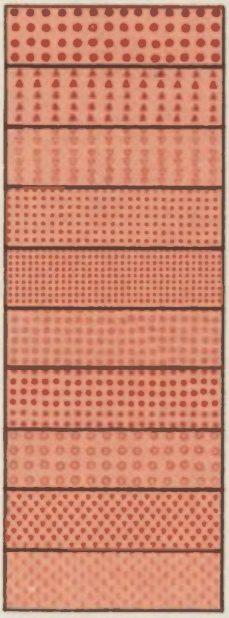
commercial orchards

unproductive

productive

kinds of fruit trees

prevailing species:



apple trees

pear trees

plum trees

cherries trees

sour cherries

peach trees

apricot trees

olives

almond trees

citrus trees

2. fruit trees nurseries

3. small fruit bushes

4. vineyards

5. semiperennial crops

a. rhubarb, strawberries

b. lavender

c. hop

d. other

6. non fruit trees nurseries

7. allotment gardens

8. intercultivated arable and perennial crops

arable crops prevailing

perennial crops prevailing

9. perennial crops with intercalary

vineyards

meadow or pasture

intensifying crops

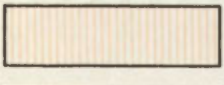
exhaustive crops

structure forming crops

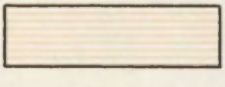
D. Permanent grasslands

1. natural associations

a. alpine meadows



on alkalic site



on acid site

b. xerothermic associations

on hard rock

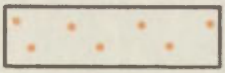
on soft rock (steppe)

2. non natural associations

a. post-bor (dry, acid)

on dunes (loose growth)

on dunes (compact growth)



on flat land *(Nardeta)*

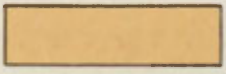
b. post-grond (dry, non acid)

fertilized from arable land

fertilized from forest

without natural fertilization (top gronds)

c. post-łęg (inundated)

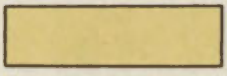


on muds

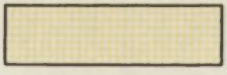
boggy

on sands

d. bog (bielawa)



on peat bogs (meadow bogs)



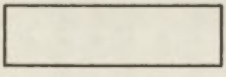
fed with springs

reeds and other aquatic vegetation

on land

on water

3. management



unmanaged

managed

fully

partly

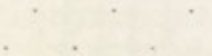
degraded

4. utilization

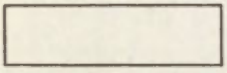
mowing

one harvest

two harvests



alternate, mowing and grazing



grazing

E. Animal breeding

Number of animal units (500 kg) per 100 hectares (250 acres) of agricultural land (shown by directions of coloured strips)

up to 60 units

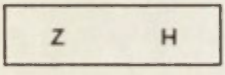
60—80 units

more than 80 units

III. FORESTS

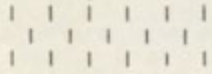
A. Dense forests

1. exploitation by clearing



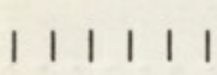
clearings

young growth up to 20 years



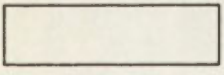
immature 20—40 years

fallable or nearly fallable 40—80 years



old stand over 80 years

2. exploitation by group or selective felling

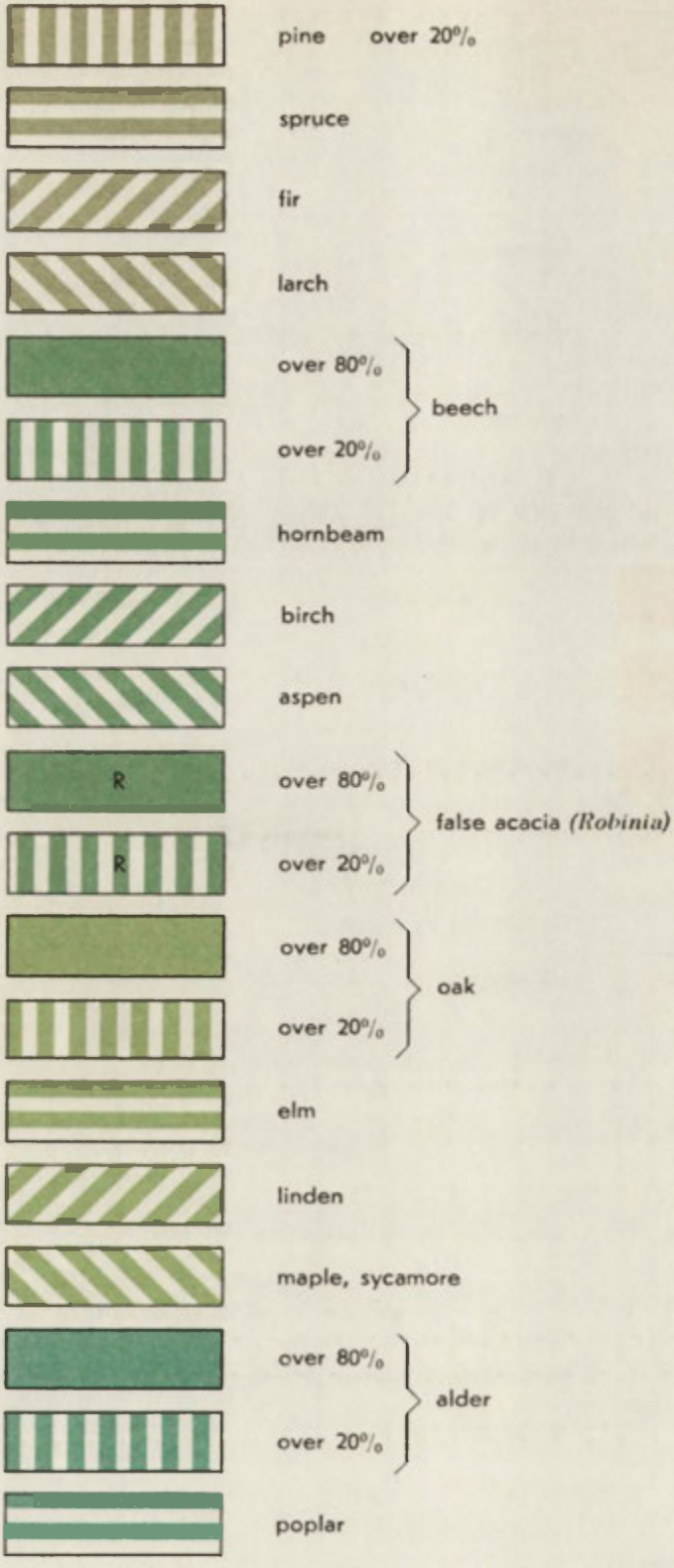


mixed age stand

B. Species of trees dominating

1. compact woodlands

pine over 80%



ash

willow

2. special stands

game reserves

forest trees nurseries

3. scattered or degraded woodlands
a. non used additionally

pine

beech

linden

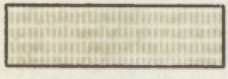
willow

b. used additionally (examples)

C. Brushwoods

1. on bor habitat

mountain-pine

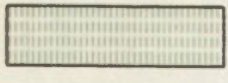


juniper

heather moorland

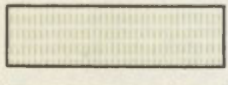
bilberries, whortleberries

other

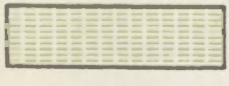


2. on lasobor (mixed forest) habitat

3. on grond habitat



fresh (shade) associations (hazel, hornbeam, alder, raspberries, etc.)



dry (heliophilous) associations (gorse, wild roses, blackberries, black thorn, macchia, etc.)

false acacia *(Robinia)*

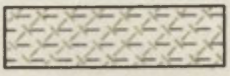
4. on tęg habitat (inundated)

willow

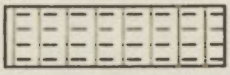
alder

osier holts

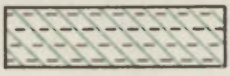
5. high moor associations (peat bog)



dwarf shrubs



dwarf shrubs with pine or mountain pine



intermediate moor overgrown with leafy trees and shrubs

IV. WATERS

A. Kinds of water

1. current waters

2. standing waters

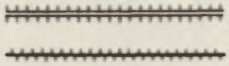
artificial reservoirs (ponds)

retention reservoirs

land periodically inundated by reservoir waters

B. Water control constructions

dams

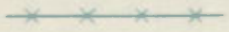


dykes

C. Water utilization

1. by population and industry

water pipe lines



aqueducts

sewage canals

2. by communication

rafting waters

navigable waters

3. for energy production

4. for agriculture

surface drainage

drainage channels

irrigation channels

mixed use channels

under drainage

acting

non acting or neglected

terracing

5. for fishing

a. fresh water habitats

extremely oligotrophic

oligotrophic–eutrophized

eutrophic

dystrophic

b. salt waters

brackish

salt

V. SETTLEMENT AND ASSOCIATED NON AGRICULTURAL LAND

A. Residential areas

1. compact lay out

high over 7 storey

3–6 storey

1–2 storey

2. loose lay out

high over 7 storey

3–6 storey

1–2 storey without farm buildings

among trees

with farm buildings (small farming)

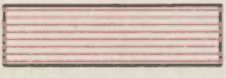
large scale (large scale farming)

temporarily used

B. Industrial areas

intensively built up

extensively built up



non utilized

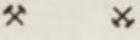
working non working

mills

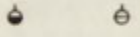
C. Mining areas

1. deep mining

working non working



mines



oil or gas wells

2. open cast mining

working

non working

P — sand

Ż — gravel

G — clay

K — quarry

3. mining fields

used as arable lands

used as pastures

non utilized

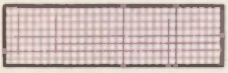
D. Agricultural–industrial areas

technical service of agriculture

poultry, pig fattening, fur animals farms, etc.

E. Commercial areas

warehouses



market areas

F. Communication areas

1. railway

2. motor car

3. port installations

4. airplane

5. railways lines

standard gauge

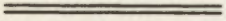
narrow gauge

industrial only

funicular

6. roads

hard surface



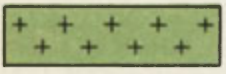
main

secondary

field

G. Public utilities

parks, green areas, etc.



cemeteries

water works

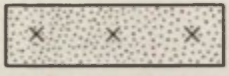
H. Recreation areas

health resorts constructions

amusement areas

play or sport grounds

beaches:



managed

non managed

I. Other constructions of tourist interest

churches and monasteries

tourist houses and camps

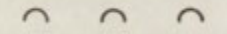
ruins

castles, palaces, etc.

VI. UNPRODUCTIVE LAND

A. Because of natural conditions

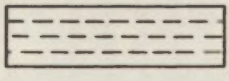
barren rocks



quick sands

gravel fields

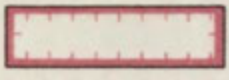
stone fields



swamps

B. Derelict lands

1. diggings



dry

filled with water

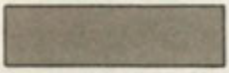
peat hags

2. heaps (waste, etc.)

barren

overgrown, with trees or shrubs

VII. SPECIAL AREAS



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