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Crosses of Wisent and Domestic Cattle. Part. V.**Bisoniana XIV**

[With 3 Tables]

Present communication gives the results of crosses of European bison with the domestic cattle, obtained from the end of 1962 until December 1965. In the crosses of wisent and cattle there was a low per cent of conception (14% of coverings) and considerable fetal mortality (in the combination wisent \times domestic cow — 30% of effective matings). The length of gestation period at such interspecific crosses depends on paternal species. Males hybrids of F_1 exhibit normal sexual drive at the age of 14 to 15 months but are sterile, and no spermatozoa were found in the semen. The rate of sexual maturation in F_1 females indicates the influence of paternal species. The daughters of a wisent matured at about 2 years of age similarly to the wisent females, while the daughters of domestic bull matured only slightly later than domestic heifers. Most of F_1 females had a seasonal reproductive cycle consistent with the reproductive season of the wisent. In F_1 females the conception rate was nearly 100% and there were no complications during parturitions. The length of gestation in F_1 hybrids is intermediate between two parental species (mean = 274 days, $n = 8$). Males from backcross to domestic cattle had normal sexual drive at about 1 year of age. The only adult backcross female matured at the age of 11 months and had oestrus in different seasons.

I. INTRODUCTION

The experiments on hybridisation of the wisent with the domestic cattle started in Białowieża in 1958 by Professor Dehnel are continued up to now. In the first stage of the breeding experiments (1958—1961) wisents were mated with domestic cattle of polish red breed and 4 F_1 hybrids have been obtained (Dehnel, 1960, 1961; Demiaszkiewicz, 1961; Krasińska, 1963). The second series of experiments were started in 1961 using the black-white lowland breed, as the polish red cows had difficulties in both conception and calving. In this group 6 F_1 hybrids were obtained by the end of 1965.

On 31 December 1965 in the Experimental Reservation of Mammals Research Institute, Polish Academy of Sciences in Białowieża there were 19 hybrids: 11 F_1 and

8 backcrosses. The observations made on larger material tend to confirm earlier observations and suggest some new conclusions. This communication is fifth in the series¹⁾ and presents the progress of breeding experiments from the end of 1962 until December 1965.

The breeding experiments in Białowieża are conducted in half-natural reservation conditions. Animals are kept in 10 hectare enclosures of *Quercus-Carpinetum* forest. In two enclosures there are 2 ha. grass forest meadows (Dehnel, 1961). The animals are fed twice daily in the feed boxes. The diet is based on rough-ground oats, mixture B²⁾, fodder beets and hay. The feed is dosed according to domestic cattle norms.

II. THE CROSSES OF *BOS TAURUS* DOM. L. ♂ × *BISON BONASUS* L. ♀

From 1962 to 1965 female wisents were mated to the frisian bull Richtje I no. c 7. This bull was brought to Białowieża on 11 July 1962. The course of matings is given in the table 1. During first few months of his stay in Białowieża reservation the young bull had considerable difficulties in covering adult, much taller wisent females. It was not until November 1962 when the female wisent »Ponętna« was successfully covered. The course of gestation and parturition was similar as in preceding years (Dehnel, 1961; Krasińska, 1963). On 28 August 1963 after 283 days of gestation a female F₁ hybrid »Figa« was born. This calf weighed 28 kg. at birth, had compact build, curly black coat with white belly, white end of tail, white hind pasterns and a "starlet" on the forehead. After a week »Ponętna« started to come with the calf to feed in the feed box. The calf was very wild; each time it was separated from the mother for weighing and measurements it would fight, kick, bell loudly and run blindly into a fence trying to fit between the poles. »Ponętna« had post-partum heat 128 days after the parturition. However, she was effectively covered only in August 1964 by a wisent which was living in the forest and broke into the reservation. On 26 April 1965 after 258 days of pregnancy she gave birth to a male wisent.

Another female wisent, »Podkomorzanka« was not covered by the black-white lowland bull »Karat« in December 1961 (Krasińska, 1963) and had long fertility disturbances covering two reproductive seasons. During this period she did not produce any progeny neither with a domestic bull nor with a male wisent used as a control.

The experiments on crosses of female wisents with a domestic bull were terminated in the middle of 1965 and both females were returned to the management of Białowieża National Park.

¹⁾ Earlier results of this study were published without subsequent numbers (Dehnel, 1960, 1961; Demiaszkiewicz, 1961; Krasińska, 1963).

²⁾ Mixture B for domestic cattle contains: bran, rough-grind corn, urea, and additions of Ca, P, Na, Si, Mn, Fe, Cu, Mg, Co.

III. CROSSES OF *BISON BONASUS* L. ♂ × *BOS TAURUS* L. ♀

Of six black-white lowland cows mated to wisents only one produced several calves. Cow number 114 was covered by a wisent on 26 November 1962 and had a pregnancy with normal symptoms (K r a s i ń s k a, 1963). On 12 August 1963, after 259 days of gestation a male hybrid »Fakir« was born. Human aid was necessary at parturition. In this cow a retention of placenta occurred. The calf weighed 51 kg at birth, had well proportioned build, thick curly dark brown coat with white end of tail. The calf was left with the mother for four months. Subsequent, third hybrid was born by this cow on 29 August 1964 after 267 days of gestation. It was a female — »Fatima«. The parturition again had to be aided. Placenta was expelled normally. The calf weighed 37.5 kg at birth. It was large and tall but very thin; had thick curly dark brown coat, white hind pasterns and end of tail.

Of the remaining 5 cows effective covering by a wisent was observed only in cow No 98 and cow No 117 (Table 1). Cow No 98 aborted early in the gestation (K r a s i ń s k a, 1963). As subsequent matings with a wisent were ineffective she was covered by a domestic bull in March 1963. On 25 December 1963 after 279 days of pregnancy a domestic calf was born. After that she still did not conceive with a wisent.

Cow No 117 was covered by a wisent on 28 October 1962 (K r a s i ń s k a, 1963). After 2.5 months of gestation there was a bloody effusion from the reproductive tract lasting about two weeks and indicating an early abortion. When the cow returned to normal she was again included in the experiments. However, she failed to conceive both with a wisent and when covered with a domestic bull as a control. Clinical examination revealed a uterine node and the cow was slaughtered in December 1964 as infertile.

The remaining black-white lowland cows, Nos 78, 106 and 107 in spite of multiple matings did not conceive with a wisent (Table 1). Cow No 107 came into heat regularly while in two remaining animals, there were interruptions in the sexual cycle, especially during the winter. Clinical examination did not reveal any pathological changes in these animals and they were covered by a domestic bull as a control. Cow No 78 after 274 days of gestation gave birth to a stillborn female domestic calf on 17 December 1963. This was a term fetus with bloody effusion from nostrils and bloody fluid in the pleural cavity. The bacteriological examination of this fetus and the serologic examination of the cow excluded an infection as a cause of calves death. After ineffective covering by a wisent in the first post-partum heat this cow had an ovarian insufficiency lasting in spite of treatment. Therefore, this cow was consi-

dered infertile and slaughtered in February 1965. Cows No 107 and 106 after 277 days of gestation gave birth to domestic calves on 20 December 1963 and 31 August 1964, respectively.

All black-white lowland cows were regularly mated with the male wisent »Pokorny« until June 1964.

It seems interesting that of 6 black-white lowland cows used in the present studies only one produced three times progeny with a male wisent. This cow was probably genetically closer to a wisent than the remaining five. The other two cows conceived with a wisent once and

Table 1.

Scheme of covering the females in on experiment on crossing domestic cattle with wisents; 1959 through 1964.

Female	Male	No. of covering	No. of effective coverings	Per cent of fertilization
Alfa pr.	Wisent	18	—	0.0
Alma pr.	Wisent	11	1	9.1
78 bw.	Wisent	19	—	0.0
	Richtje f.	1	1	100.0
98 bw.	Wisent	10	2	20.0
	Richtje f.	1	1	100.0
106 bw.	Wisent	30	—	0.0
	Richtje f.	1	1	100.0
107 bw.	Wisent	15	1	6.6
	Richtje f.	1	1	100.0
114 bw.	Wisent	11	3	27.3
117 bw.	Wisent	17	1	5.9
	Richtje f.	3	—	0.0
Ponętna W.	♂ pr.	3	1	33.3
	♂ f.	4	1	25.0
Podkomorzanka W.	Wisent	1	1	100.0
	♂ pr.	3	2	66.6
	♂ bw.	4	—	0.0

Abbreviations: W. — Wisent, pr. — polish red breed of domestic cattle, bw. —black-white lowland domestic cattle, f. — frisian domestic cattle.

did not become pregnant again. Both clinical examinations and the control covering with a domestic bull indicated their full ability to reproduce.

In crossing wisent with domestic cattle there is undoubtedly a conflict causing abortion and low per cent of conception. In the crosses of domestic bull with female wisent this phenomenon occurred only rarely. However, in the crosses with polish red and black-white lowland cows there was very low conception rate (average 14 %) and in the black-white lowland cows abortions occurred in about 30 % of effective conceptions with a wisent.

IV. THE LENGTH OF GESTATION

The length of gestation in all crosses of wisent with domestic cattle made until the end of 1965, are given in Table 2. These data confirm the hypothesis put in previous papers (Dehnel, 1961; Krasieńska, 1963) stating that in these crosses the length of gestation is influenced predominantly by the paternal species. This is also confirmed by the observations that the females used in our experiments when covered by a male of their own species had calves within proper time (Table 2).

V. FERTILITY OF F₁ HYBRIDS

1. Males. Toward the end of 1965 there were five F₁ males in the Białowieża experiment: 5 years old »Filip« and »Filon«, 3 years old »Facet« and »Farad« and 2 year old »Fakir«.

Sexual drive as manifested by reacting to the presence of a female in heat was observed in all males at the age of 7 to 8 months. They were mounting the females but extrusion of penis was never observed. At the age of 14 to 15 months these males had typical sexual reflexes usually accompanying copulation.

Domestic bulls reach sexual maturity at the age of 6 to 10 months (Bielański, 1962). However, there are no precise data on sexual maturation of wisents. Jaczewski (1958) reported that, in the reservations, the earliest matings were observed in 18, 21 and 29 months old wisents. Covering occurs most frequently at the age of 4 to 5 years (Sokolov, 1958). These data would indicate that, in respect to the development of sexual drive, F₁ hybrids are intermediate between wisents and domestic cattle.

The four oldest hybrids were tested for fertility by natural matings. None of the covered domestic cows became pregnant. Vaginal mucus was obtained from these cows immediately after the covering and no spermatozoa were found in microscopic examination. The definite proof of F₁ male sterility will be possible only after direct collection of their semen.

2. Females F₁. At the end of 1965 there were five adult F₁ females in the Białowieża herd: »Fama« was 5 years old, »Filutka« was 4, »Famela« — 3.5, »Fanny« — 3 and »Figa« — 2 years old.

»Famela« was purchased from the Institute of Experimental Animal Breeding, Polish Academy of Sciences at Popielno and brought to Białowieża on 29 August 1965 (cf. addendum). The data on sexual maturation and reproduction of Białowieża female F₁ hybrids are given in Table 3.

Most of domestic heifers mature at about 9 months of age and oestrus

Table 2.
The length of gestation in crosses of domestic cattle with wisents.

Name	Father	Mother	Date of covering	Date of parturition	Length of gestation	Author
Filon	Ananas pr.	Poneřna W.	Oct. 27, 1959	Aug. 6, 1960	283	Dehnel, 1961
Filip	Ananas	Podkomorzanka W.	Oct. 27, 1959	Aug. 25, 1960	301	Dehnel, 1961
Filutka	Ananas	Podkomorzanka	Nov. 9, 1960	Sept. 7, 1961	302	Krasińska, 1963
Figa	Richtje f.	Poneřna	Nov. 13, 1962	Aug. 23, 1963	283	Krasińska
♀ dom.	Richtje	Cow 98 bw.	March 21, 1963	Dec. 25, 1963	279	Krasińska
♂ dom.	Richtje	Cow 107 bw.	March 16, 1963	Dec. 20, 1963	279	Krasińska
<i>Bos taurus dom. L.</i>					278—290 (311)	Asdell, 1964; Studenecow, 1956
Fama	Pokorny W.	Alma pr.	Jan. 20, 1960	Oct. 14, 1960	267	Demiaszkiewicz, 1961
Facet	Pokorny	Cow 98 bw.	Aug. 8, 1961	Apr. 28, 1962	263	Krasińska, 1963
Farad	Pokorny	Cow 107 bw.	Aug. 3, 1961	Apr. 29, 1962	268	Krasińska, 1963
Fanny	Pokorny	Cow 114 bw.	Jan. 6, 1962	Sept. 30, 1962	268	Krasińska, 1963
Fakir	Pokorny	Cow 114 bw.	Nov. 26, 1962	Aug. 12, 1963	259	Krasińska
Fatima	Pokorny	Cow 114 bw.	Dec. 7, 1963	Aug. 29, 1964	267	Krasińska
♂ Wisent	Wisent	Poneřna W.	Aug. 10, 1964	Apr. 26, 1965	258	Krasińska
<i>Bison bonasus L.</i>					260—270	Jaczevski, 1958

Note: Abbreviations as in Table 1.

occurs in different seasons (Bielański, 1962). Female wisents can have their first calf only at an age of about three years, most of the effective coverings occur in August and September and most of the births occur in May (Jaczewski, 1958). In the crosses of american bison with domestic cows, female hybrids matured late giving birth to the first calf usually at 4 years of age (Boyd, 1914; Gray, 1954).

Of five F_1 hybrids three daughters of the male wisent: »Fama«, »Famela« and »Fanny« reached sexual maturity only at about two years of age, while both daughters of a domestic bull: »Filutka« and »Figa« matured much earlier with first oestrus at 11 to 13 months. This indicates that in the F_1 hybrids of wisent and domestic cattle the rate of sexual maturation is influenced predominantly by the father.

Table 3.
Data on sexual maturation, reproductive season and length of gestation in F_1 females.

Name	Male	First oestrus (age, month)	Effective covering	Date of birth of B_1 animal	Length of gestation
Fama	Richtje f.	21.5 months, July	July 31, 1962 Sept. 4, 1963 May 25, 1964	May 4, 1963 May 28, 1964 Apr. 15, 1965	277 267 264
Filutka	Richtje f.	11 months, August	Aug. 2, 1962 Aug. 10, 1963 July 21, 1964	May 9, 1963 May 18, 1964 Apr. 26, 1965	280 278 279
Fanny	Richtje f.	16.5 months? ¹⁾ 22 months, August	Aug. 4, 1964	May 2, 1965	271
Famela	No. 32 j.	22.5 months	Dec. 16, 1964	Sept. 16, 1965	274
Figa	Richtje f.	13 months, october	July 4, 1965		

Abbreviations: f. — frisian cattle, j. — jersey cattle, ¹⁾ covering was not observed.

In all our female F_1 hybrids, irrespectively of the direction of cross, the majority of effective matings and calving occurred in seasons typical for wisents (Table 3). Per cent of conception was very high in F_1 hybrids: »Fama«, »Filutka« and »Fanny« became pregnant during the first oestrus. The two oldest females are calving regularly every year. The fertility of the youngest heifer »Figa« could not be reported in any detail as she was twice outside the reservation (autumn 1964 and spring 1965). She was effectively covered by a domestic bull only on 4 July 1965. »Famela« had oestrus in different seasons. This could have been due to keeping her in the stable and not in semi-free state as the remaining hybrids.

The symptoms of pregnancy in our F_1 hybrids were as weakly pronounced as in the wisent. Several days before parturition the hybrids were choosing a lonely woody spot. There they gave birth to a relatively small calf resembling in size the newborn wisent. All parturitions were without any complications and the placentas were extruded normally. The mean length of gestation in F_1 hybrids was 274 days (Table 3) being intermediate between the length of gestation in parental species.

All female hybrids were very good mothers. Indifference toward the young described in the crosses of American bison and domestic cattle (Gray, 1954) was never observed in our female hybrids. Following the parturition they were hiding their calves in the branches of fallen trees and protecting them from people. In this, they were very much like a female wisent.

VI. HYBRIDS $3/4$ OF DOMESTIC CATTLE

The B_1 generation was obtained by crossing hybrid females with the frisian bull Richtje I No c 7. Only »Famela« was covered by a Jersey bull No 32 before arriving to Białowieża. Until the end of 1965 eight B_1 animals were obtained in the Experimental Reservation of Mammals Research Institute (Cf. addendum II). Hybrids $3/4$ domestic cattle at birth had a mean body weight of 27 kg (20 to 30.5 kg). In general appearance they were more similar to domestic calves than the F_1 hybrids. The coat was smooth and short; only »Fetysz« had slightly curly hair. The colour at birth was not uniform. Two animals were black (»Feb« and »Fetysz«) with white pasterns, forehead, tail and foreskin area. In addition »Fetysz« had a white spot on the right groin. »Fenix« and »Femina« had at birth dark red coats. On this background »Femina« had white socks on hind pasterns reaching up to astragal joint and white distal $1/3$ of the tail. »Fen« and »Feta« were bright red when born, with »Fen« having a ring of light hair around the nares. Of the remaining two hybrids, »Fez« was dark brown with a dark stripe along the back, tan legs and belly, while »Fey« was light beige with tan pasterns, muzzle and tail. Of the 7 oldest hybrids 6 changed their colour into black within the first five months of life, only »Feta« retained his dark red coat.

All B_1 calves reared by half-wild F_1 mothers were, during the first 4 months of life, very wild and difficult to tame.

Males from B_1 were mounting females in oestrus when 6 to 7 months old but only at the age of about one year it was accompanied by typical copulatory reflexes. Thus normal sexual drive occurs in B_1 males earlier than in F_1 hybrids. The oldest of B_1 males »Fenix« was castrated at the age of 20 months.

The only adult B₁ female, »Feta« reached sexual maturity early i.e. when 11 months old. The oestrus was occurring in different seasons. After the first oestrus she had an inflammation of the reproductive tract which probably resulted in infertility; she was covered several times by a domestic bull but did not conceive.

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HYBRYDYZACJA ŻUBRÓW Z BYDŁEM DOMOWYM. V
Bisoniana XIV.

Streszczenie

Praca niniejsza przedstawia wyniki uzyskane w doświadczeniu nad krzyżowaniem żubrów z bydłem domowym w okresie od końca 1962 roku do grudnia 1965 roku (patrz dodatek I i II). Opisano wygląd przy urodzeniu i ciężary ciała hybrydów F₁ i ³/₄ bydła domowego. Stwierdzono, że przy krzyżowaniu żubrów z bydłem domo-

wym występuje niski procent zapłodnienia, wynoszący 14% i dosyć wysoka śmiertelność płodów, szczególnie w kombinacji żubr × krowa domowa (30% skutecznych pokryć) (Tabela 1).

Obserwacje na większym materiale ($n = 11$ hybrydów F_1) pozwoliły potwierdzić hipotezę Dehnela (1961) o wpływie gatunku ojca na długość trwania ciąży przy tej hybrydyzacji (Tabela 2).

Samce F_1 wykazują normalny popęd płciowy w wieku 14—15 miesięcy, są jednak bezpłodne i przez krycie naturalne nie dały potomstwa, a w nasieniu nie stwierdzono plemników. Tempo dojrzewania płciowego samic hybrydów F_1 pozwala sądzić o wpływie gatunku ojca na dojrzewanie płciowe potomstwa. Córki żubra dojrzewają podobnie jak żubrzyce, w wieku około 2 lat, natomiast córki byka domowego tylko nieco później niż domowe jałowki tj. w wieku 11 i 13 miesięcy (Tabela 3).

U większości białowieskich samic hybrydów F_1 występuje sezonowość cyklu płciowego zgodna z podobnym rytmem u żubrów. Procent zapłodnienia samic F_1 jest bliski 100. Porody przebiegają bez powikłań. Długość ciąży u samic hybrydów F_1 jest pośrednia między długością ciąży form rodzicielskich (średnio 274 dni, $n = 8$) (Tabela 3).

Samce $3/4$ bydła osiągają normalny popęd płciowy w wieku około 1 roku. Jedyna dorosła samica $3/4$ bydła domowego dojrzała płciowo w wieku 11 miesięcy, a ruje występowały u niej w różnych porach roku.

ADDENDUM

This addendum gives the full listing of hybrids between the wisent and the domestic cattle including F_1 , $3/4$ domestic cattle and $3/4$ wisent. The quoted pedigree data concern the hybrids obtained in Poland in Płock ZOO, in Institute of Experimental Breeding in Popielno and in Mammals Research Institute in Białowieża, as well as in Soviet Union until 1955. Only in Białowieża a consequent system of nomenclature was used. Similarly to naming different lines of wisent it was decided that names of hybrids born by wisents will begin with a syllable »Fi« and the names of hybrids born by cows with a syllable »Fa«. Hybrids $3/4$ domestic cattle were named with words beginning with »Fe«. We propose to retain this system for future crosses and name backcrosses to a wisent ($3/4$ wisent) with names beginning with »Fo«.

Beginning the publication of this register we are aiming at publishing in »Acta Theriologica« the pedigrees of wisent domestic cattle hybrids obtained in different Institutions throughout the world. It appears that only relatively recent data could be used. We hope that this action would facilitate the exchange of information concerning actual research developments in this field. We expect active cooperation of all persons and institutions interested in this problem. Receiving any remarks or data to be published in the listing of wisent cattle hybrids will be most appreciated. All correspondence pertaining to this listing should be addressed to: Polish Academy of Sciences, Mammals Research Institute, Białowieża, Poland.

Appendix I.

Register of F₁ hybrids of wisent with domestic cattle.

Sex	Name	Date of birth	Date of death	Father	Mother	Place of birth
M	Zadornyj	1848	1860	Widnyj 6 w.	Zadzeruha sc.	Viljanovo
F	Amalgama	1851	1854	Widnyj 6 w.	Al'dona sc.	Viljanovo
F	Carodejka	1854	after 1860	Widnyj 6 w.	Černuha sc.	Viljanovo
F	Galka	III 1905	17 XI 1926	Belestok 68 w.	g. u.	Askania Nova
M	Satir	15 IV 1910	15 IV 1910	Bim 76 w.	g. u.	Askania Nova
M	Herkules	22 IV 1910	29 V 1913	Bim 76 w.	g. u.	Askania Nova
M	Byrez	27 I 1911	1 II 1911	Bim 76 w.	g. u.	Askania Nova
F	Dun'ka	21 II 1911	27 I 1925	Bim 76 w.	Lučšaja g. u.	Askania Nova
F	Volja	15 III 1912	15 III 1912	Bim 76 w.	g. u.	Askania Nova
F	Krasavica	28 III 1912	28 XI 1929	Bim 76 w.	g. u.	Askania Nova
M	Važnyj	3 IV 1912	8 IV 1912	Bim 76 w.	g. u.	Askania Nova
F	Veselaja	4 IV 1912	15 VII 1912	Bim 76 w.	g. u.	Askania Nova
F	Grun'ka	25 III 1914	26 VII 1923	Bim 76 w.	g. u.	Askania Nova
M	Tur	30 I 1917	1919	Bim 76 w.	g. u.	Askania Nova
M	Lopus	2 III 1953	2 III 1953	Pustelnik 1032 w.	Lora d.	ZOO Plock
F	Žukawa	3 VIII 1958		Puer 934 w.	Kasia 1/2 bw. 1/2 wa.	ZOO Plock
M	—	12 II 1960	stillborn	Puer 934 w.	Kasia	ZOO Plock
M	Filon	6 VIII 1960		Ananas p. r.	Ponežna 1037 w.	Białowieża
M	Filip	25 VIII 1960		Ananas p. r.	Podkomorzanka 1085 w.	Białowieża
F	Fama	14 X 1960		Pokorny 1077 w.	Alma p. r.	Białowieża
F	Filutka	7 IX 1961		Ananas p. r.	Podkomorzanka	Białowieża
F	Famela ¹⁾	20 II 1962		Pug 1087 w.	Wolna p. r.	Popielno
M	Facet	28 IV 1962		Pokorny 1077 w.	98 bw.	Białowieża
M	Farad	29 IV 1962		Pokorny 1077 w.	107 bw.	Białowieża
F	Fanny	30 IX 1962		Pokorny 1077 w.	114 bw.	Białowieża
M	Fakir	12 VIII 1963		Pokorny 1077 w.	114 bw.	Białowieża
F	Figa	23 VIII 1963		Richtje f.	Ponežna 1073 w.	Białowieża
M	Žubr	18 XII 1963		Puszkarz 936 w.	Ulga 1/2 bw. 1/2 wa.	ZOO Plock
F	Fatima	29 VIII 1964		Pokorny 1077 w.	114 bw.	Białowieża

Abbreviations: w. — wisent, sc. — Schwyz cattle, g. u. — grey ukrainian cattle, p. r. — polish red cattle, bw. — black-white lowland cattle, f. — frisian cattle, d. — dutch cattle, wa. — watussi. ¹⁾ First named Pamela, after purchasing by Mammals Research Institute changed into Famela.

Appendix II.
Register of hybrids $1/4$ wisent $3/4$ domestic cattle.

Sex	Name	Date of birth	Date of death	Father	Mother	Place of birth
F	Mal'ta	1850	1852	Zadornyj F ₁	Mal'rika sc.	Viljanovo
M	Zatejnik	1851	1853	Zadornyj F ₁	Zagljaduha sc.	Viljanovo
F	Maska	1851	1853	Zadornyj F ₁	Moldavianka sc.	Viljanovo
M	Losik	1852	1856	Zadornyj F ₁	Losica sc.	Viljanovo
F	Krinica II	1852	1852	Zadornyj F ₁	Kraska sc.	Viljanovo
M	Raešnik	1853	1857	Zadornyj F ₁	Rabonoska sc.	Viljanovo
F	Masljanica	1853	1855	Zadornyj F ₁	Myška sc.	Viljanovo
M	Lastik	1853	1855	Zadornyj F ₁	Lipka sc.	Viljanovo
F	Gromadnaja	1854	1856	Zadornyj F ₁	Gospodynja sc.	Viljanovo
M	Junak	1854	1856	Zadornyj F ₁	Jul'ka sc.	Viljanovo
M	Al'kal'd	1855	1855	Zadornyj F ₁	Al'dona sc.	Viljanovo
F	Panenka	1859	after 1860	Panyč sc.	Čarodejka F ₁	Viljanovo
F	Zajčiha	27 III 1914	20 II 1919	Zajac g. u.	Galka 16 F ₁	Askania Nova
F	Čajka II	27 III 1915	20 VI 1920	Čajka I g. u.	Dun'ka 22 F ₁	Askania Nova
M	Svet	4 I 1917	1919	g. u.	Galka 16 F ₁	Askania Nova
M	Grač	27 IV 1918	27 IV 1918	Suvoryj g. u.	Galka 16 F ₁	Askania Nova
M	Žuk	1 V 1920	19 II 1924	Suvoryj g. u.	Krasavica 25 F ₁	Askania Nova
M	Gromoboj	5 V 1920	23 XI 1924	Suvoryj g. u.	Galka 16 F ₁	Askania Nova
M	Goboj	12 VII 1921	13 VII 1921	shorth.	Galka 16 F ₁	Askania Nova
M	Fenix	5 V 1963		Richtje I f.	Fama F ₁	Białowieża
F	Feta	9 V 1963	24 VIII 1966	Richtje I f.	Filutka F ₁	Białowieża
M	Fez	14 V 1964		Richtje I f.	Filutka F ₁	Białowieża
M	Fetysz	28 V 1964		Richtje I f.	Fama F ₁	Białowieża
M	Fen	15 IV 1965		Richtje I f.	Fama F ₁	Białowieża
M	Feb	26 IV 1965		Richtje I f.	Filutka F ₁	Białowieża
F	Femina	2 V 1965		Richtje I f.	Fanny F ₁	Białowieża
M	Fey	16 IX 1965		Nr 32 jc.	Famela F ₁	Białowieża
F	Fera	14 IV 1966		Richtje I f.	Figa F ₁	Białowieża
F	Ferna	17 IV 1966		Richtje I f.	Fama F ₁	Białowieża
M	Feg	27 IV 1966		Richtje I f.	Filutka F ₁	Białowieża

Abbreviations: sc. — Schwyz cattle, g. u. — grey ukrainian cattle, shorth. — shorthorn cattle, f. — frisian cattle, jc. — jersey cattle.

Appendix III.
Register of hybrids $\frac{3}{4}$ wisent $\frac{1}{4}$ domestic cattle.

Sex	Name	Date of birth	Date of death	Father	Mother	Place of birth
F	Golubka	6 VI 1908	16 VII 1923	Belostok 68 w.	Galka 16 F ₁	Askania Nova
M	Gruzin	19 VI 1910	5 VIII 1910	Belostok 68 w.	Galka 16 F ₁	Askania Nova
M	Otboj 4 KCR	17 VII 1911	1 VI 1919	Bim 76 w.	Galka 16 F ₁	Askania Nova
M	Guliver	21 IV 1912	21 IV 1912	Bim 76 w.	Galka 16 F ₁	Askania Nova
F	Fen'ka	2 IV 1916	9 III 1921	Bim 76 w.	Veselaja 27 F ₁	Askania Nova
M	Krasavec	22 III 1917	24 III 1917	Bim 76 w.	Krasavica 25 F ₁	Askania Nova
M	Pjast	5 IV 1917	1 VIII 1936	wisent	Grun'ka 29 F ₁	Moskva
M	Valet	5 V 1917	5 V 1917	Bim 76 w.	Veselaja 27 F ₁	Askania Nova
F	Nina	12 II 1919	16 IX 1932	Bim 76 w.	Krasavica 25 F ₁	Askania Nova
M	Bandit	4 V 1921	3 III 1923	Bim 76 w.	Krasavica 25 F ₁	Askania Nova
F	Dusja 46 KCR	8 IV 1928	19 VIII 1933	Biron 92 w.	Krasavica 25 F ₁	Askania Nova
M	Žukr	21 IV 1961		Puer 934 w.	Žukawa F ₁	ZOO Płock
F	Žukrawa	8 VI 1963		Puszkarz 936 w.	Žukawa F ₁	ZOO Płock