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52 Years of European bison breeding on the Wisent-Island in the heart of Mecklenburg-Vorpommern

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Abstract: The 52 years history of European bison breeding in the Dammerower Werder reserve was fulfilled with many successes and failures. The paper present the reserve and results of breeding in years 1957–2008. As the successes prevail the breeding center can not only record a steady increase in population, benefiting the restitution of the European bison, but much more – it has been developed into a sought after tourism feature.

Since 1957, Wisents or European bison (*Bison bonasus*) are bred on the Damerower Werder in Mecklenburg-Vorpommern. The first European bison came as a gift from the Polish government to the former German Democratic Republic (GDR).

The breeding programme developed successfully. Up to eleven calves see the light of the Wisent-Island every year, 261 individuals were born here until the 31.12 2008.

Figure 1. Entrance hall

Figure 2. The Wisent-Island

Organisation

From the beginning the bison-reserve was managed by the forest authority of Mecklenburg-Vorpommern, which was reformed in the year 2006 into a public institution, namely the Landesforstanstalt, entrusted with the administration and management of the state forests. Apart from that the founding constitution of the Landesforstanstalt ensures the realization and promotion of projects regarding environmental education as well as forest tourism as a means of

rural development. In this context the Landesforstanstalt continues to manage the bison-reservation as a service provider for the federal state Mecklenburg--Vorpommern.

The bison-reserve is located in the forestry district Nossentiner Heide and therein assigned to the district Jabel. The forester of the latter is responsible for management. Two forestry employees, former lumberjacks are entrusted with the various duties as keepers in the bison-reservation.

Head Office Landesforstantalt
Forestry District Office (Forstamt)
Forestry District (Revier)
Reserve

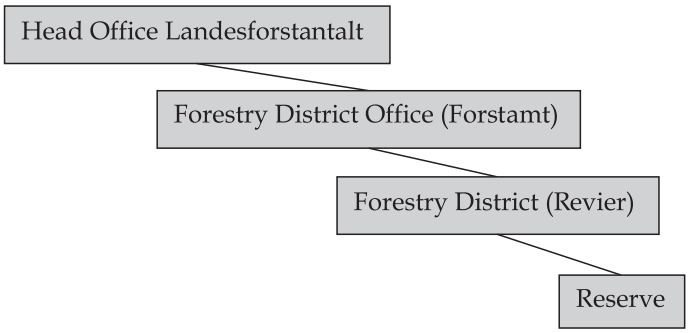

Figure 3. The organisation of the reserve.

Forest management in the reserve

The bison-reserve covers about 300 ha property of the Landesforstanstalt and consists in 94% of the forest. Apart from 65 % of the sites providing good and medium soil nutrition and growth conditions another 31 % are wetlands. These factors combined with the islands high humidity offer various silvicultural possibilities.

With 40% the main tree species is the Scotch pine (*Pinus sylvestris*), followed by black alder (*Alnus glutinosa*) with 22%, European beech (*Fagus sylvatica*) with 14%, birch (*Betula* spp.) with 10% and oak (*Quercus* spp.) with 5%. maple, larch and spruce are marginally interspersed (Fig. 5).

The stands of alder and birch are found on the organic wetland sites and dedicated to the protection of natural processes. For already six decades no treatment was applied in these stands.

The whole forest area has been inventoried. The annual sustainable felling quota amounts to 1100 cubic m. Management is conducted according to the management guidelines of Mecklenburg-Vorpommern as well as the nature conservation ordinance for this area. Stands older than 100 years cover about 50% of the area.

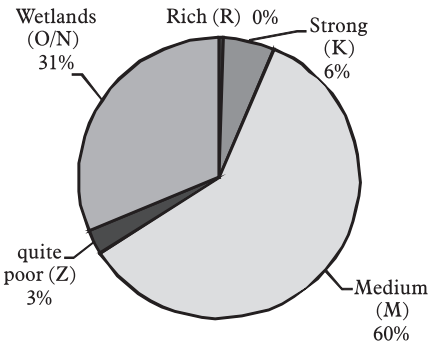

Figure 4. The quality of habitat

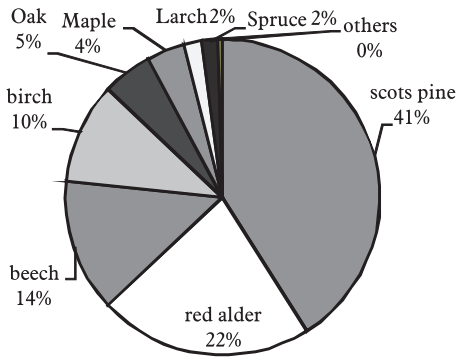

Figure 5. The type of trees in the reserve

Based on the inventory and resulting management plan it is planned to regenerate 24 ha until 2013, thereof 13 ha with oak, 7 ha with Scotch pine, 3.5 ha with beech and 1.5 ha with sycamore maple (*Acer pseudoplatanus*). For these regeneration stands a bison-proof fencing has to be ensured for 20 years. Some of the younger stands are protected by conventional wire mesh and so far the bison have not tried to intrude.

The free roaming herd of up to 25 individuals has an expanse of 163 ha of forest with ground vegetation and 12 ha of meadow at their disposal throughout the year and yet considerable damages arise on 80 ha through browsing and bark stripping, although a certain share of it is caused by red deer and roe deer. Of great concern is that 80% of beeches in all age groups are bark stripped and subsequently befallen with white rot. Therefore the beech is preferably substituted by oak in active regeneration processes.

Figure 6. Damage through stripping and subsequent white rot

Nevertheless the wisent, with its current population density, does not hinder the natural forest succession. Alder and birch regenerate very well especially on the wet meadows and the blackthorn (*Prunus spinosa*) overcomes the browsing pressure in dryer areas. Even patches of beech manage to grow beyond the wisent reach, although with considerable effort and time. But naturally the oak does not stand a chance without fencing.

Breeding conditions in the reserve

The breeding of bison occurs in three separated herds. The largest herd, with up to 25 animals, lives relatively free on 250 ha, only bounded by water and a fence at the connection to the mainland. Two smaller herds are contained in approximately 4 ha enclosures that are accessible for visitors. Direct contact between the herds is not possible as they are separated by 200m wide divisions. Each herd provides one male capable of reproduction. Breeding object is the "normal bison", the so called Lowland-Caucasian (LC) line i.e. a crossbreed between lowland-bison (*Bison bonasus bonasus*) and highland-bison (*Bison bonasus caucasicus*). The reserve has been maintained in this structure since 1976. Before there had been only one herd in enclosures from 25 ha to finally 80 ha size.

Births

261 calves with a gender ratio of 1:1 were calved until the 31.12.2008, once even twins. They descend from 40 cows and 12 bulls. The youngest cow was 31 months old by the time of her first delivery, the oldest 68 months. The age of first delivery averages 50 months or 4.2 years. The oldest cow (Dajanka) to calve in the reservation was 243 months (20.3 years) old, whereas the age of last delivery averages 17.1 years. Of the latter only one calf did not survive the first four weeks. The youngest bull to reproduce was 26 months old.

Most births (28%) occur in June, followed by May with 19%, July and August with 15% each, whilst the period from September to December ranges between 5–7%. One birth in January and three in April have to be viewed as exceptions.

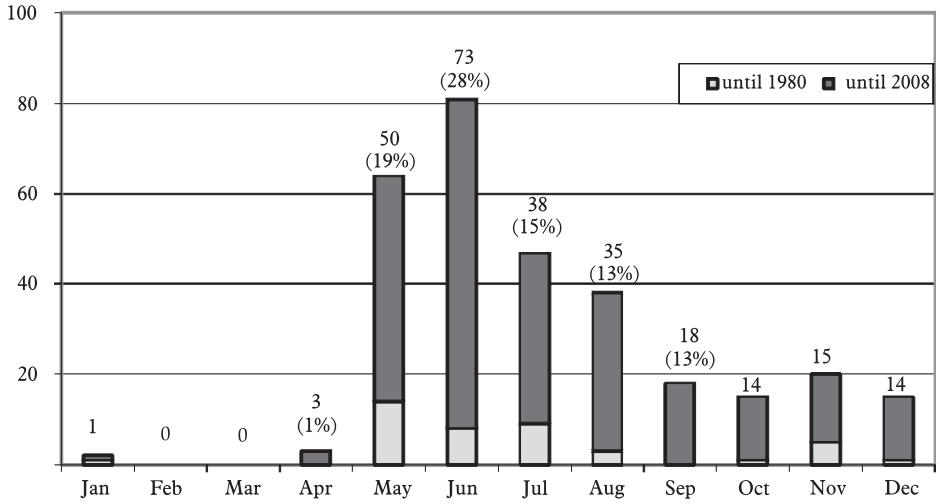

Figure 7. The seasonal distribution of birth

The distribution of births over the course of the year has changed only marginally compared to the period until 1980. In May and July respectively 16 % and 6% less births were registered, in June and August on the other hand 9% more. After 1980 the number of births in September and October increased. 56% percent of the cows to calve from July – September calved in the following year, whereas only 4% of the cows to calve from October to December gave birth in the following year (Fig. 7). The calf losses in the first four weeks are reasonable. Of 261 calves only 16 died during the first four weeks, resulting in a mortality rate of 6%. Of these 31% were calves from cows, witch had calved for the first time. Another 19% were killed by other herd members. The remaining losses were due to long birth processes, bad health condition of mother cows and resulting malnutrition of the calves. Amongst the deceased calves was one twin. Closer analyses were not conducted.

If the cows are classified in age groups of younger and older than 10 years the losses are evenly distributed.

Figure 8. Breeding herd with bull Darko

Figure 8. Cow defending her calf

The number of calves per cow varies during the span of reproduction--capability (Table 1). It ranges between 3 to 14 calves. If only the period from the first to the last birth is evaluated, counting the average years between births, relatively large differences are apparent. The most prolific cow calved annually, in contrast to the 22 year old cow Dajanka who calved only every 3.5 years.

Interesting differences also appear, if the free roaming herd is compared to the herds in enclosures. The free roaming herd has an average reproduction rate of 7.5 calves per cow or 1.8 years in between births, while the enclosed breeding herds rate 48% higher with 11 calves per cow or 1.2 years in between births. By excluding the cows that deceased during their reproductive age the rates increase to 7.8 calves per cow in the free roaming herd and 12.5 calves per cow or 1.1 years in between births in the breeding herds. Two explanations may serve for these unexpectedly high differences. In the first place it is suspected, that not all the births can be registered in the free roaming herd (stillborns, immediate losses). As second the clear arrangement and good

Table 1. Summary breeding-data of bison cows in Dammerower Werder

Cow name	Age [years]	number of calves	Age at 1st birth [years]	First calf dead	Age at last birth	Last calf dead	fertile period	Years per calving	Date of last calving
I. Free roaming herd n = 17 cows + 2 cows									
Dajana	22	7	4,90		20,3		15,2	2,2	09.09.1996
Dagne	20	4	8,40		19,5		11,1	2,8	03.12.2004
Darling	20	10	3,20		19,4		16,3	1,6	17.09.1994
Daffine	20	10	4,10		19,4		15,3	1,5	20.09.1996
Dahnka	25	12	4,90		19,2		14,3	1,2	30.07.1998
Danuta	20	10	4,10		19,1		15	1,5	15.06.1995
Dame	18	9	4,70		18,4		13,5	1,5	14.11.1977
Pustonka	19	12	3,10		17,7		14,6	1,2	10.12.1984
Daphnia	24	4	5,60		17,5		11,9	3	24.05.2002
Puella	24	10	4,80		17,3		12,6	1,3	21.11.1970
Davia	20	4	4,30		17,3		13	3,3	16.08.2000
Darissa	19	11	5,00		17,3		12,3	1,1	08.12.2007
Darinka	19	3	9,40		17,3		7,9	2,6	14.08.2003
Danja	20	7	7,30		16,9		9,6	1,4	21.05.1980
Dahlie	15	9	3,10	yes	14,3		11,2	1,2	24.07.1989
Dacia	25	5	5,80		13		7,3	1,5	04.10.1997
Dareike	22	5	6,00		10,9	yes	4,9	1	19.08.1998
Sum 1	352	132	88,7		294,8		206	29,9	
Average	20,7	7,8	5,2		17,3		12,1	1,8	
Danne	10	6	3,1	yes	9,8		6,7	2,4	15.06.1979
Dariane	13	4	7,3		13,1		5,8	1,4	15.07.1991
Sum 3	375	142	99,1		317,7		218,5	33,7	
Average	19,7	7,5	5,2		16,8		11,5	1,8	
II. Breeding enclosure n = 4 cows + 2 cows									
Darkmene	25	13	5,7		19,3		13,6	1	21.06.2002
Danica	19 still alive	13	5,1		18,4		13,3	1	08.12.2008
Daniela	20	10	4,7		18,3		13,6	1,4	19.12.1988
Darina	20	14	4	yes	18,2		14,2	1	09.06.2001
Sum 2	84	50	19,5		74,2		54,7	4,4	
Average	21	12,5	4,9		18,6		13,7	1,1	

Table 1. Summary breeding-data of bison cows in Dammerower Werder

Cow name	Age [years]	number of calves	Age at 1st birth [years]	First calf dead	Age at last birth	Last calf dead	fertile period	Years per calving	Date of last calving
Dakota	13	5	4,3		12,4	yes	8,1	1,6	28.11.1987
Dajanka*	22 still alive	11	3,8		15		11,2	1	06.08.2002
Sum 4	119	66	27,6		101,6		74	7,0	
Average	19,8	11	4,6		16,9		12,3	1,2	
III. Entire breeding-program n = 25 cows									
Sum 1+2	436	182	108,2		369		260,7	34,3	
Average	20,8	8,7	5,2		17,6		12,4	1,6	
Sum 3+4	494	208	126,7		419,8		300	40,7	
Average	19,8	8,3	5,1		16,8		11,8	1,6	

The analysis summarises Sum 1 and Sum 2 for cows who have reached the natural age limit and in Sum 3 and Sum 4 included are cows, that are sterile not for age reasons
* cow had been without bull for 4 years

visibility of the enclosures benefit the feeding by keepers as well as the health inspection by the veterinarian, so that consequently the cows have a better condition.

Population development

Until 1968/69 the standard population counted 5.2 bison and annually two calves were born (Pohle 1980). Particularly after the reserves reconstruction and the establishment of three herds for breeding the birth-rate rose to maximal 11 calves per year and remained relatively constant. The size of the three breeding herds has stabilised at a level of 30–35 individuals. Until now four cows and eight bulls were introduced from other bison breeding centers. From Poland two cows and two bulls (Niepolomice) and one bull (Borki); from Sweden one bull (Eriksberg); from Germany two cows from Kaiserslautern, two bulls from Springe, one bull from München Hellabrunn and one from Hardehausen.

64 bison were offered to other breeding centers so that bison from the Dammerower Werder or their descendents can be found in 17 countries.

Health

A contracted veterinarian attends to the wisents in close cooperation with the keepers and the responsible forester. As bison are wild bovines, a single-animal treatment is generally not conducted. Herd treatments in the three breeding

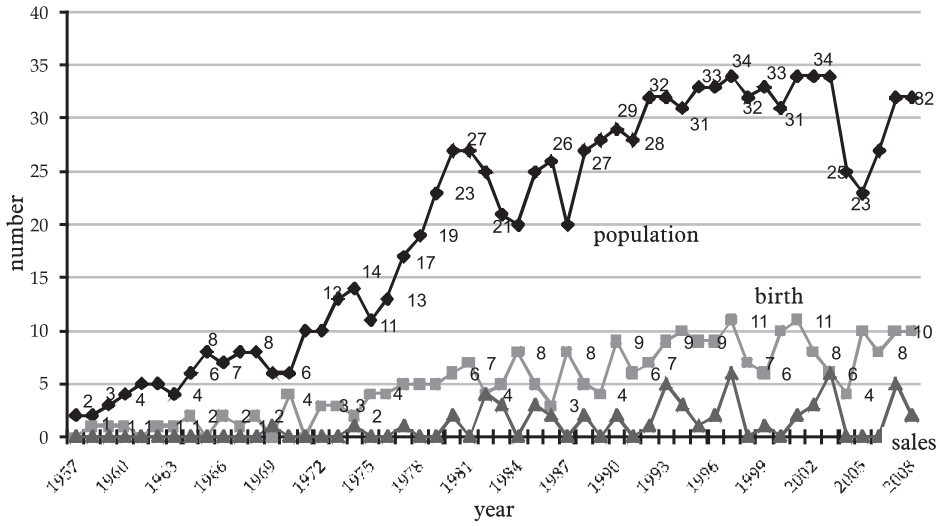

Figure 10. The development of herd in years 1857–2008

groups are especially aiming at the reduction of ekto-and endoparasite infestation. The treatment with Invermecitin has proved to be most effective. The preparation "Ivomec for Cattle" is mixed with the fodder and ingested without problems.

Health monitoring

The necessity of anti-parasite treatment results from regular excremental examinations regarding the development of endoparasitic phases or from external changes e.g. caused by scabies. The bison's condition is furthermore monitored by blood-serological examinations. The blood samples are screened for basic parameters and since two years also to determine the genetic status of the individuals. Additionally following infectious diseases are tested:

- enzootic leucosis
- bovine brucellosis
- bovine herpes infection
- bovine diarrhoea
- since 2007 blue tongue disease (BTD)
- tuberculosis (post mortem)

The bison on the Dammerower Werder are free from aforementioned diseases.

Diseases

Following diseases occurred and were treated successfully.

- three cases of calve paralysis (6, 25, 28 days old)

- *retentio secundarium* supposedly caused by selenium deficiency
- aspiration pneumonia as a result of improper tranquilisation
- sarcoptes was diagnosed in two purchased animals

Losses

Heavy losses were inflicted during 1968–1969 through piroplasmosis (*Babesia divergins*). The infection was probably transmitted by ticks (*Ixodes ricinus*) from nearby living cattle. Five cows and one bull died in May and June of mentioned years leaving the wisent-reservation with only three remaining females, Puelle, Danne and Danja (Pohle 1980). This was the worst situation for the bison-breeding on the Dammerower Werder so far. The continuation of the breeding-programme was heavily discussed but finally could be sustained by purchase of the bulls Pustlik and Puginal and the cow Pustonka from Poland.

Further losses and their reasons were:

- 1966 the bull Pumik poisoned himself, presumably with thorn apple or belladonna (Estheralcaloid) (Pohle 1980)
- 1975 the bull Pustlik dies of cardiovascular collapse after an immobilisation (Pohle 1980)
- The 18 year old cow Danne dies of cardiovascular collapse 4 days after calving (Pohle 1980)
- Two cows and one calve perished in the moor; on another occasion a cow could be freed
- 1988 the cow dies of rabies (Lyssia); her calve dies of different reasons one week later aged 61 days
- 1980/2009 three bison die of purulent pneumonia, caused by massive *Dictyocaulus viviparous* infestation.
- A young bull had to be culled due to a hernia umbilicalis
- three calves suffered deadly wounds from females shortly after calving
- 15 young bison, in general males, suffered deadly wounds from bulls; this behaviour is now avoided through the timely extraction of young bulls especially that now the possibilities to hand over surplus animals to other breeders have improved. In the past 153 wisents could have been transferred for breeding, but only 64 could be placed. The remainders had to be culled and were partially marketed as game. But not all of these had been suitable for breeding for various reasons.

A closed reserve transforms into a well-known tourist feature

In Mecklenburg-Vorpommern, as a region lacking in infrastructure, tourism is of eminent economic importance. Over the course of the past ten years the bison-reservation has evolved into a prominent and popular destination.

The whole tourism sector has expanded immensely and this development did not halt for the reservation. Since 2001 large investments have been made. 65,000 € were invested for the breeding-station. Two large tribunes were erected traditionally from timber for 60,000 €. Aided by private sponsors a new entrance and reception hall could be built including an informative exhibition on bison-breeding, forest and forestry. About 600,000 € were invested whereof 80% came from private sponsors.

According to the European guidelines for rural development programmes the Landesforstanstalt is eligible since 2006. With an 85 % Aid form the ELER-Programme a "forest-experience-path" was established. On this path children (as well as adults) are led by playing, touching, observing and experiencing to a better understanding and perception of nature and forest in particular. Not only are the classical information panels included but also elements for climbing, a formicarium and the main exhibition in the entrance hall. Also brand new is the deer park next to the bison enclosures. The latest investment covers about 250,000 €, but it will most likely keep the 50,000 visitors per year interested, who may choose from a widening range of activities.

Until 1990 certain areas of the reservation were open to the public all the time and free of charge. Nowadays a small entrance fee is charged from 3 years age upwards. But this is rather to be viewed as a most welcome contribution to the restitution of the European bison than a means to gain profit.

Figure 11. Climbing through the forest-experience-path

Figure 12. Main exhibition

References

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Authors of pictures: Fred Zentner and Thomas Kelterborn