

# European Bison Breeding Center in Dwukoły Forest District and first experiences in breeding

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**Abstract** The Dwukoły Forest District's European Bison Breeding Enclosure is located in a forest complex that serves as the main recreational area for the residents of Mława. The decision to build the enclosure was made in 2019, when the Dwukoły Forest District joined the "Complex protection of European bison in Poland" project. The former forest nursery in Krajewo was selected as the site for the enclosure, with over 10 hectares of land designated, including more than 5 hectares of forest. In spring 2021, pastures were established on the site of the future enclosure. The design was prepared by the Akint company from Warsaw. On December 29, 2023, the project was completed and an occupancy permit was obtained. The following components were constructed: a fence, a quarantine enclosure with a catching area, a viewing gate, a platform with an observation tower, a feeder, a feed alley with troughs, an outbuilding, communication routes, and paving. A parking area has been prepared nearby. The forest within the enclosure is primarily pine, with a mixture of oak, beech, linden, aspen, birch, sycamore, spruce, Douglas fir, and fir. The understory consists of hazel, buckthorn, and hornbeam, along with rich undergrowth. Three hectares of pasture, sown with a mixture of eight grass species, remain stable even in dry years and provide food for most of the year. In December 2023, four European bison came to the enclosure: a three-year-old bull, POMERANIN, from Międzyzdroje; a cow, POWILGA, from Białowieża; and two heifers, PORECKA and POSMYKAŁA, from Wolisko. The enclosure in Krajewo has become an important site for the European bison population. Various experiences related to the care of the European bison herd have been described in detail. Initial outcomes have been very positive; the first calves born in the enclosure are the result of good care. Educational activities are also being conducted for various audiences.

**Keywords:** European bison, Krajewo enclosure, breeding, welfare

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## Location of the enclosure

The European Bison Breeding Center in the Dwukoły Forest District is located on the border of the Warmian-Masurian and Masovian Voivodeships, in the Krajewo district of Mława. It is situated within a forest complex in the northern part of the city, which serves as the main recreational and leisure area for Mława residents. They have access to 20 km of nature and recreational trails maintained by the Dwukoły Forest District. This area is part of



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the Zieluńsko-Rzęgnowski Protected Landscape Area. It lies in the mesoregion of the Mława Hills, which features varied terrain with moraine plateaus, embankments, and moraine hills rising over 180 meters above sea level. One of these, located on the southern edge of the forest, is Łysa Góra, which offers a beautiful view of the city. The forest consists primarily of older pine stands, where the reconstruction process has begun. At the northern edge of the forest is a section of the so-called “Mława Position” fortifications, including the “Krajewo” fortification group (two shelters), the “Piekiełko” fortification group (four shelters), and the “Dźwierznia Łysa Góra” fortification group (four shelters). In early September 1939, these fortifications effectively held back the German offensive. Due to the importance of these non-productive forest functions for Mława residents, the Mława Forest has been designated by the Dwukoły Forest District as a forest with enhanced social functions to adapt forest management to its roles.

### *Construction of the enclosure*

The decision to build the enclosure was made in 2019, after the Lidzbark Forest District withdrew from the “Complex Protection of the European Bison in Poland” project. The Dwukoły Forest District was selected for the enclosure



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because of its proposed location in a forest complex within the city limits of a town with a population of 30,000. On February 6, 2020, a cooperation agreement was signed between the Warsaw University of Life Sciences and the State Treasury – Dwukoły Forest District. This agreement was intended to secure European Union funding under the Infrastructure and Environment Operational Programme 2014–2020. On August 31, 2020, through an annex to the funding agreement for the “Complex Protection of European Bison in Poland” project, the Dwukoły Forest District became the 25th forest district participating in the project.

The former forest nursery site in Krajewo, which included a reserve area not used for growing forest tree and shrub seedlings, was selected for the enclosure. More than 10 hectares of land were designated for the enclosure, which, in addition to the forest nursery area, included over 5 hectares of forest. The planned construction of the European bison enclosure required modernization of the forest nursery infrastructure to make seedling production more resilient to extreme weather conditions caused by climate change, improve working conditions for employees, provide a water source for the animals, and create a nature and forest education complex adjacent to the enclosure. The forest nursery modernization was completed in 2021. It included the construction of a modern irrigation system supplied by two deep wells, which



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also provide water to the European bison enclosure. A nursery fence, internal road, nursery support buildings, and an administrative building were constructed, housing the office of the European bison enclosure, the nursery forestry office, and sanitary facilities for tourists.

In spring 2021, in preparation for the planned transport of European bison in 2023, pastures were established within the future enclosure. The investment process for the construction of the enclosure began on October 15, 2020, with the announcement of a tender for the development of design and cost estimate documentation. On December 7, 2020, a contract was signed with Akint, a company based in Warsaw. Forestry officials provided the company with design assumptions based on experience gained during field visits to enclosures in the Kobiór Forest District, Pszczyna, the Forest Culture Center in Gołuchów, Międzyzdroje, the Stuposiany Forest District, and Białowieża National Park. Due to the COVID-19 pandemic, design work was extended by 10 months, and the final documentation was accepted on May 20, 2022. On May 25, 2022, a tender for the construction of the European bison enclosure was announced. The construction contract with the contractor, Rostkowscy S.C., was signed on July 5, 2022. On December 29, 2023, the investment was completed and an occupancy permit was obtained.



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The investment included constructing a fence for the enclosure, a quarantine area with a catch basin, a visitor gate, a visitor platform with a viewing tower, a feeder, a feed alley with troughs, an outbuilding, passageways, and paving. In 2023, a visitor rest area was built next to the enclosure. The final stage, completed in spring 2024, focused on landscaping and vegetation improvements that connected the various phases of the investment. This work included building additional paths, constructing dog kennels for visitors, renovating the shelter and fire pit, installing lawns, and planting thousands of plants.

### **Animal welfare in the European bison enclosure**

The enclosure covers a total area of 10.35 hectares, including the main area for European bison (8.61 hectares), farm facilities, and a visitor section with infrastructure for safe observation. European bison are bred in conditions that closely resemble their natural habitat. The enclosure's fertile soils support abundant vegetation, which forms their natural diet. The environment provides the animals with sufficient food and suitable resting conditions. The European bison have access to over 5 hectares of forest and 3 hectares of pas-



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ture. The forests are 52 and 134 years old, with an additional spruce thicket about 10 years old. Within the enclosure, pine grows alongside oak, beech, linden, aspen, birch, sycamore, spruce, Douglas fir, and fir. The understory consists of hazel, buckthorn, and hornbeam, along with a rich undergrowth of forest vegetation.

Three hectares of pasture have been specially prepared by sowing a seed mixture of eight grass species favored by European bison. Even in dry years, the pastures remain green and provide grass for most of the year. During the season, they are mown up to four times, and the harvested hay meets the European bison's need for this type of feed. The enclosure contains 50 species of trees and shrubs, providing food in the form of branches, shoots, and bark. Oaks and beeches produce acorns and beech nuts, which the European bison readily eat. The fruit of the many fruit trees growing in the shrub belts dividing the pastures is a delicacy for them. The enclosure also allows the European bison to find secluded resting places, where they remain out of sight of visitors.

The enclosure is surrounded by a high metal panel fence, fully boarded in areas adjacent to public roads to prevent direct human contact with the European bison. Inside the enclosure, in the exhibition area open to visitors, the fence is equipped with a guardrail, while in the remaining section, an electric fence is installed along the inner edge.

## **The European bison arrived, and the enclosure opened**

While the enclosure was under construction, preparations were made to welcome the European bison. Inside, the trunks of 750 trees were protected with metal mesh and stones. Brushes were provided to help the European bison remove excess fur. Ten salt licks made from thick aspen trunks were set up, and two sand pits were installed for the European bison to bath and rest.

Food supplies were gathered, including hay, haylage, fodder beets, carrots, a grain mixture of oats and barley, wheat bran, and salt licks. In fall 2023, the “Together for European Bison” competition was held, in which students from 27 schools collected several tons of acorns and chestnuts for the animals. In December 2023, four European bison moved into the enclosure. The first to arrive was a 3-year-old bull, POMERANIN, from Międzyzdroje, on December 11 at 11:00 p.m. a cow, POWILGA, from Białowieża, and two heifers, PORECKA and POSMYKAŁA, from the Wolisko enclosure arrived in the following days. After a period of acclimation, the animals were made available to visitors on March 8, 2024, despite ongoing landscaping work, due to overwhelming interest from the residents of Mława.

The enclosure officially opened after all work was completed on Friday, June 28, 2024. During the ceremony, a commemorative oak tree was planted to mark the 100th anniversary of the State Forests, as that day was the anniversary of the institution’s establishment.

## **Operation of the enclosure and its importance in restitution**

The European Bison Breeding Center in the Dwukoły Forest District serves two main purposes: it is a breeding center for European bison and an important educational facility. The enclosure is open to visitors eight hours a day, six days a week, except Mondays, when farm operations take place. Opening hours vary by season. A viewing platform and a path along the enclosure fence allow visitors to observe European bison in semi-natural conditions. At the feeding area, visitors can see the animals up close, which raises awareness about this endangered species and ongoing conservation efforts.

The enclosure in Krajewo has become a key site for the development of the European bison population. The individuals bred there are used in reintroduction programs, helping to increase the number of these animals in Poland. Foresters and nature conservation specialists ensure that the animals are healthy, have suitable living conditions, and that genetic diversity within the species is maintained. Such enclosures also help reduce the risk of genetic diseases caused by inbreeding, which is a significant issue for European bison populations that have survived thanks to a very small number of founders.



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## Education and public awareness

The enclosure also plays a key role in environmental education. It was visited by 56,000 people in 2024 and 59,000 people in 2025, including schoolchildren and youth, who had the opportunity to see European bison and learn about their vital role in the forest ecosystem. Forest educators conduct classes with organized groups from schools, educational centers, senior homes, and other institutions. Between 2024 and 2025, 150 organized groups, totaling 4,100 people, took part in these educational activities. On June 14, 2025, over 1,000 people attended nature and educational workshops titled “A Day at the Enclosure About European Bison and More.” These activities are increasing public awareness of nature conservation and the need to protect endangered species. Education at the European Bison Center covers topics related to the history of the European bison, its biology, the threats it has faced, and conservation efforts. This is an important tool for building a positive image of nature conservation in Poland and for increasing public support for such initiatives.

A number of informational and educational boards have been placed throughout the enclosure, which, combined with small-scale architecture, allow visitors to engage with nature and the European bison for extended periods. Children and people with limited mobility greatly appreciate the opportunity to spend time under the shelter or in other designated rest areas. Since

the enclosure opened to visitors, consistent interest in the European bison and the history of this species' recovery has been observed every day.

This shows that the efforts of foresters, veterinarians, and the scientific community to promote European bison recovery and nature conservation in Poland are being positively received.

### **First European bison breeding experiences – practical aspects based on observations of the herd**

Protecting the European bison requires not only legal and population-level measures, but also detailed knowledge of their social behavior, environmental needs, and responses to human interference. Observations conducted in 2024–2026 provide valuable data applicable to both captive breeding facilities and free-ranging populations.

#### ***Reproduction and calf survival as a component of population conservation***

In spring 2025, the herd increased to seven animals. The calving season was completely successful. Three female calves were born: PODKRAJEWKA (mother POWILGA) on May 17, POTUPAJKA (mother PORECKA) on May 21, and PODWUKOLINKA (mother POSMYKAŁA) on June 20. The situation was different in spring 2024. On May 3, 2024, cow POWILGA, admitted to the enclosure in her fourth month of pregnancy, calved in the morning. Despite showing no initial signs of illness, the female calf died on the second day of life. *Post-mortem* examination indicated dehydration caused by lack of milk intake. However, the examination did not reveal the cause of the calf's refusal to feed. In the context of the bull's behavior toward newborn calves in subsequent years, the aggressive behavior observed toward the newborn calf on May 3 and 4, 2024, including butting and tossing the calf with its horns, is particularly important. During its first calving in 2025, on May 17, the same bull exhibited similarly aggressive behavior toward the calf. Within 20 minutes of birth, the calf was struck with the bull's horns and thrown up to 1.5 meters. This behavior was photographically documented, and one thermal image shows the calf hanging headfirst on the bull's horns. Immediate action was taken to isolate the bull in a quarantine pen, where it remained from May 18 to June 17, 2025. Meanwhile, on May 21, a second cow calved. After the bull was released back into the herd, no aggressive behavior was observed toward the calves, including the one born after the herd was reunited on June 21, 2025. The following year, during calving on June 7, 2026, the bull's highly aggressive behavior



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toward the newborn calf was repeated. The first butting and horn-tossing occurred just 15 minutes after birth. The decision to isolate the bull was made immediately and carried out within the following hours. Unfortunately, this action was too late, and the calf died on June 8. The autopsy revealed open fractures of ribs 8 and 9 extending into the pleural cavity, bruised and congested lungs and heart, and bloody fluid in the pleural and abdominal cavities. The cause of death was acute post-traumatic damage to internal organs with internal hemorrhage resulting from severe blunt force trauma. This case highlights the crucial importance of early detection of disturbances in the relationship between the bull and newborn calf and prompt intervention by caregivers within the first hours, or even minutes, after birth for species conservation. Given the bull's repeated aggressive behavior toward newborn calves, preventive measures should be considered: early isolation of the bull or its replacement in the breeding program due to its overly aggressive nature.

A similarly brutal act of aggression against a newborn calf occurred on June 13, 2026. The bull remained isolated, but cow POWILGA was unable to defend herself against an attack by three heifers born in the pen the previous year. The heifers took turns striking the calf's neck, head, and body with the sharp tips of their horns. The aggression stopped only when the calf lay motionless, and any attempt by the calf to rise triggered an immediate attack

by one of the heifers. A heifer born a year earlier to cow POWILGA began to nurse persistently. The newborn calf was immediately separated from the herd. After the mother was separated from the rest of the herd, the calf was reunited with her. The calf was isolated within an hour, and it took approximately two hours to separate the cow from the herd. After being reunited with the calf, the cow showed no signs of rejecting it. As of this writing, the calf has survived three days, and we hope the most difficult period after birth is over. We cannot determine what motivated the heifers to show such a high degree of aggression toward the newborn calf. Is it behavior resembling that of a bull, a desire to nurse from a cow, or perhaps entirely unknown factors that should be considered when developing procedures to prevent calf deaths from mechanical injuries caused by aggression from other European bison?

Analysis of calving locations and times showed that European bison prefer quiet, sheltered areas – four of the five births occurred early in the morning in old-growth forest. One calving took place in the square in front of the observation deck during the evening. This information is crucial for planning conservation areas and minimizing human pressure during breeding periods.

### *Social structure and herd management*

The bull's aggressive behavior toward the newborn calf required its temporary isolation (May 18–June 17, 2025). Observations of the remaining individuals revealed strong social bonds: cows and calves spent most of their time near the fence of the quarantine enclosure, leaving only to eat and drink. This underscores the crucial role of the herd's social structure in European bison well-being and the need for careful intervention decisions in species conservation.

### *Safe human intervention in crisis situations*

The bull's isolation, carried out on May 18, 2025, by 10 Forest District employees, lasted about 5 hours and required the use of a Ubison 25J mobile electric fence and mechanical equipment. A key factor in the operation's success was the positive relationship between the animals and their handler: their response to voice commands and a familiar visual cue (a bucket) enabled the procedure to be completed safely without pharmacological agents. This experience suggests that long-term, calm human presence can be a valuable tool in European bison conservation. Experience gained in 2026 shows that, in addition to electric fencing, a well-designed capture facility is also essential for animal isolation and segregation.

### ***The importance of environmental enrichment***

European bison readily use sedge fields as daytime resting areas, confirming the value of varied terrain in enclosures and sanctuaries. Spruce thickets are especially important, serving as isolated refuges, particularly shortly after calving. Bulls also use individual spruce saplings as surrogate rivals during the rutting season, which helps reduce aggression toward other herd members. Playful behavior involving the manipulation of wooden objects has been observed. After potentially dangerous stumps were removed, the need for activity persisted and was redirected to safer oak branches. This highlights the role of controlled environmental enrichment in improving well-being and reducing risky behavior.

### ***Seasonal habitat use***

Analysis of space use revealed a clear seasonal pattern: in summer, European bison spend about 70% of their time in meadows, while in winter, spring, and autumn, forests become the dominant habitat. In winter, snow cover makes pasture feeding unavailable, so European bison feed on shoots and tree bark in the forest. In spring, they feed on forest floor plants, particularly anemones in the Krajewo enclosure. In autumn, they are attracted to the forest by seeds such as acorns and beech nuts. Understanding these preferences is crucial for planning the location of enclosures, protected areas, and winter feeding sites, and for reducing conflicts with human activity.

### ***Learning and adaptation to anthropogenic elements***

European bison quickly learned to respond to the sound of a metal bucket as a feeding signal, demonstrating their strong learning capacity. Equally important is their observed respect for electric fences, both electrified and de-energized. This serves as an example of a psychological barrier, which can be an effective and minimally invasive tool for managing the space used by European bison.

### ***Infrastructure that supports well-being***

The use of non-freezing waterers with pressure balls has produced very good results, especially for individuals lower in the hierarchy. Ensuring free access to water for all herd members is essential for effectively protecting and maintaining a stable European bison herd.

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### **Zagroda Żubrów w Nadleśnictwie Dwukoły i pierwsze doświadczenia w hodowli**

**Streszczenie:** Pokazowa Zagroda Żubrów Nadleśnictwa Dwukoły jest w kompleksie leśnym będącym głównym obszarem rekreacyjno – wypoczynkowym mieszkańców Mławy. Decyzja o budowie zagrody zapadła w 2019 roku, i Nadleśnictwo Dwukoły przystąpiło do projektu „Kompleksowa ochrona żubra w Polsce”. Na miejsce budowy zagrody wybrano teren szkółki leśnej w Krajewie i przeznaczono ponad 10 ha gruntów, w tym ponad 5 ha lasu. Wiosną 2021 roku założono pastwiska na terenie przyszłej zagrody. Projekt przygotowany był przez firmę Akint z Warszawy. 29-go grudnia 2023 roku zakończono odbiór inwestycji i uzyskano pozwolenie na użytkowanie. Wybudowano: ogrodzenie, zagrodę kwarantannową z odłownią, bramę wizytową, platformę z wieżą widokową, paśnik, korytarz paszowy z korytami, budynek gospodarczy, ciągi komunikacyjne i utwardzenie terenu. W sąsiedztwie przygotowano miejsce postoju. Las w obrębie zagrody to głównie sosna z domieszką dębu, buka, lipy, osiki, brzozy, jawora, świerka, daglezi, jodły. Podszyty składają się z leszczyny, kruszyny i grabu oraz bogatego runa leśnego. Trzy ha pastwisk, wysianymi mieszaną ośmiu gatunków traw nawet przy suchych latach nie wysychają i dostarczają żeru przez większą część roku. W grudniu 2023 roku w zagrodzie zamieszkały 4 żubry, 3-letni byk POMERANIN z Międzyzdrojów, krowa POWILGA z Białowieży oraz dwie jałówki PORECKA i POSMYKAŁA z Woliska. Zagroda w Krajewie stała się miejscem istotnym dla populacji żubrów. Opisano szczegółowo różne doświadczenia związane z opieką nad stadem żubrów. Pierwsze doświadczenia są bardzo pozytywne, pierwsze urodzone w zagrodzie cielęta są efektem dobrej opieki. Prowadzona jest również edukacja skierowana do różnych odbiorców.

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