



GUIDE FOR RESTORING IBERIAN ECOSYSTEMS

Bison Bonasus Management and Breeding



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INTRODUCTION

This work is a guide on how to restore ecosystems from an ecological and economic point of view, in order to understand the problems in which our forests and the society of the rural world are located, to locate them and give them back their ecological role and within society 90% of the natural spaces in Spain are privately owned and are in the rural world, obviously, to preserve these places we must find a way to also restore the economy of the inhabitants and owners of these ecosystems, give them a role in Society and give them a cost effectiveness that justifies the activity of restoring ecosystems.

In this work, I want to explain the causes that have led our ecosystems and the society of the rural world to the unfortunate state in which it is, for this we will make a brief review of the history of the Iberian peninsula to understand how we have reached this point in our days. In this way we will understand the changes that have occurred in these and why we have reached this point.

In Second place, locate and identify the problems that our ecosystems are throwing and the society it harbors. Without a doubt, the first step to correct a problem is to identify it, so we will make a list with the problems and their consequences to have very clear what the objectives are to achieve.

Once the problems are located we can put solutions to them. This has to happen through practical and simple actions that address the problems effectively and without being very traumatic for the society of the rural world.

Finally, a guide on the management and breeding of the European bison will be presented as a more practical solution to these problems, so that the owners of the forests, encourage to restore their ecosystems and their economy, have a database to help them do so Effective way, without great costs and in a simple way

I hope this guide will help you and open the doors to a more encouraging future.

Cordially

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1 A FEW OF HISTORY

1.1 Our ecosystem in its beginnings

Our ecosystems throughout history have undergone great changes that have altered their natural function of self-regulation, these changes were produced in an artificial way according to the conveniences of the human being in our lands and are determined by historical facts, these changes have Had an ecological repercussion that has transformed our habitats, until reaching the point of self-destruction of these, by the own lack of self-regulation of the ecosystem.

The Iberian peninsula was discovered by the Phoenicians 3000 years ago and called 'Saphán', meaning country of rabbits, due to the large number of lagomorphs found in it. They believed that it was an island because almost all its coasts were navigable and it took some time to discover that it was a peninsula.

In it were found very rich ecosystems, with a variety of fauna that includes Europeans and Africans, also they found tribes of celtiberos that lived in harmony with the nature.

One thing to keep in mind is that in this ecosystem the Phoenicians believed that there was a plague of rabbits in the peninsula, this fact is very significant, because in order to have many rabbits, the ecosystem had to have very determined characteristics and in turn the Own rabbits fed the trophic chain in a certain way, this balance produced many rabbits and in turn were controlled by predators and activated the entire trophic chain, enjoyed a habitat of clear and shady, with patches of forests and clearings with scrub and pasture. Control of the scrubland was assured by macro-herbivores that kept it under control, this control, despite the abundance of food for medium-sized herbivores, was less protective and aided in birth control, in this way the ecosystem could produce Large amount of herbivores of small size that in turn maintained a great amount of predators.



European rabbit-*Orvctolaqus cuniculus*

Without doubt this environment was the ideal for these latitudes and also the idyllic point of the Iberian ecosystem, but great events would change this ecosystem forever.

1.2 The changes of ancient History in ecosystems

The first change that our ecosystem underwent was with the Roman Empire in 218 B.C and lasted until century V, although the number of people that brought the Roman empire was not very significant, its environmental impact was important.



Main cities and Roman roads in iberia with the main products that extracted

They established their routes by the natural steps that drove away the wild species of these steps, thus cutting off the migratory routes of terrestrial species and helping their extinction by consanguinity, by being isolated populations and not being able to refresh the genetic lines during migrations.

They also began the first industrial exploitations in the peninsula, such as mining, iron and steel, agriculture and intensive livestock that would undoubtedly

change the state of the ecosystems of the peninsula forever.

Obviously the damage caused by this cut of the migratory routes can not be quantified with the data that we have or have reached our days, but it is clear that in the legacies that left us is considered a fauna and flora very different from Which we can contemplate today.

From the fifth century to the eighth century the Visigoths inhabited the Iberian peninsula, the Visigoths were a branch of the Goths of the northern countries and attempted to expand northwards, causing greater occupation of natural passages and wars consuming many natural resources to The campaigns, such were these wear and tear that needed truces to be able to resupply to continue the contest.



Main raw materials of the Spanish territory

From the 8th century the peninsula was conquered by the Arabs until 1492 and was reconquered by the Catholic kings, all this period was marked by the wars between kingdoms of the Middle Ages and finally against the Arabs. Obviously the last of the preoccupations of that time was the conservation of ecosystems, the bestiary we keep from that time in the Iberian peninsula is really poor, possibly the poorest in Europe.

It was from the fifteenth century when our ecosystems suffered the worst of the transformations, with the conquest of America and the medieval wars were needed at that time all the natural resources that man had within his reach, occupying all spaces to which the Human being could access. From that time it was said that a squirrel could cross the peninsula without touching the ground.

The construction of the invincible armada to bring the gold of the Americas, ended with the forests of the Monegros in Zaragoza, all the lands apt for agriculture were

deforested for its exploitation, and those that did not meet the appropriate conditions for these ends were dedicated To the extensive cattle ranch to the steepest points where the cattle ranch could not accede. Any wild animal, whether carnivorous or herbivorous, threatened farms and posed a threat to human development.

At that time the survival for human beings was very difficult, gripped by the wars and diseases, they took advantage of all possible resources, for it was created the migratory routes of domestic cattle, the real glens for transhumance, copied directly from the routes Migratory species of wildlife.

Natural areas underwent a change of management of wildlife to domestic fauna, the deficiencies that domestic cattle did not meet when regulating the ecosystems were taken directly by man, control of the scrub by the shepherds themselves and the Meat production was absorbed by society, so that ecosystems were kept alive, although artificially, regulation of the ecosystem continued, although with other actors in the setting of our rural world. Wildlife was considered as an enemy of the human being either by eating their crops or by attacking livestock.

Despite the reduced habitat for wild animal species, animals could move freely, roads and crops were used by animals without much trouble. The hunting techniques were not very effective by luck for the fauna and still a good representation of all the wild species was conserved. The lack of natural predators was replaced by the hunting of the man who until not long ago kept a shotgun in every home in the rural world and part of his livelihood came from hunting activity, being a survival hunt, did not affect trophies and more Well acted as population control.

We would have to resort to the history of art and the private collections that we preserve today to see what inspired the artists of those times, the collections that reflected nature, especially in the scenes of hunting we can give many details of the fauna That the artists found and you can see in their works.

An image that is repeated in Spanish works and in the French Pyrenees and which attracts my attention personally is the image of a large, mottled feline with a long tail that could attack even a horse, in Some representations is hidden in a tree and in others bites the head of a large dog, evidently it is not a lynx because it has the long tail and is much larger, surely it is a leopard although in our bestiary of The time was called tiger and we have as a result these works of art and the curious name of some places known as the ravine, the valley or the street of the tiger.

That may suggest that the fauna and flora of only 200 years ago was much richer than the one we contemplate today.



Vase of medieval europe with a big feline attacking a horse



Medieval images hunting big cats drawn from: Gaston Phébus's book for hunting
(*Le livre de chasse de Gaston Phébus*)

1.3 Changes of modern history in ecosystems

With the arrival of the modern era, industrialization and mechanization of production systems, rural populations suffered a migration to cities, coasts and industrial areas, the rural world suffers depopulation and one of the main causes is Their lack of economic competitiveness, traditional agricultural holdings have no place in modern society and for that reason the management of the ecosystems carried out by the human being is being abandoned.

Undoubtedly the worst times for our ecosystems are present, a much larger and monographic study would be needed to detail it, but almost everyone intuits it. The main factors that are doing damage to our fauna is the impossibility of moving freely between populations due to the barriers that wildlife, railroads, highways, marshes and a lot et cetera. These artificial barriers make the animal populations of the few natural redoubts reproduce among themselves and promote consanguinity, so that from one day to the next most members of the same species become infected by an epidemic and die almost the same Time, the genetic exchange between natural spaces and the population control of these scarces islands of nature should be a priority to safeguard the species either naturally or, if not artificially.



Artificial barrier that encourages inbreeding in wild populations



Consequences of poison on wildlife

Other more subtle factors are pollution and poisoning of the rural world. For some it is not as tragic as hunting, but it is much more cruel, whether by simple pollution, to prevent insects or rodents from eating the plantations, or to control predators, these poisons are used every day in our fields Which lead to a ruthless and indiscriminate death of the whole food

chain, often causing more harm even to the human being than we imagine, because those extra benefits in a harvest or a hunting campaign, finally ends up paying the society when contracting New diseases.

The abandonment of the rural world and the new habits of consumption, also affect the ecosystem, not so long ago, more than 95% of the waste produced by the human were organic, also their lifestyle to survive in our ecosystems induced To plant fruit trees in the mountains to find the food there and not have to transport it, in this way the wild fauna benefited directly from the action of man, studies show that with the depopulation of the rural world in recent years, Have diminished and find a direct relationship in the trophic synergies between both, this shows that the human being's coexistence in the ecosystem is much more recent than it was thought and that with an ethics according to the environment, the presence of the men In nature, does not have to be a negative influence.

2 IMPACT OF THE ABANDONMENT OF THE RURAL WORLD

2.1 Change in ecosystem management

As mentioned earlier, as of the 15th century, agriculture and livestock occupied all the natural space possible, all biodiversity was affected, most wild macro-herbivores were replaced by domestic ones such as cows and horses. The domestic fauna is not able to control the scrubland, since it is not in its diet, and therefore, in order not to lose pastures absorbed by the undergrowth and the forest, the human being had to fulfill the function previously exercised by the macro-herbivores, Cleaning the forest.

Something similar happened with goats and sheep, although they do eat some types of scrub, their impact is about 1/3 of a decrease in scrub and not of all species, so they also needed help from humans to maintain The undergrowth under control.

In one way or another, the management of forests was replaced by humans, preserving them from fires and ensuring the diversity of plant species.

Management of the forests and meadows of our rural world was assumed by man for almost five centuries, but with the arrival of the industrial revolution, the mechanization of the agricultural sector and intensive livestock, traditional agricultural production is abandoned and little by little. Little the rural world is being depopulated and therefore its management of mountain ecosystems.

2.2 Negative impact of the abandonment of the rural world

With the elimination of almost all wildlife that managed ecosystems and the progressive abandonment of the rural world, the natural function of ecosystem self-management is impossible.

Plants grow without any control, have no herbivores that control their expansion, do



Medieval image of livestock

not have the seed dispersal service provided by some species of animals and insects, the aggressiveness of some species of plants occupy spaces of others, losing plant biodiversity, This loss affects the insects that do not find sustenance and leave this type of areas with loss of biodiversity and this way little by little is lost the ecosystem.

2.2.1 Invasion of scrubland

One of the biggest problems that ecosystems suffer is the invasion of the scrub, without the timely management of these species, its expansion increases every year and occupy the space of other species.

Studies of the invasion of the scrubland of the Ordesa and Monte Perdido National Park, indicate that the *Echinopartum horridum* is the main factor of biodiversity loss. This plant, if not controlled, has a 2% occupancy rate Year, despite not seeming excessive data, in a period of abandonment of 50 years, would occupy 100% of the territory with the consequent loss of biodiversity.



Overpopulation of *Echinopartum horridum*

2.2.2 Increase of Biomass in nature

The lack of animal species that control the excess of scrubland of alpine meadows and forests directly affects the loss of biodiversity and accumulates year after year a large amount of biomass with a high power of propagation of fires, turning our natural spaces into future forest fires impossible to extinguish



It is difficult to control a forest fire with an excess of biomass

2.2.3 Ecosystem destruction

The scrub not only subtracts food from the trophic chain, it also provides shelter to medium-sized herbivorous species, in such a way that they feel more protected for breeding, causing a population of swine and ungulates, such as wild boar, deer, mouflon, Deer, etc., and for want of food the extermination of small herbivores such as rabbits, hares, partridges, quail, etc.

This, together with the lack of predators, causes damage to crops, accidents, disease spread and definitely destruction of the ecosystem.

Also the digging action of the wild boar destroys the soil and without having a restorative agent, the degradation is irreversible.



An overpopulation of wild boars can easily destroy the ecosystem

2.2.4 The rural world's economy

The main problem of the depopulation of the rural world, definitely, is the lack of economic competitiveness that exists between traditional agricultural activities and industrial or intensive activities.

There is no doubt that natural products are of a much higher quality than industrial ones, but the economy is in charge in all sectors and this is by no means an exception.

The future of the rural world in economic terms is dead, barely surviving with subsidies and aid that sooner or later will be exhausted.



Livestock farming as we know it is disappearing

2.2.5 Generational relay

Obviously, the children of workers in the rural world aspire to a better paid future, less sacrificed and that gives them a better quality of life. These aspirations do not enter into life in the countryside or village, where the maintenance of animals and crops has neither schedule nor dates. In short, it is not attractive for the generational change and therefore the rural world as we know it is doomed to a safe abandonment and therefore to its self-destruction.



New generations seek comfort and stay away from rural life

3 SOLUTIONS OR OBJECTIVES TO METS

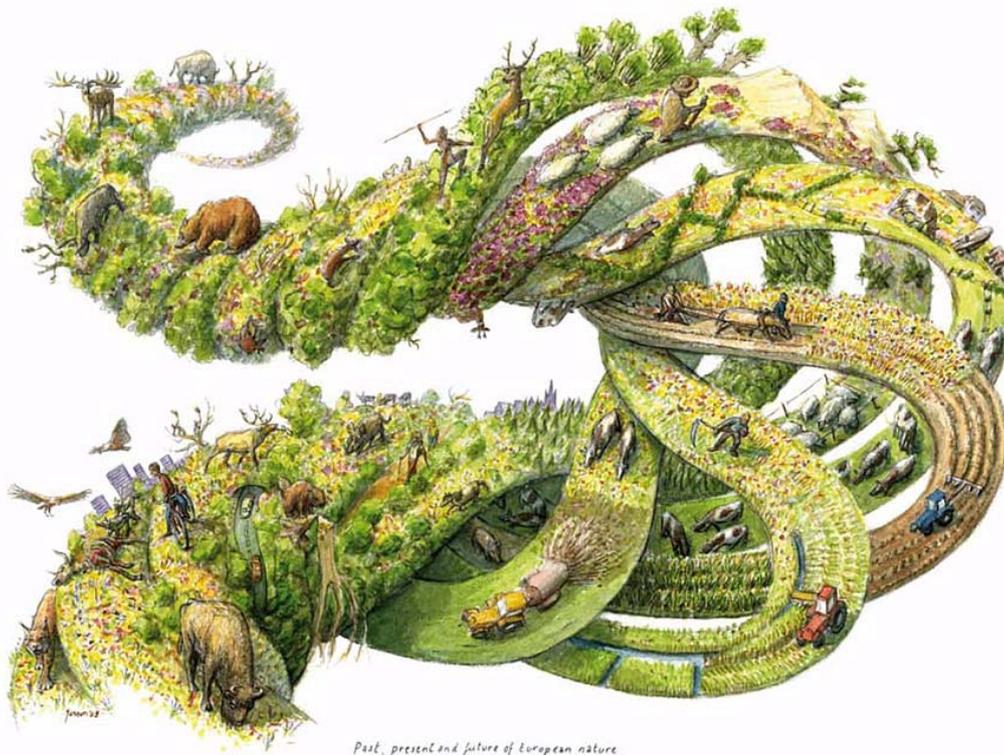
Obviously, the problems listed above are not all that our rural society is going through, but we could say, that if they are solved, our ecosystems and their populations could be maintained.

Failure to adapt to changes in the rural world can cause its own self-destruction. As we have seen throughout history, the Iberian peninsula has undergone major transformations, the most significant was in the Middle Ages, When almost all the surface of the Iberian peninsula was flooded, and created the majority of rural peoples, Since then, these populations have developed the same activities, more than 500 years, this are many generations developed the same activity and therefore, it is difficult to assume a change for a society that has so long doing the same activity.

It is normal for rural populations to be frightened by the vision of changing activity, but even more so, it is more terrible that all this territory is left out of society for lack of adaptation to the new times and with them the destruction of Ecosystems

3.1 How to recover ecosystems

Looking at the history of ecosystems, the action of man has been invading ecosystems according to their needs, with the industrial revolution, traditional activity has stopped producing an economy so the rural world is abandoned.



Past present and future of European nature

As listed in section 2, the most striking problems are:

Invasion of scrubland, Increase of biomass in nature, Ecosystem destruction, The rural world's economy and generational relay. Therefore, it is necessary to find a simple solution to all these problems that does not suppose a very traumatic step for the societies of the rural world

Logically, just as once the natural space was invaded and the wild species that regulated ecosystems were removed, now, by abandoning these habitats, we would have to return these species to continue to manage ecosystems, but this should provide benefits to The owners of the natural sites so that they have a social function in the world today

3.2 Managing ecosystems

To reach the ecosystem self-management, we need to include the "habitat engineers", these are macro-herbivores and large predators, but since all terrestrial habitat starts from the ground, large herbivores are the most indicated to begin to recover ecosystems

Without doubt the greatest manager and reformer of the biomass of the European continent is the European bison (*Bison bonasus*), we know that historically it has inhabited the Iberian peninsula and that fulfilled with different functions within the ecosystem, but well: can this animal help To restore our ecosystems and the economy of the rural world? An analysis of the main problems of the rural world can clarify the doubts.



Bison Bonasus. the greatest manager and reformer of the biomass

3.2.1 Legality

Before moving to introduce an animal in our farms, we have to take into account if it can be introduced legally.

The European bison is a species reintroduced after being extinct , that is to say it is an animal that existed in our ecosystems and at the moment does not exist, therefore, it is a recovery of species and not of an introduction of an invasive species.

From the point of view of agricultural exploitation is a bovidae and therefore is legislated just like any agricultural exploitation in extensivo of the many that exist in the rural world. This leads us to the conclusion **that agricultural farms in extensive "only have to change species, from the cow to bison"**.

3.2.2 Control of excess scrubland

The European bison has in its diet a 33% of woody, this is due to that in the Pleistocene was not the greater herbivorous of the ecosystem and opted by a diet with less competitiveness, reason why it conserves the capacity to ingest bark of trees, Branches and scrub, in an adult animal the daily consume supposes 33 kg of average vegetal mass, reason why a single adult bison eats 12,045 kg of vegetal mass, of which 4,015 kg are of scrub and rest of wood.

3.2.3 Control of biomass increase in nature

To these 4,015 kg of scrubland that eats each adult bison a year, you have to add what this imposing animal breaks in its path, steps and ultimately eliminates the ecosystem.

In the centers where the bison has been reintroduced, changes in the ecosystem have been overwhelming, impenetrable tangle forests have been thoroughly cleaned in a few years, doing incalculable work in fire prevention and contributing to the food chain for the Rest of the species.



An adult bison is able to eat 4.015 Kg of scrubland a year

3.2.4 Control of the destruction of ecosystems

The control of the scrub makes the species of plants can be more varied and contribute more food, thus supporting a greater number of animals.

Medium-sized herbivores find themselves a serious competitor for food and in this indirect way, also a control of their populations. The brushcutting action guarantees less shelter, makes them have fewer offspring and all these factors, guarantee biodiversity and therefore favor the self-regulating function of ecosystems.

The bison is one of the animals that most of the plant species consume, which together with the European bison's unique ability to get 90% of the seeds to germinate after passing through their intestinal transit, not only makes their dung fertilize the Land, also sowing, distributing the seeds of a great variety of plants, recovering the dead soils and fomenting the biodiversity.



Medium-sized herbivores find a serious competitor in bison

3.2.5 Rescue of the economy in the rural world

It is obvious that the main problem of the rural world is its economy, or rather "its lack of economy", then we will see how it can affect the presence of the bison in the local economy:

1- Maintenance of wildlife is less costly and laborious than domestic wildlife, alleviating the economy of forest owners.

2- The possession of emblematic animals generates extra income through ecotourism and outdoor activities.

3- The production of biodiversity creates a new niche market in the place of its development, that is, it creates ecotourism industry.

4- The control of species through hunting generates extra income that does not exist in traditional agricultural activities.

5- The meats obtained from this control of species are of better quality and therefore with greater income for the producers



Ecotourism is a great source of income

3.2.6 Future for the generational relay

It is evident that for future generations, a future with better working conditions and better remuneration is much more attractive.

The applied biology in their own farms, ecotourism activities, wildlife veterinarian, rescue of species in danger of extinction and a wide range of attractive possibilities are opened for a generation that finds no future in the traditional activities, and only, changing fauna Domesticated to the wild.

As can be understood, the rescue of ecosystems is not only for nature, also for the human being who lives in it and also owns 90% of the forests of the peninsula, with a single step starts the path and This will be cleaned by the European bison



Future generations seek better working conditions and better paid

4 Other biodiversity producers

As already mentioned, the large herbivores are responsible for managing and renewing the biomass, scrub the ecosystems, prevent fires, spread the seeds and make it possible to conserve a large number of plants, which give food to all herbivores and insects that feed the entire trophic chain.

For those who prefer to start slowly with the renewal of ecosystems, or want to expand the attractiveness of their farms, there are certain animals that can be very attractive, emblematic and can bring great benefits.

It's important to mention that all animals that staying our holdings must be indigenous or have disappeared within a reasonable time of our ecosystems. From the point of view of conservation, it is an aberration to import exotic species because they do not belong to the ecosystem itself or simply because they can do more harm than good.

4.1 Bos Primigenios

Extinct in the seventeenth century It was another great mammal that manages our ecosystems as is the Bison today; Already in the middle of the 20th century the Heck brothers tried to recreate it, not with very good results. Today there are several projects to bring it back to life. His recreation is more faithful since today we have his DNA.



Results of the first breeding (Project Tauros)

The benefits of having the aurochs as an ecosystem manager are practically the same as the Bison, only that their habitat is more related to the meadows.

It is an animal with physical characteristics quite attractive for an ecotourist, provides a meat resource and can be managed in the face of an excessive population, considering that the ecosystem can not keep a high number of specimens, you can always remove some specimens to

the use of their flesh.

Its feeding is not as extensive as the Bison, since the bison can eat more number of woody plants than the aurochs; but it is still able to eat several kilos of biomass a day. Its handling is simpler than the a bison since it is domestic cattle and does not have as much adrenaline in its body. Recent studies confirm that the current European bison descends from the hybridization between *Bison Priscus* and the *Bos Primigenios*.

It is advised that bison and aurochs are separated by risk of hybridization. they do not usually sympathize. A good way to maintain distances between these animals is the preference of the uro for the meadows and that of the bison for the forests.

Usually, Aurochs is able to offer us as many economic and beneficial resources for the environment as the bison itself. A great and emblematic animal to take into account of the already extinct mega fauna.

As for its management, care and diseases (will see it later), it can be treated almost like a bison, because it is also a bovine and is subject to the same regulations.

4.2 Equids

There are other emblematic animals, which by their characteristics are also good managers of ecosystems. These animals are usually of great tourist attraction as they also have prehistoric features or with physical characteristics that make them a good eco-tourist asset.

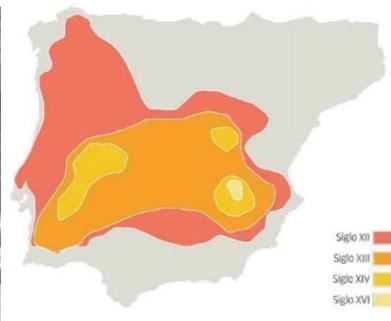
The Iberian peninsula has had and currently has a good representation of equine breeds, in fact, it is overwhelming the repercussion that Iberian equine breeds have had practically all over the world, in the last five centuries. For all this it is common sense to recover the native species that are in danger of extinction in favor of those that are not part of our history or our natural heritage. We will highlight three emblematic breeds that are in danger of extinction.

4.2.1 Iberian wild ass

The Iberian zebra lived in the 12th century in much of the Iberian peninsula. As is inferred from the toponymy. A century later it had lost the territories of the northwest, including Asturias, and its population was concentrated, in the center and south of Portugal. Throughout the next century its geographical area. was fragmented into three nuclei; only the southeast of the Central Plateau survived until the sixteenth century.



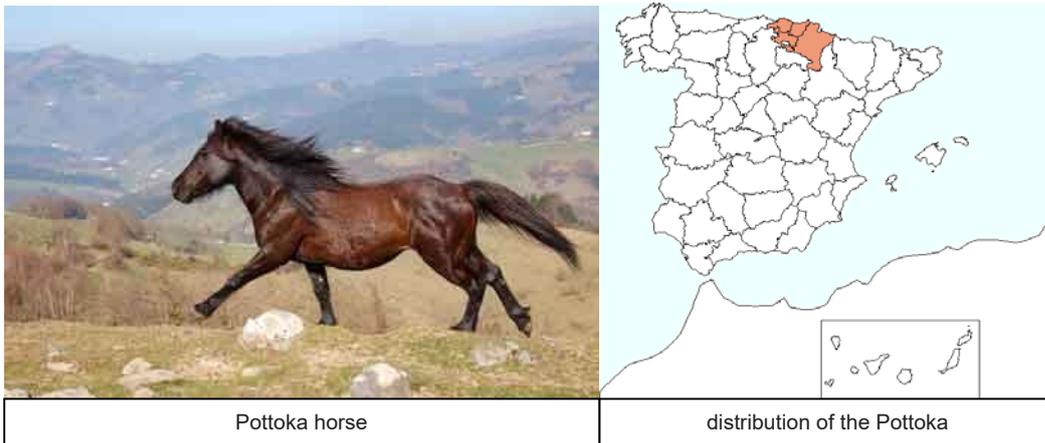
Iberian wild ass



historical map of the distribution of the Iberian wild ass

4.2.2 Pottoka

The Pottoka is a slender and strong animal. Very well adapted to the environment of Euskal Herria and at the same time reinforced and molded as a result of this special environment. Inhabitant in our mountains and valleys from the Paleolithic Age (40,000 a.c.). Witness the beautiful images of the caves Ekain and Santimamiñe. So far he has been a loyal and hardworking assistant today. All this and the personality of the race and its antiquity make the pottoka special.



4.2.3 Sorraia

The Sorraia or iberian tarpan, descends of an old group and is directly related with the Tarpan. The Sorraia is a primitive horse of the South of the Iberian Peninsula, not a race in so far as we know, but a subspecies. Its discoverer, Portuguese scientist Ruy d'Andrade, believes that it is a direct descendant of a wild Iberian horse and the main ancestor of the Andalusian horses, Lusitano, and Barb.



Sorraia horse

The Sorraia horses are found in paintings made in prehistoric caves of the South of the Iberian Peninsula, as in Escoural (Portugal) and La Pileta (Spain). The population in the year 2000 is only about 200 heads.

5 European Bison or Bison bonasus

Taking into account the factors that can determine the recovery of ecosystems and populations of the rural world, we will examine a little more in depth to this species and how it can help us.

Obviously, each farm is a small company and its final function is to have an economy that allows its owners or managers to live, the maximum benefits possible.

The first point to take into account is the conservation of the ecosystem, fire prevention and ultimately ensure the future of our forests, but what really worries the inhabitants of the rural world is how they will pay their bills, give food to Their families and how they are going to give their children a future.



An agricultural exploitation the first thing that looks for are benefits

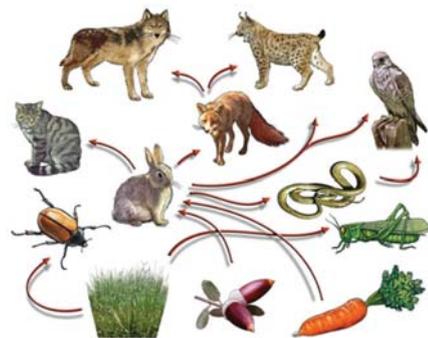
For this reason we are going to make a review of the contributions that can contribute this species.

5.1 Why the European bison

There are many and very important works that are done throughout the world to preserve endangered wild species, probably without these important works many of these species would have disappeared.

But what these species really need are habitats to live in, the communion between the wildlife and the human being needs a common reason to be able to live in harmony. This reason, can be the **economic** production that can produce the natural spaces.

The basis of the restoration of all terrestrial ecosystems begins in the soil, specifically in its conservation status and in the European bison we find the great ally of the restoration of ecosystems, the healthier the ecosystem, the more biodiversity can This way with only one species can recover all the species and total biodiversity of the Iberian ecosystem.



The ideal for an ecosystem is that it has a great variety of species

5.2 Economic contribution of the European bison

If we decide to put bison on our farm, we have to take into account that we have an emblematic animal, in danger of extinction and that arouses great expectation, possessing this animal will bring media impact and of course potential clients who want to contemplate.

The centers that exhibit these beautiful creatures charge entrance and prices range from 6 to 12 €, apparently not much, but can receive between 50,000 to 100,000 visits, lets be humble and set lower our standards too much either.

Imagine that we put a small breeding group of 5 specimens. Being humble, we will get 10,000 visitors a year, 5 € of media between adults and children. Each year we will have a son result 50,000 € per year. That's 10,000 € per bison, the comparison with the exploitation of cows begins to be important.



The bison is an emblematic animal for a cattle ranch

These data on paper seem very grandiloquent, but in Spain, in 2016 we have received 72 million visits and adding the 46,468,102 Spaniards who live in this country we added 118,468,102 inhabitants of floating population, taking into account that a 33 % Of this population demands activities of nature and environment we can verify that 39,489,367 people a year are potential clients, reason why we have a demand of outdoor activities to which we can give an offer that the society is claiming, contributing a Niche market that does not exist and placing the rural world in the current society.



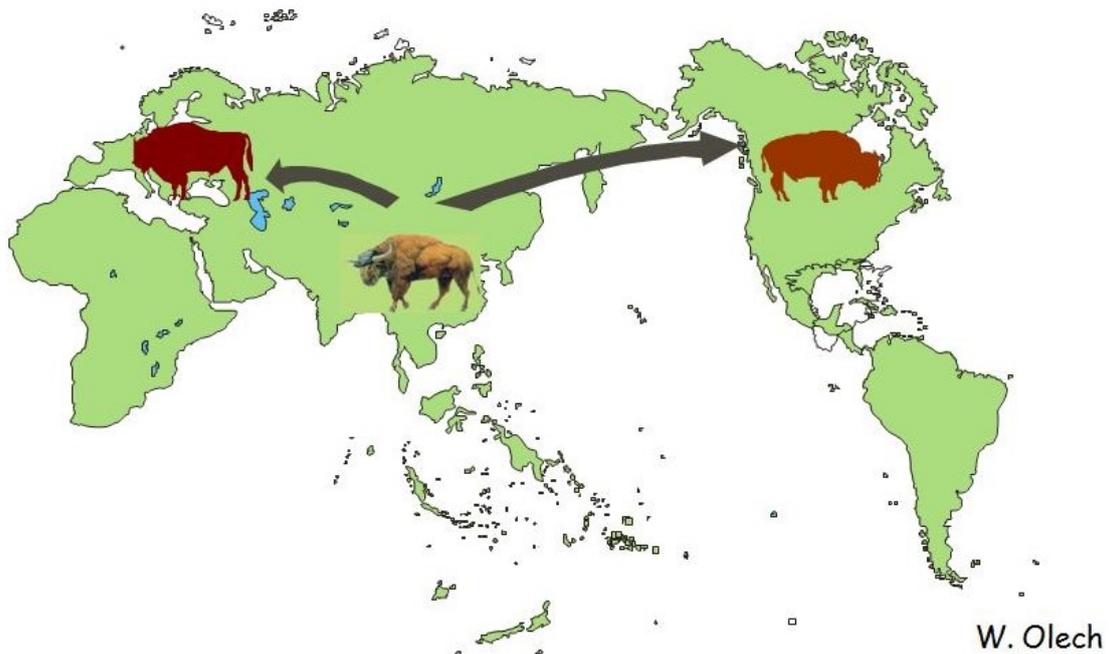
This animal contributes even to the economic activity of the hotels, the restoration and the commerce

The attractive lure of the contemplation of this imposing animal, not only brings economic activity to the owner of the center, also the whole society is benefited by the presence of ecotourism, hotels and catering, commerce, and the entire services sector is seen Reinforced by the economic activity that produces this new

niche market, and, therefore, the whole rural world.

5.3 The bison and its subspecies

After thousands of years of evolution the European bison in the Pleistocene was the *Bison Priscus*. It lived in what is now Europe and Asia, a part of these bison passed through the Bering Strait to the American continent, there with the abundance of meadows and few predators adapted to the new ecosystem and evolved to *the Bison Latifrons* and from this to the *Bison Bison*.



The *Bison priscus* was the predecessor of the bison we know today

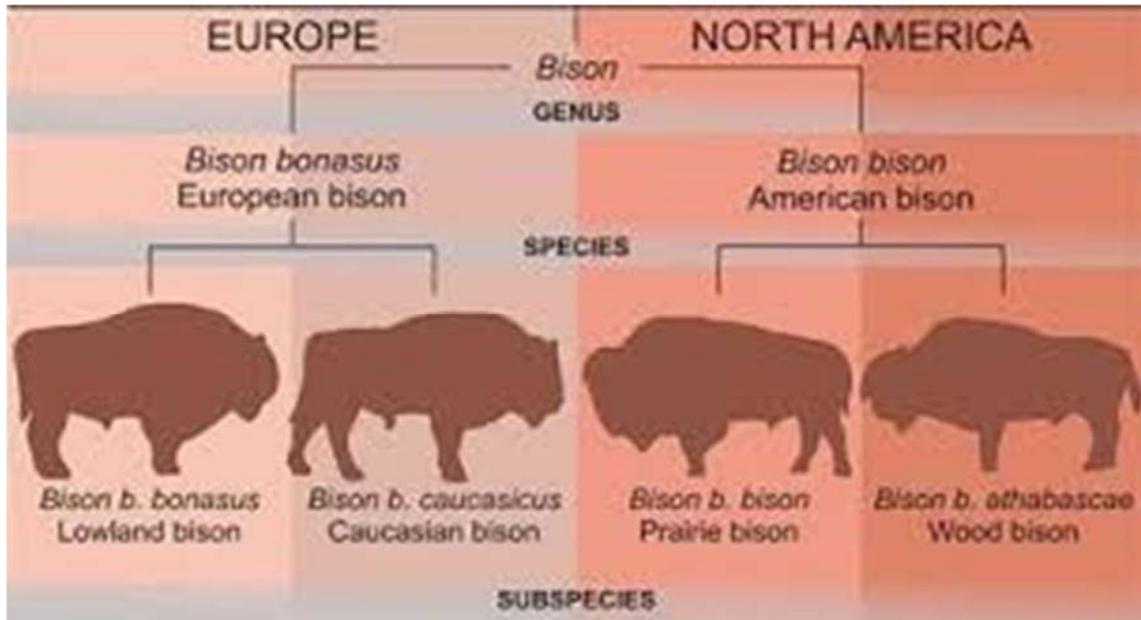


Bison priscus



Bison latifrons

Meanwhile, in Europe the *Bison Priscus*, evolved directly into the *Bison Bonasus*, so we have two lines, the European *Bison Bonasus* and the American *Bison Bison*. Of these two lines there are also two subspecies.



After World War I, there were only 12 European bison specimens and no Caucasian line stallion, so they divided the species into the Lowland and Lowland-Caucasian lines, their close American relative, although it was also close to extinction, Retained a sufficient number of representatives of the two lines, Meadow and forest, so their inbreeding rates are more acceptable than those of the *Bison Bonasus* or European bison.



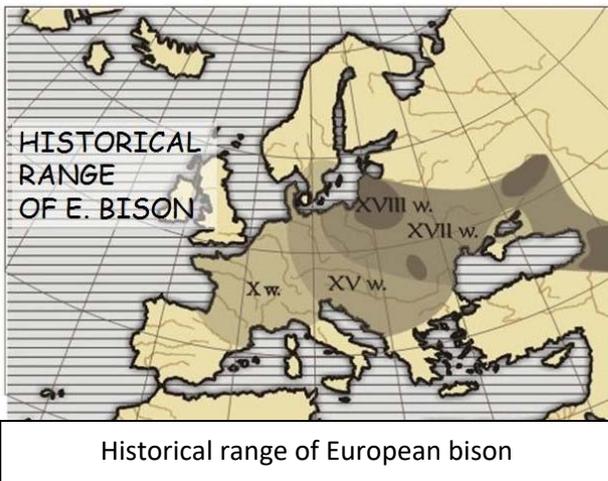
The differences between the two lines of European bison are not very appreciable, because the Lowland-Caucasian line is the result of three copies of Caucasian with three of Lowland, Hybridizing on this way the two lines in the absence of more copies of

Caucasian, and in this way , Preserve the representation of the two lines, although one is not pure.



5.4 History of *Bison bonasus*

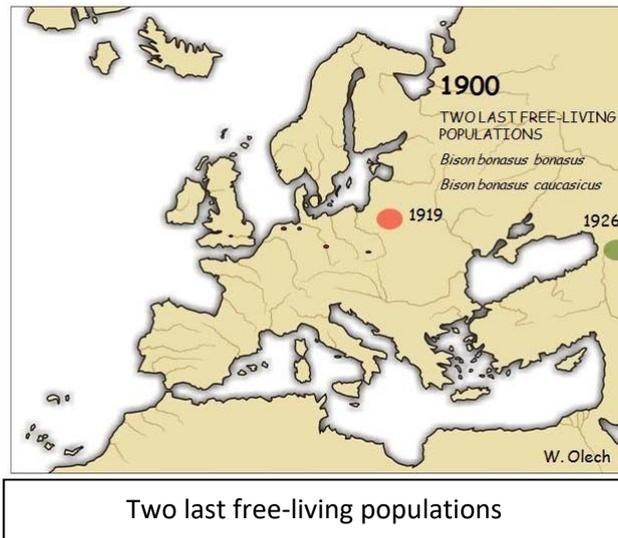
In historical times the European bison covered western, central and southeastern Europe, extending up to the Volga River and the Caucasus. The European bison probably also spread to the Asian part of Russia. The extinction process began from the south-west to the north. The bison in France was the first to die (8th century). In northern



Sweden bison survived only until the eleventh century. In the seventh century, the existence of European bison was reported from northeastern France. In the Ardennes these animals survived until the 14th century. In Brandenburg by the sixteenth century, they were already kept, and bred in captivity. At the end of the seventeenth century (1689) an attempt was made in Mecklenburg to liberate European bison in enclosures, however, this failed. In the 12th century, the existence of

European bison was reported from the forest of Usocin on the Oder River, near Szczecin. Bison existed in West Pomerania until 1364. Thanks to the protective actions of Wilhelm I, the bison survived in eastern Prussia. In 1726, its number was estimated at 117 individuals, but in 1755, the last two animals were killed by poachers between Labiau (today Polesk) and Tilsit of Prussia and Poland, European bison were transported to Saxony in the 16th century, and were kept in closures. In the years of 1733 to 1746 these animals were released. They survived in fences in Kreyern and later in Liebenwerda until 1793. In the 16th century the bison was extinguished in Hungary, although free animals survived a relatively long time in Transylvania. The last individual was killed in 1790. In Romania, the last European bison died in the Radnai mountains in 1762. In Poland, in the 11th and 12th centuries the populations of bison were limited to larger forest

complexes where they were protected as royal hunting . In the fifteenth century, they remained in the Bialowieza Forest, Niepolomicka Forest, Sandomierska Forest, near Ratna on the Pripet River and in Volhynia. In the forest of Kurpiowska, they were extinguished in the eighteenth century. The last European population in the Bialowieza Forest was protected until its extinction in the spring of 1919. There is direct and indirect evidence of the existence of European bison within the former Soviet Union up to the 17th and 18th centuries. Along the Don river, European bison was preserved until 1709, in Moldavia until 1717. The last free population survived in the Caucasus until 1927.



5.5 Threats

Historically, habitat degradation and fragmentation due to agricultural activity, logging, unlimited hunting and poaching were the main causes of decline and extinction of European populations of bison. Among the main reasons for the rapid decline of the European bison population in Białowieża at the beginning of the 19th century was the overpopulation of deer species and the drastic reduction of the natural resources of the herbivores that followed. During the period of World War I and the Russian Revolution of 1917, conflict and poaching imposed a severe toll on the remaining populations.



Bisons hunted at the beginning of the 20th century

5.5.1 Habitat reduction



Bison inkraansvlak

At present, is the lack of appropriate habitat, fragmentation of populations, loss of genetic diversity, disease, hybridization and poaching. There is little room for a large herbivore such as the European bison in the contemporary ecosystems of Europe, especially in the west. The most significant limit for the expansion of European populations of bison is human population density. Forestry and agricultural activities are a factor whose result is zero genetic exchange

and are more vulnerable to extinction. So far, there is no opportunity to rebuild a geographical area to facilitate the migration of bison between herds.

5.5.2 Inbreeding

As a result of passing a dramatic bottleneck (the present population descends of only 12 founding animals), the genetic group is limited and the animals are highly consanguineous. The average inbreeding coefficient is very high, with about 44% in the Lowland Line and 26% in the Lowland-Caucasian line for individuals with a full pedigree. The negative effects of inbreeding, which are manifested in the decrease in the rate of reproduction. Endogamy exerts a deleterious effect on skeletal growth,



Currently inbreeding is a great and silent problem in Spain

particularly in females and possibly decreases the resistance of the bison to diseases and pathologies.

A particular problem with regard to the management of existing European bison is the existence of herds that were created some time ago and have not refreshed the blood to avoid consanguinity, the animals of these centers, can have an index of endogamy much superior to those that are calculated in the controlled herds and that can multiply the problems already experienced by too high inbreeding.

<http://www.iucnredlist.org/details/2814/0>

5.5.3 Diseases

Diseases that appear in European bison populations can bring serious threats to the whole species. It is not certain whether the species has always weak resistance to disease or if immunity has decreased due to inbreeding. It is necessary to take into account the current causes of mortality of European bison, studies in different countries indicate the following causes:

· **foot-and-mouth disease**

Foot-and-Mouth Disease is a highly contagious, fast-on viral disease affecting split hoof animals; is characterized by fever and formation of vesicles mainly in the buccal cavity, snout, interdigital spaces and coronary ruts of the hooves.

-In order to buy the animals, always require the corresponding vaccination.

- Make the carry only with proof of vaccination.

- Vaccination against foot-and-mouth disease does not cause abortion in animals. Although certain precautions must be taken in the management of pregnant cows, it is mismanagement that can lead to an abortion and never the vaccine.

· **Posthitis**

It affects the male reproductive organs and manifests itself in the inflammation of the penis and the foreskin, leading to diphthero-necrotic lesions, diagnosed as balanoposthitis. This disease was discovered in the early 80's in the Białowieża forest; Although similar symptoms had previously been reported (Korochkina and Kochko 1982) in Russia and Ukraine (Krasochko et al., 1997). Despite many years of study, its pathogenesis has not yet been clarified

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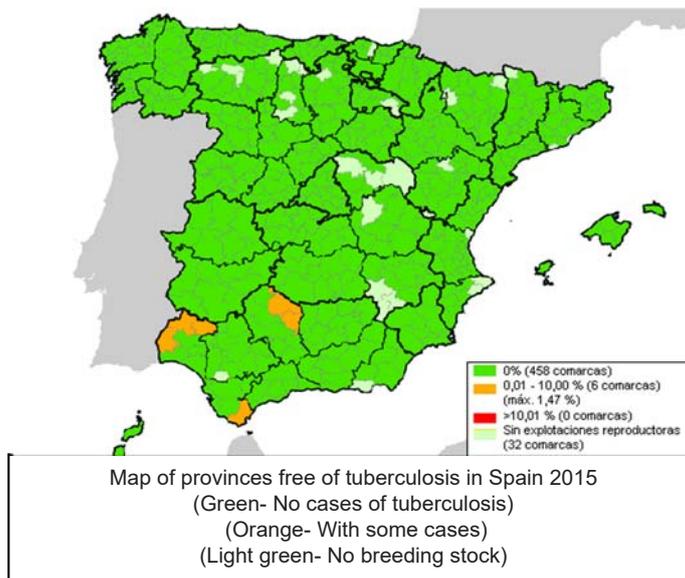
- Carry only with proof of vaccination

- Vaccination against foot-and-mouth disease does not cause abortion in animals.

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· Tuberculosis

Bovine tuberculosis is a chronic disease of animals caused by bacteria *Mycobacterium bovis* (*M. bovis*), a bacillus belonging to the genus *Mycobacterium*, which has a close relationship with the bacteria that cause human and avian tuberculosis. Although the true host of *M. bovis* is considered to be cattle, the disease has also been described in many other domestic and non-domestic animals. *M. bovis* has been identified in buffaloes, bison, sheep, goats, horses, etc.. And various feline predators



-The name "tuberculosis" comes from the nodules, called "tubers", which form in the lymph nodes of the affected animal.

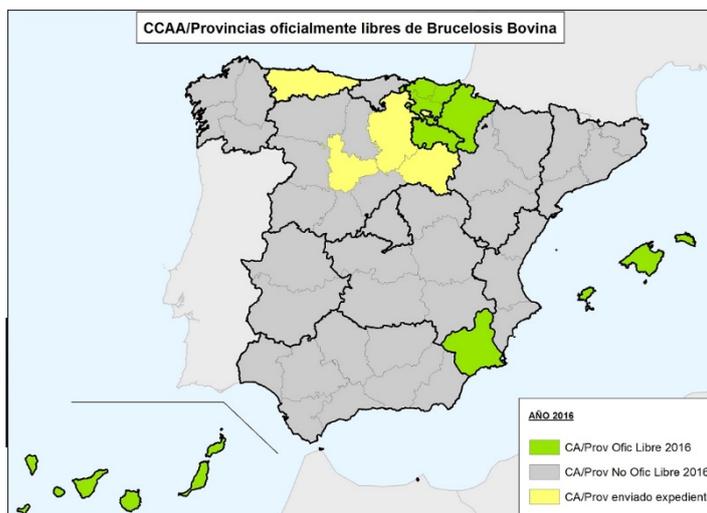
-It is an important zoonosis (can be transmitted to humans) and is a mandatory statement disease.

-The tuberculin test is, for today, the basic instrument for detecting the presence of tuberculosis infection

· Brucellosis

Brucellosis is a contagious disease of cattle that has important economic consequences.

It is caused by various bacteria of the *Brucella* family, each of which tends to infect a specific animal species, although most of them are also capable of infecting other animal species. Brucellosis affects cattle, pigs, sheep, goats, horses, camelids and dogs. It can also infect other ruminants, some marine mammals and humans.



The disease in animals is characterized by the existence of abortions or lack of reproduction. Although the animals usually recover, and after the first abortion are able to procreate, they can continue to excrete bacteria. In areas where brucellosis is endemic, vaccination is often used to reduce the incidence of infection. There are several vaccines with live modified viruses. Detailed instructions on the development of vaccines are provided in the OIE Standards Manual.

· **Pneumonia, hemorrhagic septicemia (Pasteurella) Transport sickness.
Bovine Respiratory Syndrome (BRS)**

The disease manifests itself in many countries of southern Europe, the only symptom observed is sudden death, the illness lasts 1-3 days. Síndrome Respiratorio Bovino (BSE) o Enfermedad Respiratoria Bovina (BRD) is a generic name for a set of respiratory diseases of cattle. It is caused by a number of factors, which individually or in combination, can affect the lower respiratory tract, ie the lungs (pneumonia), or the upper respiratory tract (rhinitis, tracheitis, bronchitis).

Pasteurella is associated with sudden changes in temperature, humidity, stress and food, factors that occur in the transport of animals and therefore also called "Transport Disease". The animals may have latent in the country of origin and wake up during transport or time after due to sudden changes in weather, Spain (like many other countries) have suffered casualties due to this disease, but since in Spain there is no such disease, obvious that they have acquired it in the country of origin. Some experts and centers advise against getting from some centers

- Check if the center has a history of death from the disease.
- In the acquisition of animals, always require vaccination.
- Carry only transport with proof of vaccination

· **Parasitic diseases**

Parasitoses affect all animal species, domestic and non-domestic, causing serious problems, which sometimes have an impact on human health, as some are transmitted to humans. On the other hand, animals infected by parasites suffer from diarrhea, anemia, weight loss and sometimes death.

The mechanisms by which these symptoms occur are due to the damage that the parasites cause in the intestinal, lung, liver and other organs.

A periodic deworming program should be enough to keep parasitic diseases under control, the local veterinarian will tell us the factors to take into account for a deworming program.

· **Diseases of the alimentary tract**

They are the diseases that affect the gastrointestinal tract, most of them are caused by pathogenic microorganisms with great invasive power.

Gastrointestinal diseases affect the digestion of food and the absorption of nutrients, produce diarrhea and vomiting and consequently weakness and dehydration of the animals, electrolyte imbalance and in many cases the stomach and intestinal tissues are affected

· **Other causes**

Other causes that can cause the death of bison are traumas of different origins, injuries caused by other bison, poaching and drowning.

Many of which can be avoided with good management of the breeding center.

5.6 Habitats

The optimal habitats for European bison are deciduous and mixed forests, but the condition should include about 20% of pasture. To give an example, in the Białowieża forest (Poland) they mainly feed on moist deciduous forests, and then on mixed coniferous forests. Forest complexes with a type of mosaic type forest are the most favorable for bison, this type of forest is typical in Spain and with a



Typical Iberian forest, formed of light and shadows

better climate than in the northern countries. In fresh deciduous forests, European bison find food throughout during the life of the herbaceous. In the Caucasus region, European bison prefer hillside forests; In summer, they feed on alpine meadows. However, the variety of plants that the European bison is able to eat allows it to feed in habitats where coniferous forests predominate. All European bison populations inhabit areas covering open areas such as prairies, deforested forests covered with grass, clearings and plantations of young trees up to 10 years of age. Open areas of grassland and sowing are very attractive and provide ungulates with much more food than the same area of forest grass and food are easier to get. The species played an important role in the formation of European prehistoric forests and wooded steppes.

Being a species that not long ago was all over the European continent, it is easy to adapt to our ecosystems because of its climate, only diseases, human action can fail an initiative of these characteristics.

On the contrary, the presence of these large herbivores can bring many benefits to our ecosystems, since it is the natural relay to the traditional exploitations that are leaving the rural world the ecosystems.

Only with one species can regulate biomass, control scrub, control fires, recover dead soils, spread the seeds and thus promote the diversity of ecosystem plants. By recovering and enriching the base of the food pyramid, the whole trophic chain is reinforced and the rest of the fauna will have a habitat where they can live in better conditions than in habitats that are not renewed, ie, they are not ecosystems because of lack of self-sufficiency or self-regulation due to lack of biodiversity.

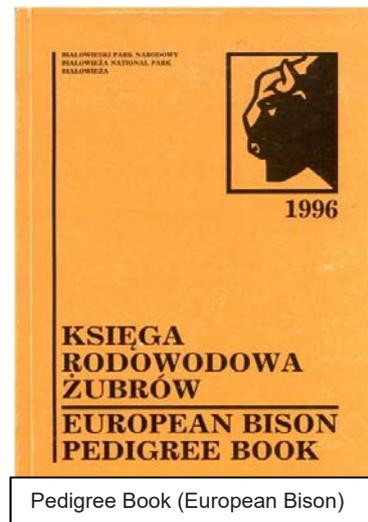
“with just one step its possible to recover all biodiversity including endangered species”

6 Advices for the creation of the breeding center

For those who decide to preserve and recover these ecosystems with this majestic animal, it is important to know that a bison consumes 10% less than a cow and that with the same space of good forest would have enough to survive for a year. In order to be able to have the animal extensively, as we have the cows, it takes two hectares per animal to comply with the bovine health plan, and for those farms that have enough space, the general rule is 50 bison per each 500 hectares (at least) so that they can live with the rest of fauna without problems of competitiveness for food

6.1 the selection of the specimens

A fact to keep in mind is the choice of the members of the herd that we want to acquire, so that they have a high birth rate and are strong in the face of diseases. Therefore, we must to keep in mind the rate of inbreeding of animals, remember that the Lowland Line has a 44% of consanguinity and that the Lowland-Caucasian line 26%, although some breeding centers may have more for the lack of planning and exchange of animals (some experts recommend not buying animals from certain centers). For this we can check the EBCC herd book and see if they have a good genetic variability or come from a some centers, so high inbreeding is assured or consult with an independent expert or center that is successful in breeding.



https://bpn.com.pl/index.php?option=com_content&task=view&id=1133&Itemid=213

Something that may make us suspect of a questionable management is that the real data and the data found in the Pedigree Book, such as number of animals, unnotified transfers, etc

Once the center where we are going to acquire the animals is selected, it is very interesting to visit it, to see how they have it built, the feeding that is provided to them, the state of the animals, the size, the number of births, the number of deaths by diseases and what they have been, etc

Its important to keep in mind that not all centers are enrolled in the EBCC, so the data contained in the Pedigree Book are not all animals that exist, some centers find differences with the EBCC and therefore are simply not inscribed or do not share the information, in some cases they do an individual or collective work of following and preserving the genetic lines of the first reproductive bison that remained after the first world war. These centers, whether or not they are within the EBCC, are very interesting to get animals with a lower rate of inbreeding, have stronger and healthier animals and make a responsible breeding.

"Although there seem to be many disadvantages, these will be rewarded by a lower presence of diseases, a higher birth rate and less mortality and abortions"

6.2 Documentation and transportation

Undoubtedly, one of the most sensitive points in the creation of our center.

The documentation has to be perfectly regulated and the operating licenses of the center in order to avoid last minute problems, in fact, before investing money in our center, is the first thing to do since not having such permits can cause us major problems. For this it is important to know what kind of center we want to do, the operation or activity we want to develop and the possible extensions in the future.

The transport must be carried out in summer and plan in time, look at the weather forecast to avoid great thermal or humidity contrasts and if any event or element, can hinder the correct route of the vehicle, such as roads, the condition of the road itself, trees or other elements that can interrupt the passage, festivities, cut roads by strikes, demonstrations or other events, etc.

In order to carry out the transport, we have to pass a veterinary check and notify the competent authorities of origin and destination. This veterinary control can be used to check the microchip number of the animal, to control the diseases of the species that may have (and are not mandatory in such control) and to vaccinate to ensure that on arrival at our center are in the best Health conditions.

Example of document

Compulsory disease control is: Brucellosis, Tuberculosis and Bluetongue During this process, it is advisable to test and vaccinate of: foot-and-mouth disease, Pausterella Parasitic diseases

"Ensure that animals are disease free. Although these tests and vaccines are an extra expense, they can avoid big surprises "

Anesthesia for the management of these animals, in most cases can not be avoided, being very dangerous in a species that has much adrenaline. It is best to have the presence of a good veterinarian with experience.

The loading, transfer and release of the animals must be done by minimizing the stress of the animals as much as possible. Avoiding noise, aggressive driving and unnecessary annoyances will help the animals reach their destination in the best possible conditions.



The welfare of the animal has to be a priority

Many owners like to prepare a big event for the arrival and unloading of the animals, obviously it brings marketing to the farm, but without a doubt it is better to do it with the minimum of human presence and environmental noise. Give them

salts, minerals, food and water in abundance and leave them calm to rest from their trip in the quarantine, give them time to adapt to the new home and leave the big event for when they are acclimated, for example, at the opening from the center.

6.3 The installations

For animals in a state of semi-freedom, it is best to have plenty of space, food and enough water, water is very important for animals to be in good health, must be clean, water may not be stagnant and that there is no water deficiency, because they drink every day about 30 liters per animal. And it can be scarce in summer due to drought, as in winter by freezing.



Bison will not cause problems with a simple wire

It is important to have a smaller enclosure for the quarantine, to isolate them and to have them controlled in case of illnesses or to prepare them for the transport, the ideal is to have a catch sleeve, where to be able to immobilize them to be able to make the sanitary controls (sanitation), the cures and vaccines without having to resort to anesthesia.

The outer closure can be very simple, with only three wires of electrified wire is more than enough to contain the species, basically an electric shepherd for cows. It is economical and easy to maintain, besides it is not necessary to have electric light of the network, with a battery or with solar panels is more than enough. But it has to be reviewed periodically.

Another question is the humans, although the species itself, is not dangerous, intruders who want to see them closely and get inside the farm, causing discomfort to animals and putting their own security at risk, for which is recommended in areas with accesses that can enter the human being, put some type of closure or deterrent to prevent people from entering uncontrolled.



The eco-tourist can enjoy a unique and wild experience

In case we want to make the exhibition of the animals it is more advisable to have some kind of infrastructure so that the visitor can make the visit in a way that guarantees its safety, such as a specific enclosure, an appropriate vehicle, or a car pulled by horses. Any element serves, as long as there is a physical barrier between the animal and the client

7 Management of the species

Any species that is in danger of extinction needs care to avoid extinction, it is necessary to take care of their state of health, control their disagreement to alleviate consanguinity, respect a vaccination and sanitation regime. Unfortunately, they also can not enjoy being in full freedom, they will be in a center of greater or smaller size and for all that, it is necessary to be able to manipulate the individual or the herd according to the needs of the animals and the criterion of the responsible person in charge of animal care. For this reason it has to do a management of the animals, avoiding to the maximum the stress, the use of narcotics and therefore giving them better quality of life.

7.1 Advantages of bison management

The European bison is a prehistoric animal that currently inhabits some forests and reserves of Europe. It is older than many of the mammal species that inhabit today. The fact that it is a prehistoric animal makes it capable of generating more adrenaline than any modern animal. Which makes the sedation very dangerous to control the individual. The adrenaline that animal

generates inhibits the sedative in its bloodstream, so it would be necessary to give it more sedative which can cause it to overdose and consequently death. With proper management it would be possible to reduce or avoid sedation for certain animal health treatments. Not only that, doing it in a proper way, The animals will become accustomed to the



human, ceasing to be a stranger to them and allow the approach for the best observation of the herd (either to take photos or visualize their state of health). It makes the care and treatment of animals less intrusive, stressful and costly. Although not all animals are easy and in some cases there is no other option than sedation. Applying a good management of the species from the first day will certainly make the life of the center much easier.

7.2 Correct handling

Although it seems to be a rather artificial term, most animal species have their own hierarchical order, behavioral rules in the herd and even routines that must be followed by the whole group (some species even have culture). These routines are typical of their natural behavior, such as eating, drinking, sleeping, mating time, bachelor herds, etc.

In a center with a regime of semi-freedom, it is the human who ensures that they do not lack food, water and even shelter. An appropriate way to manage a species is to include in the least traumatic and invasive way the elements necessary for its proper management.



after its handling in a sleeve is preferable to give it a reward

Including these elements (catcher sleeve, quarantine fencing, drinking fountains, etc ...) within daily routines makes the animals gain in their quality of life

and facilitates the coexistence between human and animal, whether it is for a health intervention as for an ecotourism activity, if what we want is to take care of the species, the best thing is that their days go by with a routine that does not alter them, in the case of having to do some treatment that does not like the animal, it is better to end the activity by giving it a reward like feed or something similar, so that it does not have bad memory of what happened.

Animals should become accustomed to human presence, as mentioned earlier, ecotourism is a valuable source of income. Eco-tourists look for experiences that can not be given in a zoo. They seek to see some wild animals in their natural state, remain considerably close to a prehistoric animal in a free environment and surrounded by nature, enjoy a experience as natural as possible.

These experiences are now possible since it has been shown that these animals get easy accustomed to human presence. We must not forget that they are still wild or semi-wild animals and therefore we must always treat them with respect. That is why the person who manages the herd must have experience, to know each individual and their possible reactions.

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