



NATURAL GRAZING

Practices in the rewilding
of cattle and horses

Rewilding
Europe



This document has been revised and reviewed for Rewilding Europe.

ISBN

978-90-822514-2-5

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Practices in the rewilding of cattle and horses

ROELAND VERMEULEN • FREE NATURE

JULY 2015

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1. NATURAL GRAZING: A NATURAL PROCESS

1.1 CO-EVOLUTION OF PLANTS AND HERBIVORES

Those who are aware that grasses were already on the face of the earth before humans began to mow, that meadows and moors were already here before shepherds started to graze their livestock, and that our forests co-evolved with many types of large herbivores, have a different understanding of nature. The plants and animals we know today from our managed fields, meadows, forests and moors, have evolved from natural plains, herbaceous fields, thickets and ancient forests. These natural areas were rich in both species diversity and numbers. This natural wealth was largely the result of the presence of large grazing animals.

Plant growth attracts grazing animals, which in turn attract predators. This has been so for millions of years, long before the human species evolved. A process of co-evolution has shaped plants, herbivores and predators and a fascinating but complex relationship has come into existence. As plant eaters developed different feeding strategies, plants adapted by developing defensive strategies, such as thorns or by being toxic or unpleasant to taste. Some plants took a different turn; species like grasses profited from being eaten, and evolved to use large herbivores for seed dispersal.

In this manner, complex ecosystems came into existence. Among thousands of species, large herbivores play a crucial role for many, and others benefit directly or indirectly from their presence.

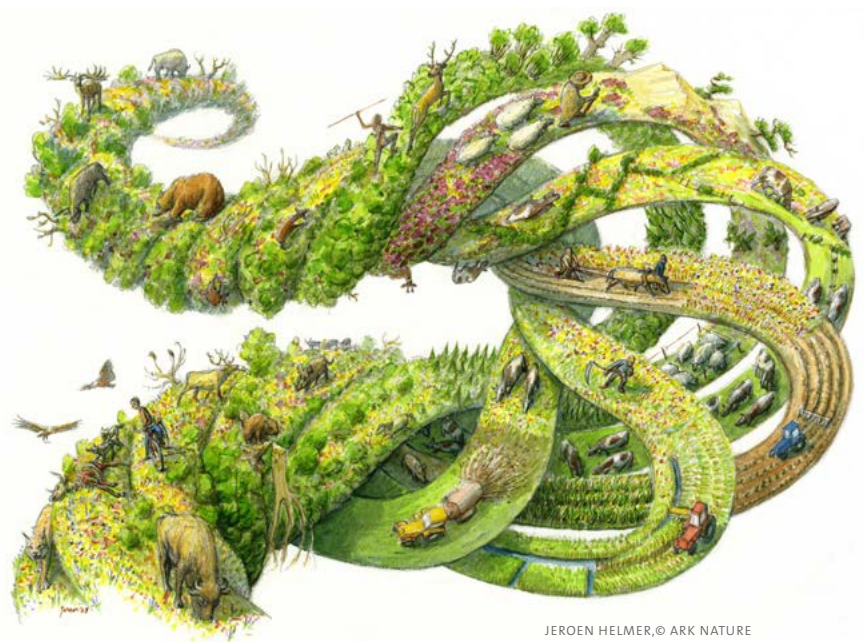
1.2 NATURAL GRAZING: A NATURAL PROCESS

Herbivores have a big impact on their surroundings. By grazing they change the structure and species composition of their environment. This is especially true for large grazers and can not only be witnessed on the African savannas, Indian forests or North American plains, but also in the European countryside. Large herbivores maintain natural meadows, support germination of herbs and trees, and can even open closed forests through debarking or uprooting trees.

Attention towards the crucial role of wildlife grazing is growing within European conservation. But still amongst many biologists, grazing is often seen as an old agricultural practice in which sheep or cattle are used to graze open fields. Large grazers are seen as cheap “land mowers,” and their presence is supported by several European agricultural subsidies. However, grazing actually supports many species that cannot survive in closed forests. Many conservationists do not realise the fact that the biodiversity they are trying to protect was here long before early humans and their livestock arrived. During those pre-agricultural times, semi-open ecosystems were supported not by human livestock, but by huge numbers of wildlife. Species like auroch, wild horse, European bison, saiga, wild ass and deer, all had their own unique impact on their surroundings.

The re-introduction of wild and semi-wild herbivores is an integral part of ecological restoration, or rewilding, to use a term that is becoming more and more popular.

IMAGE 1.1: How we unravelled the complex interactions within nature and how we can restore this web



JEROEN HELMER, © ARK NATURE

2. HERBIVORY; SPECIES AND STRATEGY

2.1 FROM CATERPILLAR TO BISON

Plant eating species come in many varieties. Even the smallest can have a big influence. Some species of caterpillar or grasshopper can suddenly emerge in huge numbers, defoliating complete forests. Their impact, however, is temporal and relatively small; within the next growth season, or even within weeks, their impact fades away.

Slightly larger grazers like rabbits or geese have a different impact. Rabbits can maintain short grazed fields for long periods of time. High reproductive rates make them capable of emerging in large numbers. The same is true of migrating geese which can quickly be present in their thousands. Both love eating newly grown short grasses, but when their population suddenly drops - as occurs in rabbit populations due to myxomatosis and other VHS diseases, or when geese migrate further north or south - grazing pressure drops, and vegetation recovers. Under these circumstances grasses quickly grow tall, and weeds and herbs emerge. When the geese return after 6-9 months, or when rabbit populations recover, entire systems have changed and their preferred habitat might no longer be present.

IMAGE 2.1: Europe's wildlife distinguished between feeding strategy (adjusted from Hofmann, 1989)



DRAWINGS BY ESTHER LINNARTZ, © FREE NATURE

The biggest of our grazers, the large herbivores, have the biggest influence on their structural surroundings. By having long intestines they can digest even the hardest of plant materials such as twigs or bark. Their size makes them capable of uprooting shrubs and trees, and debarking kills even the biggest tree. Shortening long growing grasses, large herbivores re-create short grass fields, the preferred habitat of smaller grazers.

Large herbivores are crucial for the functioning of a biodiverse ecosystem!

2.2 SPECIES AND FEEDING STRATEGIES

Not only have large grazers developed in a co-evolutionary process with plants, insects and birds, they also continue to facilitate each other. To co-exist different species use different feeding strategies, and therefore influence their surroundings differently. A simple division is made by Hofmann (1989), who divides large herbivores into grazers, browsers and intermediate feeders.

The European continent is home to many ungulate species. During glacial periods, continental species like aurochs retreated to southern Europe or into Asia, while northern species like muskoxen expanded their range. During the interglacial periods, aurochs, deer and even elephants spread out over the continent. This process of alternating glacial and interglacial periods took place at least 13 times over the last 2.58 million years. Human encroachment partly stopped the return of interglacial mega fauna after the last glacial period, when the current interglacial, the Holocene, started. Due to over hunting some species became extinct; others were driven to the far corners of our continent.

Despite the fact that humans had a huge influence on the presence of large herbivores, a rich variety of large grazers still survived, species which are currently reappearing in their former range due to ecological restoration or rewilding.

TABLE 2.1: List of European large herbivorous species

BOVIDAE	
European bison / wisent	<i>Bison bonasus</i>
Auroch	<i>Bos primigenius</i>
Water buffalo ¹	<i>Bubalus ssp.</i>
Wild goat	<i>Capra aegagrus</i>
West Caucasian Tur	<i>Capra caucasica</i>
East Caucasian Tur	<i>Capra cylindricornis</i>
Alpine ibex	<i>Capra ibex</i>
Spanish ibex	<i>Capra pyrenaica</i>
Musk ox	<i>Ovibos moschatus</i>
Mouflon	<i>Ovis aries musimon</i>
Pyrenean Chamois	<i>Rupicapra pyrenaica</i>
Chamois	<i>Rupicapra rupicapre</i>
Saiga	<i>Saiga borealis</i> , syn. <i>Saiga tatarica</i> 'mongolica'
CERVIDEA	
Elk (Moose)	<i>Alces alces</i>
Roe deer	<i>Capreolus capreolus</i>
Siberian roe deer	<i>Capreolus pygargus</i>
Red deer	<i>Cervus elaphus</i>
Fallow deer	<i>Dama dama</i>
Wild reindeer	<i>Rangifer tarandus</i>
SUIDEA	
Wild boar	<i>Sus scrofa</i>
EQUIDAE	
Wild horse (Tarpan)	<i>Equus ferus ssp.</i>
Wild ass	<i>Equus hemionus</i>

1 Debatable, some argue the European Wild water buffalo (*Bubalus murrensis*) is extinct, others claim that in the Holocene Asiatic wild water buffalo (*Bubalus bubalis*) made it to Europe naturally. Some even claim that this is in fact just one species.

2.3 WILD HORSES AND CATTLE: A CRUCIAL LINK

Amongst indigenous European wildlife, the extinct species of wild horses and aurochs played a crucial role. One might argue that amongst all the other species that survive, why bother with these two species. In fact these wild horses and aurochs were the only indigenous grazers in many ecosystems, while other species were either intermediate feeders or browsers. This puts wild horses and aurochs in a different but vital role within the ecosystem.

As stated in paragraph 2.2, large herbivores co-evolved with each other, each having their own unique niche within the ecosystem. Traditional ecological theories suggest that ecosystem succession starts in open areas and tends to move towards closed forest². As true grazers, wild horses and aurochs are amongst the first to influence succession.

Due to their crucial role in shaping the European landscape, it is logical that it was these two species among the larger herbivores that were domesticated. For the same reason, it is no surprise that it is precisely these two species that became extinct. With human encroachment, wild horses and aurochs were in fierce competition with humans.

IMAGE 2.2: Schematic division of wild herbivores on a lowland European situation

2 More on this subject in chapter 5



They lived in exactly the same place where humans wanted to keep their livestock or grow their crops, and so wild horses and aurochs were either domesticated or exterminated.

2.3.1 Aurochs and cattle

Wild bovines or cattle are ruminants specialized in consuming grasses. They graze by curling their tongue around (longer) grasses and pulling them inwards. As ruminants they are very capable of digesting hard cellulose cell membranes as well as several mildly toxic plants. Shortening long grasses, wild cattle create short grazed areas, facilitating other grazers who prefer shorter grasses or have a harder time digesting thick cellulose cell membranes.

Extensive natural grazing by wild cattle creates richly diverse fields full of flowers, herbs and insects. During the growth season, wild cattle mainly focus on the most nutritious plants; grasses, thus creating space for many other plant species to flower. During harder times (winter or drought) wild cattle consume the now withered herbs together with twigs and other woody materials. Evergreen bramble also serves as a good source of food during winter.

2.3.2 Wild horses

Wild horses, just like cattle, are true grazers, but are not ruminants, and so have difficulties digesting cellulose. Wild horses prefer to graze on short freshly grown meadows, on which the cellulose cells have not fully developed. They benefit from the protein rich regrowth of grasses already grazed by other herbivores, thus creating typical short grazed horse meadows.

During harder times, older withered grasses, with cellulose membranes that have already started to decay, are consumed. Unlike cattle, horses graze with their teeth. During winter they nibble and debark trees. Fast growing tree species with a rough bark, like poplar, are especially vulnerable.

Other species of grazers have their own unique behaviour. Some species are more forest dwelling, others prefer swamps, high mountain cliffs or steppe areas.

2.4 INTERACTIONS BETWEEN SPECIES

Different habits and feeding strategies generally lead to different species using different biotopes. However, there is overlap in habitat use. Sometimes this leads to competition for the same resources, but usually there is facilitation, where one species creates the right circumstances for another. For example bison or wild cattle graze on longer grasses,

creating the right circumstances for wild horses, which in their turn create better circumstances for rabbits or geese. For example, the re-introduction of Przewalski horses in Mongolia created the right circumstances for red deer to re-colonize the area naturally. Dam building beavers create new ponds, attracting elk and deer, and when a dam collapses, the pond drains, attracting wild cattle.

Natural grazing does not mean reintroducing just one species. The process of natural grazing is about all species. A complex web of interaction creates the most diverse ecosystems.

2.5 NATURAL POPULATION DENSITIES

For animals to fully display their natural behaviour, they have to live in natural densities. Only under these circumstances will they have the greatest impact on their surroundings. These densities are much lower compared to those of intensive industrial farming, but are far higher compared to Europe's current densities of wildlife, as almost all populations are heavily hunted. In its natural density, each species is able to fully exploit its surroundings. Unfortunately for most species we do not know the conditions under which this occurs.

Under natural conditions, food availability defines the number of grazing animals³. During the growth season a surplus of food sources is available. During harder times animals use less favoured food sources as well as their fat reserves. The amount of fat reserves and food availability during winter or drought determines the maximum number of animals that can survive in one area. Migration helps to overcome periods of food shortage, but in most parts of Europe, natural migration is no longer possible, due to infrastructure, hunting or other reasons.

Most references of animal densities are based on human controlled systems. Densities are either determined by human hunting within the area or in the surrounding systems. Some species migrate between habitats to find sufficient food sources throughout the year. This behaviour can be found in mountainous areas or swamps, which during winter are mostly inaccessible due to snow cover or river flooding. Winter hunting in mountain valleys or on swamp moraines lowers the number of animals which will return to the high pastures or swamps during the next growth season.

Elsewhere, hunting outside nature reserves creates open niches, attracting animals from

³ For the influence of predation see chapter 7

within the reserve. This works as a drain sink balance. To have large natural animal densities (without fencing), one needs large areas with even larger buffer zones. How large these areas should be is determined by the environment. In mountainous areas, the core areas should at least include low laying valleys as well as high mountain meadows, and the migratory routes in between.

For some species we are able to give minimum densities. This is more easily done for solitary or territorial species, where other factors, not only food availability but also social behaviour, determine the maximum density. Roe deer occur in densities that range from a few animals to some dozens per 100 hectares. The Dutch Oostvaardersplassen, a fenced area of approximately 6000 hectares (including 3600 hectares inaccessible swamp), is currently home to 2522 red deer, 992 wild horses and 184 heck cattle⁴, densities much higher than previously believed possible.

Supplementary feeding (in winter) increases survival rate. This leads to higher unnatural densities and overgrazing in summer. Less fit animals survive, causing weaker genes to be passed on. Although feeding might benefit individual animals in the short term, in the longer term it will not benefit the species, and could have serious negative consequences. Artificial feeding sometimes occurs to prevent animal movement or damage to forest production. Production forests contradict rewilding or wilderness management.

4 According to helicopter senses November 2013

Animal movement is a natural behaviour and should be encouraged. Fed animals in winter no longer have to search for alternative food sources, thus their natural impact on the environment is lost. In natural grazing, woody species will grow and develop differently from those in production forests. Overgrazing caused by artificial feeding and unnaturally higher animal densities leads to devastated, desolate areas without forest regeneration. Feeding also habituates animals to humans which is a form of domestication. Feeding of animals does not fit into rewilding.

2.6 MINIMUM RANGE

There is no strict answer to what the minimum range for natural grazing should be. Introduction of large grazers is already beneficial in areas of only a few hectares. But for natural grazing to fully work, without human interference, larger areas are needed. Areas should include both summer and winter feeding grounds. Ecosystem productivity and the duration of winter or drought seasons also determines densities and impact of grazers.

Generally speaking, a minimum population of 150 animals per species is needed for genetic sustainability. Of these at least 25 males and females should take part in reproduction. Based on these numbers and ecosystem productivity a minimum area can be calculated. The outcome will be different in each situation. For genetically vulnerable species like European bison, even higher numbers are desirable.

PHOTO 2.1: As farmers with their livestock occupied the favourite habitat of wild horse and aurochs, the wild species were heavily persecuted. The wild horse hardly survived



3. REWILDING HORSES AND CATTLE

3.1 LOST WILD ANCESTORS

Unfortunately aurochs (*Bos primigenius*) and wild horses (*Equus ferus*), the wild ancestors of our domestic cattle and horses, are extinct. Although their genes still survive within our domestic livestock, many of our cattle have been bred to such an extent that the resemblance to their ancestors can no longer be seen. They have been bred to fulfil our need for milk or meat production. Cattle used for draught appear to show more auroch characteristics and have been bred to a lesser extent. Recent DNA studies give us more insights into the relationships between today's cattle breeds and aurochs. For more information on the breeds see also Goderie et. al (2013).

PHOTO 3.1: Despite their color, Hungarian grey cattle still have many aurochs characteristics

For wild horses the story is somewhat different. There is no clear idea of what wild horses used to look like. Many of the wild living horses of the last 2000 years have cross bred with domestic horses, so no clear picture can be drawn. However, we do know that wild horses used to be part of the European mega fauna and many breeds seem suitable for rewilding. Breeds like the Konik, Exmoor pony, hucul, karakachan, Letea horse and sorraia are already living as wild animals in different parts of Europe. It seems best to search for the best ecotype fit for purpose, both in an ecological and societal sense. For more information on breed selection see also Linnartz & Meissner (2014).



Today many cattle and horse breeds have lost the capability to survive on their own. Kept in stables, they lost the ability to grow sufficient winter coats. Highly productive animals are not capable of surviving on poorly nutritious natural forage. Some breeds cannot calve by themselves and need caesarean operations in order to give birth. Udders producing too much milk cause infections when not milked daily.

The social structures of kept cattle and horses are shaped by human desires. Until not long ago a farmer needed a bull for reproduction, but these days insemination is done artificially. Young bulls are slaughtered at 3 years old, as raising them only increases costs. Calves of only a few days old are separated from their mothers, meaning they are not taught how to behave, how to avoid predators or where to find food sources and drinking water. All traits which are very important in nature but irrelevant on a farm.

Herds of cattle and horses, which reclaim their ancestors' ecological role, have to adapt to living in the wild. This process is called rewilding or de-domestication. Animals are selected by their physical and social survival traits. Selection can be done both naturally or through human selection, given the circumstances. Slowly but surely the animals become adapted to this new life, but it does take time. Centuries of domestication cannot be undone in just one generation.

3.2 BREEDS AND DIVERSITY

For rewilding horses or cattle, and to maintain the maximum genetic diversity, as many suitable breeds as possible should be used. Influenced by the needs of today's global economy, breed selection is controlled by productivity. Less productive domestic breeds are becoming more and more endangered. These are the kind of animals which are in general more suitable for rewilding. Some of today's breeds found in nature have a very small lineage from which they have evolved. Konik horses (27 genetic lineages) and Exmoor ponies (14) are among them. When focus is placed on just one breed, the new wild horses and cattle are deprived of much of their genetic heritage. When more breeds are used, Europe's new wild horses and cattle are given a strong base for the future. This can be achieved by using different breeds at different sites, or by cross breeding.

While selecting suitable breeds for rewilding, several factors have to be taken into account. The animals need to be adapted to local climatic condi-



PHOTO 3.2: Primitive cattle breeds from different parts of Europe are the main source for natural grazing programmes



PHOTO 3.3: The Exmoor pony resembles in many ways the characteristics we learn to know from the original wild horses in Western Europe

tions, parasites and diseases. Also local involvement is very important. In some cases local communities will not accept their old ancestral breed as wild animals (perhaps feeling a too big a need to care for them), whilst elsewhere people are very proud when their breed is chosen for rewilding. Working with local breeds can be both an advantage and a disadvantage given the circumstances.

Selecting animals for rewilding is usually a precise process. On a European scale it is best to use as many breeds as possible.



JOAO CARLOS MUNOS REBENDES / GETTY IMAGES EUROPE

3.3 SELECTING CRITERIA

PHOTO 3.4:
The Iberian peninsula is a hotspot for primitive breeds that can be used in natural grazing programmes to develop the biodiversity of Europe's 'savannah'

In principle all breeds can be rewilded, but with some highly productive breeds the rewilding process will take much longer and is more complex compared to less productive breeds. The most practical approach is to work with primitive local breeds that are used to living in feral or wild conditions. Selection criteria include:

- The ability to calve or foal without human assistance in the best season (mostly spring). This usually involves animals of slow growth, which only come to sexual maturity at a later age
- Being capable of dealing with local extreme climatic conditions all year round, such as extreme cold or high temperatures, snow cover or rain. For example by having a warm winter and a thin summer coat.
- Being capable of extracting enough nutrition from rough forage, leaves, twigs or bark
- Limited milk production with high nutritious value in combination with a small udder
- Physique adapted to local circumstances like wet swamps or rocky mountains
- Hardiness against diseases
- Alert and confident behaviour

- Well developed maternal behaviour
- Capability to store a fat reserves between the muscles and able to use these reserves during harder times
- Being able to fend off predators

Besides physical suitability, also instinctive behaviour, social position, knowledge and tradition play an important role within rewilded herds. Older cows or mares lead their herds towards favourable feeding grounds and know where to find drinking water during drought. This knowledge is normally obtained and passed on over generations and has to be regained during rewilding. Good social structures help to protect herds against predators. Young animals are raised by elders that – when needed – reprimand the youngsters. Male animals, at a young age, play fight with each other, thus training them to become dominant when they come of age.

When selecting animals for rewilding, it is best not to just select young animals fit for the job, but to also take social matters into account, as well as making sure of a balance between males and females.

3.4 WILD CATTLE

The auroch became extinct in 1627. What is left is a huge variety of domestic breeds, some of which are still very primitive and have a resemblance to their wild ancestors. Several strategies are used for rewilding cattle.

- Crossbreeding several primitive European breeds, with the purpose of resembling the auroch as much as possible. The German Heck brothers tried to do this around the 20s and 30s of the last century. Among other breeds they used Corsican cattle, Highland cattle, Spanish fighting bulls and Hungarian grey cattle. They basically selected the animals on appearance. Compared to aurochs, Heck cattle are a bit smaller and their horns are shaped differently. A more recent project is the Tauros-programme of Rewilding Europe and the Taurus foundation. This time animals are selected by a genetic resemblance with aurochs, rather than on appearance. For more information see Goderie et al (2013).
- Use of (local) primitive breeds which are still capable of living in the wild. Amongst other breeds, the Rhodopian shorthorn (Bulgaria), Highland cattle and Galloway (Netherlands, Germany and other countries), Sayaguesa (Spain / Netherlands), Maremmana (Italy) are used for rewilding and de-domestication.

3.5 HORSES

Compared to cattle, the domestication history of horses is much shorter. Many types of horses are still capable of living in the wild.

Feral, semi-wild and wild living horses can be found all over Europe. Officially all horses in Europe are owned, but in practice it is different. On Letea Island in the Danube Delta horses have been living in the wild for centuries. These animals no longer need rewilding or de-domestication. Within the Netherlands rewilding of horses started with the Polish breed kon polski, also named Konik. This breed was chosen because of its relationship with the last wild horses from Białowieza, Poland. Later Koniks from Dutch reserves were introduced in countries like Latvia, Lithuania, Belgium and the UK. Meanwhile the genetic resemblance of the Konik with the original European wild horses is under scientific debate. The last wild horses of Poland most likely cross bred with feral horses for several centuries. Although Koniks genetically differ from the wild horse, they are fit for purpose. They need very little to no care and are very self supporting.

Although Koniks have been transported all over Europe, it is wise to also consider other breeds. By using just Koniks much genetic diversity within horses is lost. In some situations local communities will not accept Koniks, and prefer the use of local breeds. The study 'Rewilding Horses in Europe, background and guidelines' (Linnartz & Meissner, 2014) suggests the use of 6 different ecotypes in various regions in Europe. Local breeds can be added when possibilities arise.

IMAGE 3.1: Suggested use of horse ecotypes across Europe, According to Linnartz & Meissner 2014



4. REWILDING PRACTICES

4.1 TO BECOME SELF SUPPORTING

Rewilding of animals means that lost characteristics, needed for survival, have to be regained. Animals showing characteristics preventing or hindering survival have to be taken out of the herds. Success at adapting to living in the wild is, amongst other factors, shown by:

- Birth synchronisation in the most favourable season (spring). This shortens the period in which herds are stuck with less mobile vulnerable young and reduces losses due to predation. A synchronised mating season leads to a wider spread of genes as dominant males cannot cover all females in heat
- Sexual maturity at a later age
- Hooves adapted to local circumstances (rocky soils or muddy bogs)
- Swimming ability- to cross rivers
- Growing knowledge about local resources; water, fleeing areas, food sources and shelter
- Small udders

4.2 HUMAN VERSUS NATURAL SELECTION

The first stage of rewilding starts by selecting suitable breeds. A specific breed can be chosen, or several different breeds as part of a breeding programme. Although a breed might have proven itself suitable for rewilding, this does not guarantee that all individuals of this breed are capable. For example in a Latvian project, zoo raised Hungarian grey cattle were used. These individuals did not at first even know that grass grew on the ground, having been hay fed all their lives. This was despite the fact that Hungarian grey cattle are known as one of the hardiest breeds in Europe. Their offspring however is now living a wild life in Latvia.

Thus rewilding always starts with human selection. But at a certain point one has to let go and let natural selection take over. This moment differs in each situation. European law only recognizes cattle and horses as domestic animals, but individual countries can make their own policies and legal exceptions.

After purchasing animals for rewilding, the next step is to let them adapt to local circum-



stances. When not of local origin, animals need to learn which plants are edible or inedible. This is even more important during winter or drought when the most favoured grasses are in shortage. Artificial surplus feeding during the first winter can be considered as part of adaptation. In the long term animals need to be able to fully sustain themselves and surplus feeding should only be considered in extreme circumstances.

After the first year of rewilding, additional feeding should be avoided. Individual animals not capable of surviving winters on their own should be taken out of the herds. Only in extreme circumstances, like a very severe winter, and when entire herds are under threat (instead of one or two individual animals), one could consider feeding. As long as the animals are under veterinarian law, owners are obliged to care for their animals. Feeding must then be done to prevent starvation during these rare severe conditions.

Adaptation also involves building resistance to disease. Being introduced into a new area, animals might come across diseases or parasites to which they are unfamiliar or for which they have been regularly treated before they were selected for rewilding. Providing veterinarian care can be considered during the first stages of rewilding, but in the long term should be avoided. Animals use various plant species with medical properties.

When animals become sick and need treatment, especially during the adaptation phase, veterinarian care should be provided as long as the animals are under veterinarian law. Animals could be in need of care because of 1) human failure or 2)

their inability to survive in the wild. An example of human failure is an animal getting entangled in barbed wire. To prevent weaker genes being passed on, individuals incapable of living in the wild should be taken out of the herds before the next reproductive season starts. Individuals receiving veterinarian care due to human failure can be maintained within the herd.

National laws usually state that we cannot let domestic animals suffer. When animals need treatment, they are usually unsuitable for rewilding. Under wilder conditions they would be predated by wolves or bears. European laws give individual countries the opportunities to give animals a different status. For example Dutch laws provide the opportunity to give animals a status of 'not kept'. 'Not kept' animals are no longer registered (ear tagged for cattle or chipped for horses) and as a result meat of these animals may no longer be consumed by humans (registration is required to ensure human food safety). These animals are no longer under veterinarian law, but this does not automatically mean they fall under natural laws. In order to achieve the latter, national laws need to recognize wild cattle or horses as a wild (protected) species. Bulgaria could be a frontrunner in this respect as Tarpans are still on the national red list and wild horses registered as Tarpan are protected.

When animals are no longer kept, natural selection can take over. Survival of the fittest may cause a loss of individual animals but it strengthens herds overall. As long as human selection prevails over natural selection, the manager should select animals through "the eye of the wolf."

PHOTO 4.1:
Konik horses





4.3 GENETIC MANAGEMENT AND INBREEDING

PHOTO 4.2: A recent breeding programme with primitive breeds of cattle leads to a breed (the Tauros) that is well adapted to natural circumstances

Usually rewilding starts with a small founder herd. In the long term this might result in limited genetic variation. This effect is even stronger when breeds with a small genetic background are used. For example the total world population of Przewalski horses originates from only 13 bloodlines, the Konik population comes from 22 founders (6 male, 16 female) and Exmoor ponies from only 14 founding animals. To top this the world European bison population has only 8 founders.

Other breeds like Galloway, Highland or the various types of grey cattle, derive from much larger founder populations. When animals are part of a breeding programme, like the Tauros programme, genetic variability is added by using several breeds of a different origin.

Genetically varied populations are better adapted to cope with diseases, changing environments and climate change.

In due time, rewilding started in smaller areas needs additional genetic input. When several areas are used, with the intention to connect them in the long-term, it is wise to use animals of different genetic lineages at different sites. When herds have

already grown into the hundreds, the input of a few new animals only has a limited effect on the genetic variability of the total population. Effects are much greater when new genes are added in the earlier stages and within smaller herds. At the very start of rewilding one has to consider genetic variability in the long term.

For as long as the herds are managed and human selection is still in control, one can set up a genetic database by extracting hairs.

At a certain stage animals will become wild. To prevent the loss of genetic diversity in that situation, the minimum population size should be at least 150 animals, of which at least 25 males and females take part in reproduction.

Among polygamous species like horses, the risk of genetic loss is far greater compared to monogamous species. Each species has its own strategy to prevent inbreeding, but this only works if the animals are given enough space and opportunity. Free choice of mating partner helps. Birth synchronisation leads to more bulls being able to breed, as one bull can not cover all females within his range.

4.4 DEALING WITH WATER SHORTAGE

There are two causes resulting in water shortage, which should be dealt with differently. The first cause comes from limited access due to fences or other human causes. In this case it is reasonable to add artificial water sources.

The second reason is a natural lack of water sources within a rewilding area. In this case the question of whether the area is suitable for grazing at all should be asked before solving the water problem.

Under natural circumstances, water shortage causes animals to migrate in search of drinking water and the manager of the area should facilitate this migration as much as possible. When animals are living within a restricted fenced area, one has to care for the animals. When no natural water source occurs or when natural water sources regularly run dry, an artificial source has to be provided. A water pit can be dug or a tank with a piping system can be put in place. Artificial water sources have to be checked on a daily basis.

When rewilding areas measure several thousands of hectares, under natural conditions one or more water source should be available. Creating artificial water sources will change the behaviour of grazing animals and thus their impact on their surroundings. On a daily basis, animals seek out a water source several times. When an area is naturally dry, this behaviour results in a gradient of intensively grazed areas near water sources to less extensively grazed areas further off; a gradient which in turn results in higher biodiversity.

Creating artificial water sources also impacts competition between various types of grazers. Wild ass or saiga are well equipped to deal with water shortage. Creating artificial water sources favours species which demand a greater amount of water, like cattle or deer, thus outcompeting wild ass and saiga.

Freezing temperatures or snow cover does not necessarily result in water shortage. Even when open water is inaccessible, animals break open small pools by standing on or jumping on the ice. A lot of moisture is consumed by eating hoarfrost while grazing. Also snow can be consumed. In smaller rewilding sites with frequent visitors, ice holes are sometimes created due to public demand, although grazers do not necessarily require them.

Using experienced herds help to overcome periods of water shortage. An older experienced mare or cow leads her herd towards water sources which she remembers from past times. While doing so she passes her knowledge on to the next generation.

4.5 DEALING WITH SEVERE WINTERS

The duration of winter is of particular importance to grazing animals. Short periods of heavy snowfall can be easily overcome by using the fat reserves gained during summer, but when a winter comes early, and lasts long, additional feeding can be considered.

In smaller fenced areas and when animals are still “owned,” laws oblige care for the animals. When entire herds are under threat of starvation, additional feeding can be provided. When only a few animals (less than 10% of total herd size) are threatened, the individual weaker animals within the herd should be taken out.

When areas measure several thousands of hectares and animals are no longer “owned,” they can freely migrate across different habitats and the need to supply feeding is much less. Within mountains, rewilding sites should house both summer mountain pastures as well as low lying valleys which are winter feeding grounds. Here animals are given the opportunity to search for alternative habitats during harder times. Severe winters under these (near) natural conditions, with all habitats present, result in natural population dynamics; during severe winters more animals die compared to normal years, and in a mild winter, almost all animals might survive. Natural population dynamics are of extreme importance, for forest regeneration cycles, for example.

For dealing with water shortage during winter see paragraph 4.4.

4.6 RELEASE INTO THE WILD

The final goal of rewilding cattle and horses is to release them into the wild. This can be done when the animals are fit and adapted to local circumstances. Before animals are released they are kept in so-called pre-release sites.

Pre-release sites come in several forms. A small pre-release site of only a few hectares can be used for a few weeks or months for animals that have already been part of a rewilding programme elsewhere. These pre-release sites can be used several times for successive introductions. Another option is to start rewilding on the release site within a fenced area of a few hundred hectares, with the final goal of taking down the entire fence. For the duration of several years one can actively select animals fit for purpose and prepare both the animals as well as local communities for the actual release into the wild.

Pre-release sites are fenced and habituate the animals to their surroundings. When the animals have lived there for several months, they become used to the area and usually stay nearby.

Another option is the so-called hard release. Animals are introduced straight from the trailer into the wild. This has the advantage of a minimum of operations, but the disadvantages are more numerous. Firstly, the animals have no connection with the area, which sometimes causes a restless search by the animals for more familiar surroundings that takes them several or even tens or hundreds of kilometres away, possibly into an area where they are unwanted. Secondly, animals are not easily recaptured when they prove to be less adapted than previously thought. For example, they might come across a new unknown type of parasite, which they have not dealt with before. In the case of hard release, this can cause the death of more animals than is necessary, while soft release enables animals to become adjusted to their new surroundings, with possible veterinarian care during the transition phase.

To keep horses and cattle within a pre-release site, a fence of about 1.1 meter height is sufficient, made either of barbed wire or electric fencing. Electric fencing, if set up correctly also prevents predators from entering the site. The fence has to totally surround the area with no possibility for predators to crawl under or step over the electric wires.

4.7 DAMAGE CONTROL

In time populations will grow. When released into the wild, social pressure causes animals to wander off in search of new habitats and territories. At one stage they will meet with conflicting interests.

As long as animals are still owned, the owner is responsible for his/her animals and the damages caused. The owner usually has insurance to cover liability. As long as the animals are owned it is advisable to keep them within a fenced or restricted area.

When an animal is given the status of a wild animal and is no longer kept, nobody is responsible for it. Most European countries have compensation schemes for damages caused by wild animals. The problem is that most countries at this moment do not recognize cattle and horses as a wild species, but only as a kept species. Even when given the status of a wild species, and compensation schemes are in place, local farmers who experience damage might oppose the rewilding project, breaking down support for the entire project.

Fencing over longer distances will prevent animal movement and according to some, this is a less preferable option under natural conditions. However, strategic fencing can separate rewilding sites from other interests like highways, urban areas or productive agricultural fields. To fence a complete nature reserve of hundreds of thousands of hectares does not seem the best method, although this has been practiced in several southern African national parks like Kruger and Etosha. Having buffer zones with hunting areas can be an alternative measure, with increasing hunting pressure further off from core rewilding sites. In several Canadian national parks there is a practice of shooting animals which wander into urban areas with rubber bullets, in an attempt to scare them off.

4.8 DEALING WITH WOLVES

Predation by wolves or other predators is just as much part of rewilding as the return of indigenous wild grazers. They help to keep herds healthy by preying on the weakest.

Quite often, when grazers are released, they are not yet familiar with wolves or other predators. This means they have to learn to defend themselves. A pre-release site with a well-designed fence not only keeps grazers inside, but can also keep wolves outside. Within the period before the actual release wolves will visit the fence and meet with the grazers without harming them.

In larger fenced areas of several hundreds of hectares it is much harder to keep wolves outside. It helps to have smooth curves within the fences, to prevent wolves cornering grazers where a fence makes a straight turn. Even more important, is the need for a healthy, alternative, wild prey population, like red and fallow deer or ibex, which lessens the need for wolves to hunt cattle and horses. Losses to predation within fenced areas are still natural, as long as the animals are given a fair chance to defend themselves. Losses of animals over which you have ownership should be accepted.

After release into the wild, it is quite normal to lose animals to predation. Calves and foals are especially vulnerable. This has to be accepted. Remember, from this point onwards you no longer have ownership of the animals.

First experiences with free living horses and cattle in Bulgaria and Croatia show that horses are more vulnerable to wolf attacks than cattle. Horses even seek the protection of cattle herds to be safe. This can be seen as an additional argument to release horses in combination with cattle.

4.9 TRANSBOUNDARY GRAZING

With the growth of rewilding areas throughout Europe there is an increasing chance that free living cattle or horses cross national borders. This could cause new problems because of their legal status. Each country in Europe has its own registration system for domestic livestock and European law dictates all cattle to be ear tagged, horses to be chipped, and both to be centrally registered. These European laws are implemented at a national level. This makes transboundary grazing problematic as animals registered in one country cannot simultaneously be registered in another.

The purpose of registration is to secure national and international food safety. Through registration, diseases amongst livestock can be tracked down to its source of contamination. As the implementation of registration falls to national authorities, national authorities dictate how care and supervision is to be provided. This differs amongst individual countries. For example German rules dictate that all animals used for natural grazing are seen on a daily basis. In the Netherlands it is not dictated how often one has to see the animals. In general animals here are seen at least weekly

by a professional and in between several times by volunteers. Also different countries have different rules about which diseases animals have to be checked for and which pre-emptive treatment has to be provided.

Transboundary grazing is legally possible if different countries make arrangements between each other. Current arrangements within the Benelux (Netherlands, Belgium and Luxemburg) only provide for year round transboundary grazing with sheep. Cattle in the Benelux are only allowed for transboundary grazing during summertime and have to be stabled during winter. Transboundary cattle grazing between the Netherlands and Germany is possible when animals are under the more stringent German veterinarian regime. Elsewhere different arrangements have been made between different countries.

If cattle or horses are seen as wild species the situation becomes easier. Transboundary grazing with wild species like deer or European bison is possible all over Europe as they lack the need for registration and fall under a different set of laws.

PHOTO 4.3:
Boskarin cattle in the
Velebit mountains
Nature Park, Croatia



5. SOCIAL HERDS

5.1 HERD FORMING ANIMALS

Horses, cattle, bison, wild boar, deer and ibex are all social animals. We have a very clear view of how the social structures of deer and boar work as we have studied these animals in the wild for a long time. But due to domestication, we have lost our view of how herds of horses and cattle are naturally structured. Most of what we know today comes from farm-managed animals. Farmers organise the social structures of their animals to their best advantage. A farmer only needs one stallion or bull for reproduction. Surplus male animals are castrated or slaughtered. Calves are removed from their mothers at a very young age so as to enable the provision of milk for human consumption. Groups of cattle usually consist of large numbers of cows of similar age. Horses very often stand alone within a small stable, when outside in the field they are generally surrounded by different individual animals all the time.

In the rewilding of herds of cattle and horses there is a need to restructure their social behaviour. This is especially true when rewilding starts with populations from an agricultural background, which takes more time than the rewilding of feral animals.

PHOTO 5.1:
Rewilded Sayaguesa
cattle live in social
herds

At the base of a naturally structured herd is the presence of all ages. Male and female animals are born in a 50%–50% ratio. Young animals are raised by both their mothers and the rest of the herd. Knowledge of resources and migration routes is passed down through generations. Mock battles between young males determine social rank and prepare them for sexual maturity.

5.2 WILD CATTLE HERD STRUCTURE

Wild cattle live in a matriarchal society, a type of social structure found within several species. For example, elephants or European bison have similar social behaviour. The following group types are distinguished among wild cattle:

Family Group

A family group consists of related females and their offspring. Younger females stay with their mothers and grandmothers for most of their lives. Only the younger bulls are expelled when reaching sexual maturity around the age of 3.

The matriarchal group is led by the most experienced female, which is usually the mother



IMAGE 5.1: Social structure amongst wild bovines

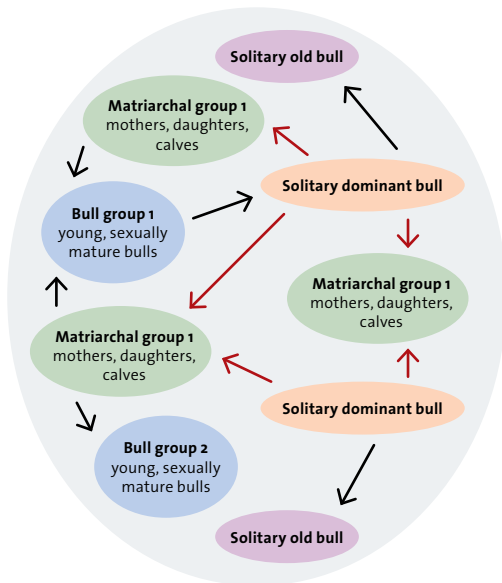
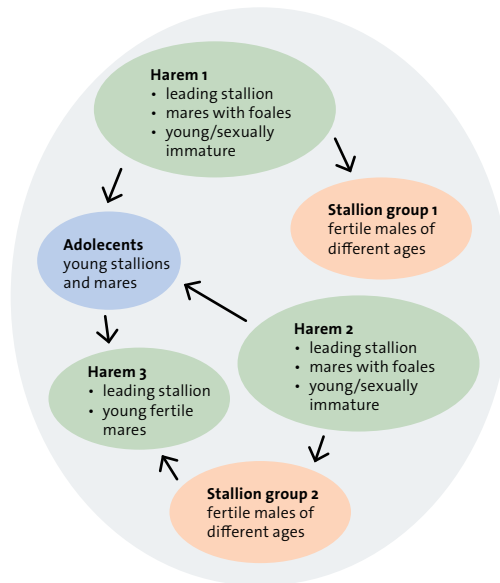


IMAGE 5.2: Social structure amongst wild horses



or grandmother of all the other group members. Due to her experience she leads the herd to better pastures or shelter. Knowledge is passed down over generations. Around the matriarchal group, pass lone, dominant bulls, mating with those who are of their liking. During the rut a bull stays with one or more females for several days. Other receptive females mate with other bulls. Inbreeding is prevented due to the fact that the female line stays together, while young bulls are expelled. They are driven out of the area by the local dominant bulls. A bull with higher social rank covers more cows than others, but not all!

After several generations family groups can grow too large. A higher ranking female with her followers splits off from the herd, starting her own group.

Bull groups

Bull groups are a lot smaller consisting of only 2 to 5 animals. They have their home ranges in the less favoured pastures and away from the dominant bulls. Here they have mock fights preparing themselves to claim their own territory. Sometimes two or three bulls join forces to outfight an older dominant bull.

Solitary bulls

Dominant bulls defend their ground. Although not completely territorial, they try to stick to the most favourable grazing grounds. They mark them by creating bull pits. They check on passing family groups for receptive females.

Older bulls, past their prime, spend their days alone at the edges of their former range. They will not join up with bull groups anymore.



5.3 WILD HORSES

Wild horses live in large groups, which can number into the thousands. Within this mega herd many smaller groups can be found alongside each other.

Harem groups

A harem consists of a leading mare and stallion and their followers. The leading mare decides what the group does when and where. The main task of the stallion is to keep the herd together and to protect it against other stallions or predators. Sometimes he joins forces with a younger lower ranking stallion(s), granting him limited mating rights to lower ranked mares. The group usually stays together; sometimes a new young mare is added. Young mares and stallions are expelled when reaching sexual maturity, which prevents inbreeding.

Harem groups are not territorial and several groups can live side by side. Looking at one big herd one can distinguish several harem groups. These will stand next to each other, but never mix.

When the leading stallion dies or comes of age, he is replaced by an outside stallion or his position is taken over by one of the younger, lower ranked

stallions within the herd. When the leading mare dies, her place is taken by the second most experienced mare. Mares in one harem are quite often not related to each other.

Bachelor groups

Expelled animals will search for their own herd for protection and company. They will form so-called bachelor groups, which are unstable in composition and change often. Younger mares sometimes foal once or twice before they are accepted into a new harem. Young stallions join stallion groups or try to be accepted as a helper in a harem.

Stallion groups

Stallions which do not have a harem of their own live together in stallion groups. Among younger animals, mock fights are ongoing, preparing for the moment they can conquer their own harem. This will never be accomplished by most of them.

Stallion groups have loose bonds and their composition can change on a day-to-day basis. These groups are usually found on the edges of larger herds.

PHOTO 5.2: What from a distance appears to be one big herd actually consists of many smaller social groups



5.4 SOCIAL HERDS AND THEIR LANDSCAPES

The distribution of individual animals is strongly influenced by the social structure as described above. As such the social structure of species also has its influence on the landscape. Here are some examples:

- Being less mobile during the birthing season means that birthing grounds are periodically grazed more intensively. Therefore the more productive and nutritious areas are selected for birthing. Other areas are grazed less during these times
- The splitting of herds and repelling of youngsters leads to more diffuse habitat use. In particular, young bulls and stallions might migrate to new habitats in search of their own mates
- Both serious and mock fights turn up soil. Dominant bulls dig their own bull pits, horses regularly create sand baths. All cause variations in open soils and closed fields
- Eating in one place and defecating in another supports the transport of nutrients, causing local differences in soil fertility. Dominant stallions want their scent to be most prominent, and so defecate on top of others' scent, creating huge dunghills, which in time become nutrient hotspots for vegetation, causing local differences in plant communities.

The social behaviour of animals has a big impact on biodiversity. At first this might seem trivial, but considering that each plant species has its own very specific niche, even local minute differences cause dozens of different plant species to grow side by side. A lot of them are brought by the grazers themselves, which carry seeds of many species in their fur. Bigger grazing species create more local differences. Bison or cattle bull pits are far larger than deer wallows. Horse dunghills or cattle manure contain far more nutrients than deer droppings.

5.5 MANAGEMENT OF SOCIAL HERDS

Each species has its own unique social structure. This is more clearly visible amongst wild living animals compared to kept ones. However, this does not mean that kept animals do not have a tendency to express their behaviour. It is important that during the earlier stages of rewilding or at breeding stations, when human influence and selection amongst animals is still strong, one keeps these social structures in mind.

Within the earlier stages of rewilding, the animals are likely to be caught and handled several times. Animals less suited for rewilding can be



removed and herds might be moved between different areas. As long as cattle and horses are under veterinarian law, cattle still have to be ear tagged, and horses to be chipped.

When the animals are caught, they are put into close quarters with little space to move. Different harems have to be separated in different compartments to prevent fights for dominance between stallions. Bachelor and stallion groups need to be separated from harems. When handling cattle, bulls have to be separated. Making a corral as tight as possible prevents animals from moving.

Animals born feral or semi-wild are not used to being taken out of their herd and set alone. These animals should always be transported as part of their own group. This is totally different from domestic animals, which are trained to stand apart. Domestic animals are also more used to transportation, resulting in less distress compared to (semi) wild animals.

Practical management for rewilding cattle:

- Family groups of related females should be kept together as much as possible. When splitting herds, remove one separate line from one of the more experienced older cows.
- Bulls can be separated from the family groups as they normally live solitary lives. Younger bulls stay within the neighbourhood of their maternal herd till the age of 3, but wander off regularly. These animals should not be moved separately, but with one or two bulls of the same age and from the same herd.
- If rewilding starts at very small sites of only a few hectares, it usually provides space for only one bull. To prevent inbreeding, the bull should be replaced after two years, when his first female offspring become sexually active.

PHOTO 5.3:
Bulls create large pits to impress others or mark their territory

Practical management for rewilding horses:

- When moving animals between different sites, one should move complete social structures such as harems or stallion groups. Dominant animals should not be extracted from the herd. A herd that is treated like this can use all its energy to explore the new surroundings instead of losing energy in building a new social structure.
- Removing or replacing dominant animals disorganizes the herd. When animals have to be removed, it is preferable to remove youngsters. These animals should be at least one year old and be totally weaned. Animals less than one year old still have a very strong maternal bond. When animals are removed, try to remove those who would be naturally repelled within the coming months.
- Stallion groups are loose in composition and can be created by putting several stallions together. This should be done at the new site, not before transportation. These groups can be built up from young stallions expelled from their harems.
- Good socially structured groups have the added advantage that the animals stay more active and healthy.

PHOTO 5.4:
Catching semi wild horses, one should separate different social groups immediately into different compartments

Genetics

When numbers of animals are still limited, and human control is strong, or when animals are within breeding stations, it is important to keep a close eye on the genetics of the herds. As stated earlier, several species or breeds have limited genetic heritage. In the long term, for resistance against disease or to cope with changing environments, it is important to preserve most, if not all, of this genetic diversity. Small groups are especially vulnerable to genetic loss as it might be that only one or two genetic lines reproduce. Groups sized up to about 150 animals should still be genetically monitored. DNA samples can be taken by extracting hair or blood. A sample from the Netherlands showed that within a reserve housing about 80 semi-wild horses, the sons of one dominant stallion conquered one of the other harems, leaving only one male line to reproduce. Although there are also examples where mares leave their harem during the night to mate with other solitary stallions.

As long as herds are still controlled by humans, all animals should be DNA tested. Keeping a pedigree book provides insight in genetic diversity. If needed additional genes can be added or herds can be moved for genetic management. All of this is done to provide the widest genetic diversity when animals are finally released into the wild. After that stage genetic management is very limited. Adding new genes after release will only have an influence in the long term.



6. NATURAL GRAZING AS A NATURAL PROCESS

6.1 GRAZING AND FOREST GROWTH

Centuries of exploitation shaped the European landscape. Forests have been managed for wood production, animals hunted for their meat and fur. To prevent animals damaging production forests, animals were kept at low densities or fed in winter. Open grasslands, moors and meadows were cultivated. Diverse herbaceous fields changed into agricultural monocultures. Large herbivores were driven from these areas and replaced by domestic livestock. Finally the link between the open, now human-dominated landscape and the closed forest was no longer recognized.

Today in those places where forests and open grasslands meet, the transition is quite often sudden and abrupt. Wild animals, which are supposed to live inside the forests, follow their natural habits and move to these fertile meadows to graze. Here they cause damage to farming practices, when for the animals these practices had prepared their “dinner table.” Only a few conservationists realise that forests and open ecosystems should be intertwined. Naturally large herbivores use both; for foraging and for shelter.

Natural succession is traditionally viewed as the follow up of several stages ending with climax vegetation. In most of Europe this climax was thought to be a dark beech or coniferous forest. If this were so, all systems would be closed forests. Grasses or light dependent flora would not have evolved. Without grasses pure grazers like aurochs and the wild horse would never have existed. Rather than being a linear process, natural succession is under the influence of natural catastrophes, including the influence of herbivores, which constantly reopen closed forest stands.

6.1.1 Forest growth

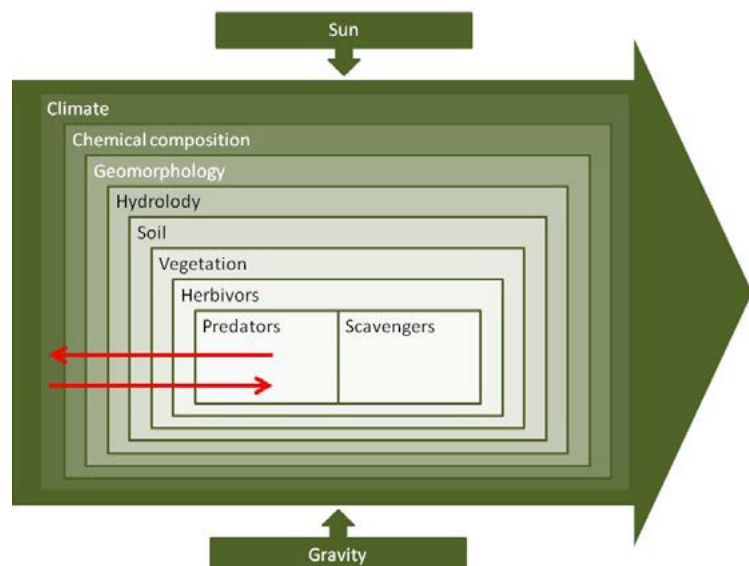
Natural ecosystems in western and central Europe have a very strong tendency towards forest succession. Deforested areas left untouched, soon become overgrown with shrubs and trees. Only within the wettest, coldest and driest areas, forest succession can not take hold. Colder and alpine landscapes give room for coniferous forest,

landscapes with a milder climate to broad-leaved tree species. This is a natural force that has been ever present.

Dynamic forces restricting the tendency of forest succession have been halted by human management. Forest fires and bark beetles are no longer seen as an integral part of nature, but as catastrophes. Flooding of rivers is controlled. Wildlife is hunted severely and kept at densities far below the area’s natural carrying capacity. As a result of these natural forces being no longer present, nature tends to succeed towards closed forests. Over time our human baseline perception of the way natural succession works has shifted, to believing that this is the ‘natural’ state of affairs. We no longer recognize that closed forests are caused by the fact that humans have eliminated the counter forces that would affect their succession.

Within natural ecosystems these anti-forces are fully present. Forest succession is still ongoing, but on a different scale. Where in some places canopies are closing, in others old trees collapse. When light reaches forest floors, grasses and herbs come into bloom, attracting large grazers. Within open grass-

IMAGE 6.1: Order of natural processes structuring landscapes and natural succession



lands only thorny or poisonous shrubs can avoid being eaten. The concept of climax vegetation should not be linked to closed forests, but to mosaic landscapes of grasslands, shrub thickets, and young and old growth forests all existing alongside each other. The top of a climax situation is not a fixed state, but a dynamic landscape in which different stages of succession are all present, but in different places at different times.

6.1.2 Forest degradation

The strong tendency towards forest succession meets numerous counter forces. This causes succession to take a different route and for forests to be replaced by open fields and vice versa. A number of these forces are currently viewed as disasters and as damaging; forest fires, windthrow, bark beetles, disease, avalanches, flooding or grazing, while in fact they are part of nature itself. Bark beetles for example are still fought by traditional conservation, while they are just as much part of evolution as all the other species present.

Fighting these counter forces has economic significance within forestry, but within nature these forces should be embraced and seen as

natural. These forces create local and regional differences. Highly structured systems with many different niches leads to higher biodiversity values. Restoring these natural forces leads to the restoration of natural forests and mosaic ecosystems.

In common with all these forces is that they open the canopy and cause more light to fall on the soil, resulting in the exuberant growth of herbs. This attracts large herbivores to graze upon these herbs and stimulates the development of grasslands, instead of a rapid reclosing of the forest canopy.

6.1.3 Grazing of open meadows

Natural grazing by large herbivores like bison, elk, deer, wild horses and cattle is unmistakably connected with forest ecosystems. Together with the above mentioned natural processes, they have shaped our ecosystems and are crucial to the European natural landscape. Generally speaking large herbivores are not able to open closed forests on a large scale, though locally by debarking they do kill trees. Wild elephants, which push down complete trees, disappeared from the European continent after the last glacial period. One other

PHOTO 6.1:

Wild fires like this one in Yellowstone National Park are not a disaster but a creative force



exceptional species is still present; beavers take down small and large trees. Other grazers profit from the lush open places they create. In the long term, natural grazing of these meadows does not stop forest encroachment, but tree growth is hindered for long periods of time.

Eventually all open grasslands will turn into forests, and all closed forests eventually will once again turn into open meadows. Interaction between natural grazing, windthrow, landslides, wild fires, forest succession and disease creates a constantly moving mosaic of open and closed habitats. Open meadows attract large herbivores where tree saplings are eaten, hindering fast forest regeneration. Shaded areas shelter herbivores during rumination or rest. The climax vegetation will not be a closed forest but a 'walking' forest mosaic of grasslands, herbaceous fields, bush thickets, patches of trees, old growth forests and all the stages in between. Forest succession and degradation will be more in balance. Some places are kept open by large herbivores for several decades; other less preferable grazing grounds close more rapidly.

Many examples of mosaic landscapes are still found across Europe. Usually they are found on



common ground which has a history of long term extensive grazing. Examples are the New Forest in England and Borkener Paradis in Germany, or mountainous areas like the Bulgarian Rhodopes. Here old ways of husbandry are still in use or only very recently disappeared.

PHOTO 6.2: Beaver activities and flooding due to dam building can create large open lush valleys



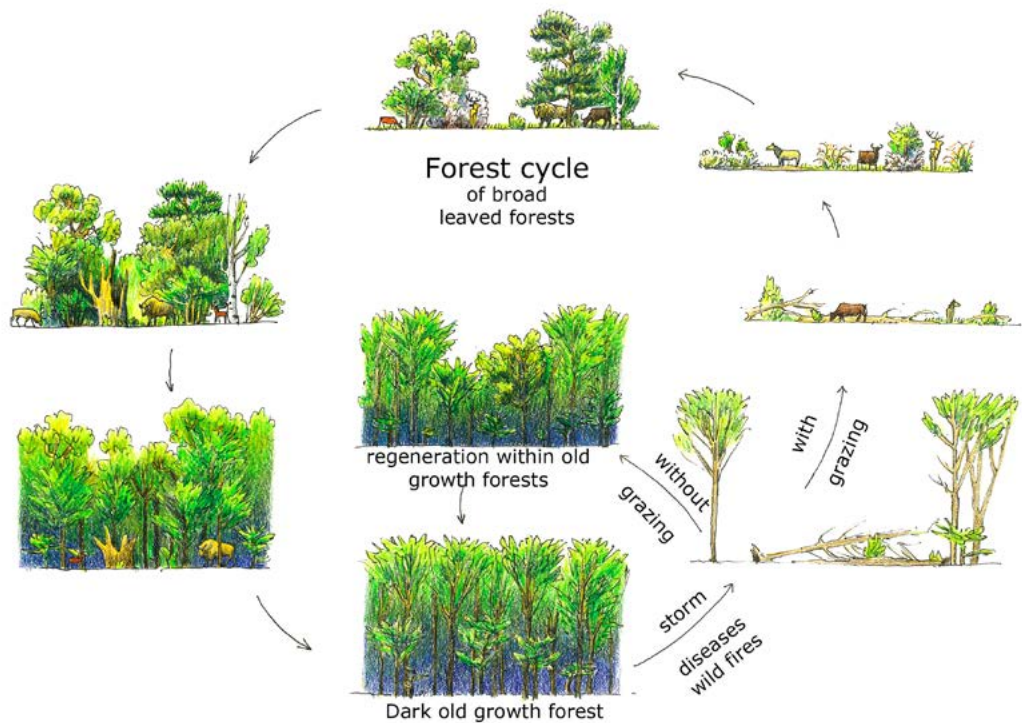


IMAGE 6.2: Forest cycle with and without natural grazing

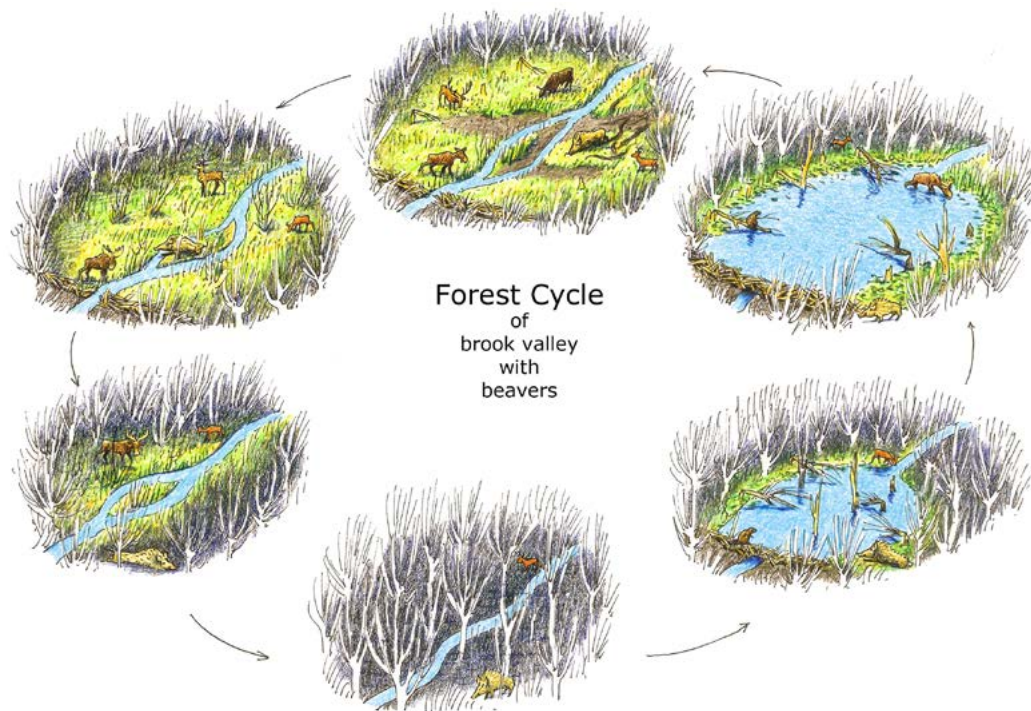


IMAGE 6.3: Forest cycle with beavers

6.1.4 Forest regeneration

Most tree species regenerate far more easily outside forests than inside. Within dark old growth forests, fast growing tree species cannot survive. Here you will only find beech, spruce, fir and holly. Competition for light causes other species to disappear. Old growth forests are dominated by slow growing tree species with high shade tolerance. They are able to survive under poor light conditions, suddenly showing rapid growth when the canopy is opened.

Regeneration in open meadows makes saplings very susceptible to grazing. But several mechanisms are at work, which eventually cause the balance to flip over from the grazing animals towards the trees.

One way for shrubs to protect themselves against grazing is by growing sharp thorns or spines. Blackthorn, hawthorn, buckthorn and bramble are all species that use this strategy. One of the tree species that benefits from those thorny shrubs is the oak (F. Vera, 1997). Oak is one

of the main tree species in central European forest communities, but has a hard time reproducing. Acorns, which fall under shady forests, are highly nutritious and eaten by many animals. Those which are not eaten are usually in too dark a place to survive. Outside the forest there is more light, and this is ideal for growth. But, how to get there? Jays store acorns for harder times, and to protect them against wild boars and other animals, they do so under thorny shrubs. A large number of them will never be eaten, and now have a chance to germinate under far better conditions.

Large herbivores are a major threat to oak saplings, but protection by thorny shrubs leaves them out of reach. After growing for several decades, they overgrow the shrubs and are now far less vulnerable to grazing. From here on they start shaping the new forests.

This method has many variations. For example, ash and oak being protected by buckthorn or bramble thickets. Other tree species use poisonous leaves instead of thorns. Willows can survive years of grazing, being already present before the thorny species germinate.

Another way to survive the hungry mouths of grazers is 'waiting' for periods of less grazing. Large grazers are susceptible to many diseases, which might cause a temporary population crash. This lightens grazing pressure and leaves room for rapid growth. Unfortunately diseases amongst wild animals are now far less common, as most are fiercely fought to protect human livestock interests.

6.1.5 Future natural forest landscape

Our current view of forests is strongly influenced by the forests we see today. The question that arises is what these forests would have looked like under natural circumstances. To answer this question there is only one method: to restore all natural processes and let wild animals roam freely once again. We should start this experiment with open minds, not judging natural processes as disasters or catastrophes.

6.2 THE EXPLOSION OF LIFE

As thousands of plant and animal species evolved in a landscape full of large grazing animals, reintroducing large herbivores under natural circumstances seems a logical remedy to halt the still ongoing loss of biodiversity.

The effects of natural grazing reach much further than just the structure of forest. By eating favourable nutritious grasses, more room is created for less tasty herbs. Under natural

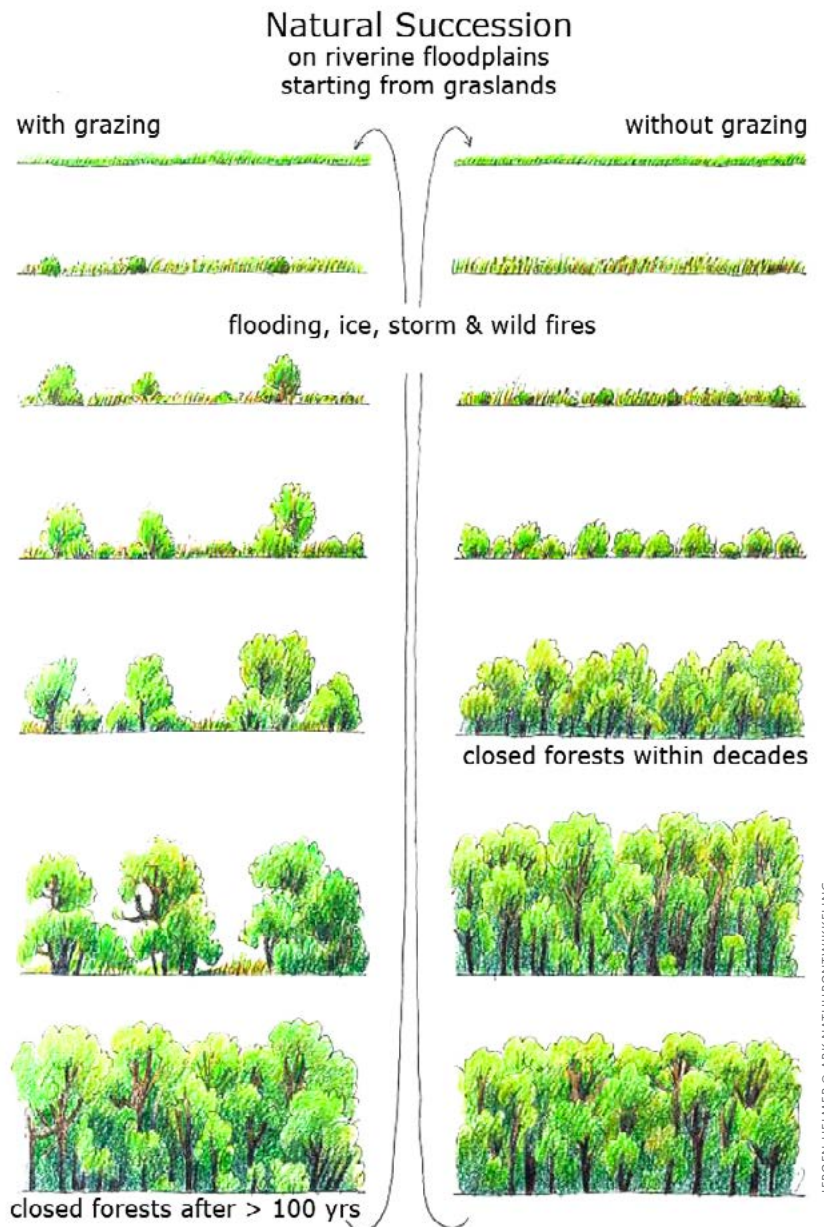


IMAGE 6.4: Forest cycle in riverine areas

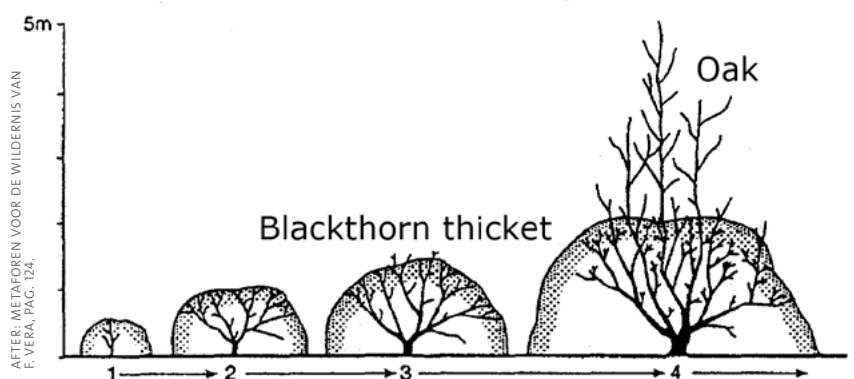


IMAGE 6.5: Schematic view of thorny shrubs protection and oak regeneration



PHOTO 6.3: Black elder and willow growing inside buckthorn thickets



PHOTO 6.4: Invasion of hawthorn on river Waal floodplains, the first stage of natural forest development



PHOTO 6.5: Forest regeneration on former cornfields in the Netherlands (Millingerwaard)

conditions, the number of large herbivores is mainly determined by available food sources during winter or drought. During the growth season, animals cannot consume all the growing vegetation. By only consuming the tastiest parts, lots of less tasty flowers and herbs come into bloom. All of which attract thousands of insects, which in turn are eaten by hundreds of birds: a real explosion of life.

Plant species classified as species of agricultural hay fields come into bloom during summertime, even when the environment is extensively grazed. This is where they have their natural occurrence and this is where they have evolved. These flowering fields attract birds like the corncrake and partridge. In autumn many herbs die and dry with their seeds largely available. In autumn their seeds serve as a food source for rodents or migrating birds. During winter these dead standing herbs are now consumed by the large grazers as standing hay, and the herbivores will only do this when the tasty grasses are gone for the season. Some herbs will not be eaten at all, and their hollow stems become shelter for insect larvae to survive until next spring.

Biodiversity within forests is largely enhanced by natural grazing. Firstly, because naturally grazed forests are more naturally structured with differences in age structure and light reaching the forest floor. When more light reaches forest floors, large grazers are attracted by the lush plant growth. Just like in the open fields during summertime, only the most nutritious plants are eaten. Brambles are set back during winter time, preventing their complete colonisation of forest gaps. Inside hoof tracks, heath and broom germinate.

6.3 NATURAL GRAZING VERSUS SEASONAL LIVESTOCK GRAZING

Conservation of plant and animal species usually focuses on the optimum habitat of those species. Many species that depend on open habitats, currently have their last strongholds in small scale agricultural systems. Management focuses on maintaining economically expensive, unsustainable agricultural measures, like shepherding sheep. This often leads to conflicting interests as farmers prefer to maximise productivity.

With seasonal livestock grazing, the farmers' first interest lies with high production of milk or meat. During winter, animals are kept inside and are hay fed. They are absent from the fields during winter, and in summer are out in the fields in higher numbers than natural densities of wild herbivores would create.

Due to increasing insight into naturally functioning ecosystems, more awareness is growing with regard to grazing. But there is a confusion of language. Both natural, and domestic livestock grazing are called 'grazing', although functionally very different.

Below the main differences between natural grazing and seasonal livestock grazing are described, with a short reflection on their ecological results:

1. With natural grazing, animals are outside year round. The number of animals is determined by food availability during winter. In short this means that there is an abundance of food during summer with massive flowering and seed production.

With seasonal grazing numbers are determined by the farmer and are usually much higher (up to 30 times) compared with natural grazing. This causes higher grazing pressure during summer with less flowering, and an absence of the explosion of life.

2. With natural grazing animals need to search for alternative food sources during winter; twigs, stems and bark. This is the period in which they have the strongest influence on the landscape, creating a mosaic pattern of open grasslands, thickets and forests. In particular,

the transitions between different habitats are rich in life and diversity.

Seasonal grazing creates sharp boundaries between open overgrazed meadows and untouched woody stands. Summer pastures are grazed so intensely that even thorny saplings will not survive; forests stay untouched due to the absence of animals in winter.

3. With seasonal livestock grazing, there are high densities in summer, which leads to over fertilizing and trampling of soils and vegetation.
4. Natural grazing means that many herbs, like thistles and burdock, are not eaten during summer time. In autumn, their seeds get stuck to animal fur or serve as a food source for (migrating) birds. Overgrazing with domestic livestock does not allow these herbs to produce seeds.
5. Wild herbivores grow a layer of fat beneath their skin, which helps them to get through the winter. During this time they can lose up to a quarter of their body weight. At the end of winter, when most of the fat reserves have been used, weaker animals are under a higher risk of death. This natural cycle which allows only the fittest animals to survive and to go on and strengthen the total population, does not occur within farming practices.

PHOTO 6.6: Seasonal grazing with livestock can simulate natural grazing, but has some serious disadvantages



6. Natural grazing includes many interactions between different species of grazer, like deer, cattle, horses and bison. Competition and facilitation between species strongly contributes to a richness of biodiversity. With livestock grazing usually only one species is used.
7. Social interactions within herds like calving / foaling, fighting stallions / bulls, creation of dunghills, the passing on of knowledge about good habitats for feeding and shelter, sand bathing, rutting activities, and so on, cause many habitat variations. With domestic livestock farming there is a lack of these social interactions. Usually groups of animals consist of only one sex and one age group.
8. In many cases, domestic livestock can not survive under natural conditions. This is especially true for intensively bred varieties of livestock. Highly productive breeds come to sexual maturity at too young of an age, can not give birth by themselves, grow too large udders and produce too much milk which causes the udder to become infected. In many cases they are not well adapted to extreme weather conditions and domestication causes differences in colour markings, making them more easily noticeable and more vulnerable to predators. Seasonal grazing does not allow the build up of local knowledge about water and food sources, which is passed on over generations.
9. From the point of view of eco-tourism, it is far more attractive to look at rewilded horses and cattle with all their natural social behaviour, than domestic livestock. Take for example the red deer rut, which is a real spectacle to watch. Similar behaviour can be seen within rewilded cattle which have their own rutting season. The natural landscape which comes into bloom with natural grazing is more diverse, with new surprises around every corner. Domestic livestock grazing has both less socially structured herds as well as less structured landscapes.
10. With domestic livestock grazing the responsible farmers focus mostly on productivity. This takes most of their time and attention.

With natural grazing the animals take care of themselves. Thus wildlife managers and rangers are normally more in contact with the public audience, passing on knowledge about wildlife and giving support.

11. Within social herds newborns are raised by their mothers and the rest of the herd. The animals do not have any dependence towards humans. Animals do their own thing and do not pay any attention to us (unless we come too close, when they become alert). Domestic livestock, from birth onwards, have an intensive relationship with humans. They are separated from their mothers at a very young age, and raised by the bottle. Groups of one year olds are kept together, lacking adult animals to correct their adolescent behaviour. Domestic bulls might see a farmer as a threat in their goal to become the leading animal in the pecking order. All are unwanted behaviours in view of public safety.
12. To prevent economic losses due to animal illness, farmers are likely to use medication. This leads to weaker animals surviving. Anti-worm medication leaks into the ecosystem, killing insects, which in their turn are eaten by birds, which are poisoned.

Natural grazing and seasonal livestock grazing are very different in many ways and have totally different impacts on their surroundings. With rewilding, use of domestic livestock grazing is not the solution. Extensive domestic livestock grazing can show us something of past times, like our agricultural heritage, but economically it holds no future. The explosion of life which comes with natural grazing cannot be expected with modern day intensive farming practices.

Involving farmers in rewilding herds might seem good practice as they are used to handling animals. In the early stages of rewilding this might be especially useful. However, production of a large amount of meat should not be expected, and there is no option for milk at all. Also, the main goal should be to let the animals go wild once they are ready. This means that farmers cannot receive a direct income from the animals.

7. LIFE AND DEATH

'Nature is all about life and death!' This might sound logical, but it isn't. In particular, when it comes to large herbivores, it is mostly us, as human beings, and not nature, that decide between life and death.

We treat life and death differently depending on the circumstances. If a domestic animal has a broken leg, it is perceived to suffer and we put it out of its misery. We do not let such an animal suffer. This wounded animal would have been treated differently if it were a bison from Yellowstone or say an antelope in Africa. There, we accept such a situation as being part of nature and wait for the predators to move in. We apply different standards to domestic and wild animals, but also different standards between species. If the leg of a horse is broken we go to a veterinarian for treatment. Species with which we bond, like horses and dogs are treated similarly to how we would treat another human being, but cattle, sheep or pigs are slaughtered when a leg is broken. Horses and dogs are allowed to grow old and kept alive to keep us company as long as possible. Letting animals like cattle die naturally of old age is by many considered unethical. What the standard will be with rewilded horses and cattle is still uncertain. It would be preferable to treat them the same way as any other wild animal, but not all people view them as such.

Even more questions are raised when the process involves young animals. Young animals are endearing. What do we do if a foal is not accepted by its mother for example? In nature, the weak, the young, and the old are targeted by predators, and in doing so, predators play an important role in the process of survival of the fittest.

7.1 PREDATION

Numbers of large herbivores are naturally controlled by the effects of disease, fertility levels, natural processes such as wildfires or flooding, and predation. Generally speaking, the larger the animal, the less vulnerable it is against predators.

Today Europe's largest and most important predators are the lynx, wolf and brown bear. Species like the leopard and striped hyena, which

were once widespread, currently only survive in the Caucasus or in nearby Asian populations. The Eurasian lion, which during Roman times still lived all over the Mediterranean, has completely vanished from the European continent.

Different species of predator concentrate on different species of prey. Lynx mostly hunt hares and roe deer, or chamois within the mountains. The Iberian lynx, which is much smaller, hunts almost exclusively on rabbits. Wolves need larger prey and concentrate on roe deer (in Germany, Spain and Western Poland), red deer (Baltic area, Eastern Poland, the Carpathians), elk calves (Sweden) or ibex (Spain) when present. Omnivorous bears rarely hunt, but when they do they mainly search for hidden calves through using their excellent sense of smell. Bears can also be seen scavenging. Larger prey species like bison, horses or wild cattle are less vulnerable; their main issue is protecting their calves and foals. Diseased, injured and old animals are at risk of predation.

Large predators influence prey species in many ways. First of all they keep populations healthy by preying on the weak. In turn prey species try to avoid being eaten, and in doing so develop different strategies. They show unpredictable behaviour by not walking the same route day after day, which

PHOTO 7.1: Lynx





PHOTO 7.2: Wolf

makes them less easy to find. Depending on the species and their environment they will form large herds or live solitary lives. Horses mainly live in open areas and are easy to spot. For them the best option is to be with as many others as possible to see danger coming as early as possible. Species like roe deer or elk, which are browsers, live in more closed environments. They prefer to be solitary. By being on their own they are less easily noticed and harder to find. Even within species differences are shown, roe deer can form bigger groups (up to 50 animals) in wintertime when they need to get out into the fields to find additional feeding, while in summer they are completely solitary in the woods.

Within herd living species, younger animals are kept on the inside of the herd for protection. Species like wild horses are more likely to flee from predators; bison and wild cattle might defend themselves. Chamois, ibex and mouflon need steep cliffs to flee onto; they will not be able to avoid predation on flat terrain or survive there.

Dangerous places in which prey species can be trapped are avoided. For this reason riverbanks are grazed less, causing riverine forests to grow. This in turn has a positive influence on beavers.

Predation has a huge influence on prey behaviour and as such is a landscape forming natural process. There is a lot of debate concerning the question of whether or not predators can control prey numbers. In most cases predators are

only able to prey on the weak. The strong are just too smart and fast and avoid being eaten.

Where prey numbers are low, like in the far north of Europe, predators can keep their numbers down by hunting youngsters. With high numbers of prey species, predators have less effect. Within predator territories there is a minimum social range into which a predator will accept other predators and when there is an overabundance of prey species, reproduction of prey will exceed the number of predated individuals. For wolves this minimum territory size is around 250 km². If not enough food is available, they enlarge their territory. The minimum territory size for lynx is 100 km² for females and 200 km² for males, but usually territories are larger.

Populations of wolves, lynx, bears and golden jackal are growing in Europe. Nowadays at least one of the big predators is present in almost all European countries.

The increase of large predators is partly due to their current protective status. The Bern convention has given strict protection to numerous species since 1982, and this protection was also included in the Habitat directive of 1992. Land abandonment also plays a crucial role in the return of wildlife and predators. Public opinion has changed a great deal over the last century. With most Europeans now living within urban areas and no longer directly dependent on farming practices, their view of wildlife has changed: wildlife is seen less as a pest and more and more as something to be enjoyed.

7.2 CARCASSES FEED MANY

Dead animals are a source of food for many, with some species being totally dependent on scavenging. However, many national laws restrict livestock carcasses being left outside, due to the fear of them spreading disease. Fortunately European law is less strict and allows exceptions, for example for feeding vultures in Spain. However, in many cases carcasses of rewilded horses and cattle are not allowed to be left outside.

Animals like ravens and vultures are highly dependent on dead animals. In past times human garbage supplied them with food. Around rural slaughter houses in Southern Europe, vultures were even used by humans to get rid of the scraps. Wild boar, bears, badgers and many different types of insects consume parts of dead animals.

Presence of large predators provides a constant supply of carcasses. During drought or winter, animals might die of food or water shortage. Several webcams within Europe now give insights into the role of dead animals. However, by law, carcasses of rewilded horses and cattle must be destroyed.

7.3 DISEASE

Disease used to be one of the main causes of death for large herbivores. In general, the impact of disease is bigger when animals live in higher densities. This increases the chance of animals infecting each other. Contamination can be direct or indirect. Indirect contamination can be through droppings, which leave parasites or bacteria in water or vegetation, which in turn are consumed by another animal.

Natural grazing with natural densities lowers the risk of contamination compared to the high densities of livestock kept at farms. Having multiple species composition also has a positive impact, as many parasites or diseases are species specific. In this case even if the total number of herbivores is high, each species will only occur in a lower density. Some herbivores avoid contamination through migrations between different feeding grounds. Old and weak animals are especially vulnerable. Presence of disease or parasites is natural, and from an ecological point of view, should not be fought. They play an important role in genetic selection and survival of the fittest. During the early stages of rewilding, when animals are still handled, vulnerable animals should be taken out as soon as possible. This prevents weaker genes from passing on and higher losses at later stages, which in turn might cause more public debate about ethics.



PHOTO 7.3: Carcasses like this red deer are part of nature



PHOTO 7.4 & 7.5: Carcasses of large animals are the prime food source for different types of insects and their larvae



Contact between domestic and wild animals should be avoided. Domestic animals, living in high densities are more vulnerable to disease. Use of drugs or medicines prevents disease from appearing among domestic livestock, but domestic animals might be a source in the spreading of disease into wild populations.

Farmers usually claim the opposite. Whether it is true or false, it is another reason to keep livestock out of contact with wild animals, both for animal welfare and to gain support for rewilding. Remember, often the farmers' main interest lies in high productivity and profit, and even the simplest of diseases, which might not be deadly at all, could cause loss due to a reduction in milk production, growth or restricted export possibilities.

Rewilded cattle and horses are in constant contact with wildlife and thus with parasites and disease. In the long term it does not help to give them treatment. They have to build up their own resistance and learn to take care of themselves.

7.3.1 Horses, cattle and the law

In contrast to deer, bison and wild boar, rewilded horses and cattle are not treated as wild animals by law. In European law these animals are considered domestic livestock. National laws can make their own exceptions to these rules. The laws require animals to be taken care of, in relation to agricultural animal welfare and food production. Diseases like TBC, IBR, brucellosis leucosis and leptospirosis are to be extinguished. Carcasses of animals should be destroyed.

National policies tend to exaggerate the need for this. By extinguishing even relatively harmless diseases like IBR, the animals' resistance among livestock gets very low. This is already recognized by veterinarians and epidemiologists. New laws try to limit the use of preventive antibiotics in agriculture and human society.

7.3.2 Dealing with sick animals

Besides legal obligations, ethics play an important role during rewilding horses and cattle. This is especially true during the earlier stages of rewilding, when animals are still more or less managed by humans. Animals should not suffer due to human failure. Removing sick or injured animals from the herds helps to strengthen the total herd. Removal can be done directly if possible. When ethics say it is better to treat an animal than to remove it, it should still be removed afterwards. The choice to treat an individual animal can be made in case of public complaints or debates.

Public opinion can set back a rewilding project severely when the public is not well informed. It is important to inform the public what you

are doing and the reasons for your actions. If an animal is clearly suffering due to human fault or due to a small enclosure, this surely will not aid the cause. When animals are kept in small (temporary) enclosures, always place information signs about the project, including a phone number for questions.

When you have to choose between treating an animal and removing (killing) it, always consider ethics. Wild or rewilded animals are not used to being separated from their herds. This causes a lot of distress. Treatment should always be in one instance and not involve daily routines. Isolating animals should be avoided. Only work with veterinarians who are used to working with wildlife or are familiar with your practices. Most veterinarians are used to working in an agricultural setting. Preliminary involvement of veterinarians helps. This prevents debates about the right method in the field, which does not help the animal or support for your rewilding project.

When illness is clearly related to poor genetic heritage, stopping breeding with this particular bloodline should be considered. By keeping these animals within the breeding population, this poor heritage is maintained, weakening the total population. When illness is related to previous poor conditions, from before the purchase of the individual animal, treatment could be carried out.

Slaughtering animals takes planning. The animals must be free of drugs to enter human consumption. When animals have been treated, drug leaflets indicate the waiting time before the animals can be slaughtered. Ethically it is not preferable to transport animals on their own. During transportation animals are kept in tight quarters, not giving them space to fight their social battles in the truck. Many butchers consider it unethical to slaughter pregnant animals. When an animal is in need of immediate assistance, but transferring it to a slaughtering house is considered unethical, it might be better to shoot the animal in the field, let it be destroyed and its meat go to waste. Wounded animals are never allowed to be transported.

Treatment of minor injuries is unnecessary. Animals know very well which plants to eat for which purposes. Willow has a similar chemical composition to aspirin. Other plants work as wormers. Open wounds might heal better and quicker than expected. Stallions usually bite each other during hierarchical fights; their bodies have evolved to deal with this. It is best to rely on the self-healing capacities of animals.

When animals are kept in pre-release sites or closed breeding stations, animals might have to be supplied with additional minerals.

8. NATURAL GRAZING AND PUBLIC

Most rewilding areas within Europe are freely accessible. With increasing numbers of wild and semi-wild animals, visitor encounters are more and more likely. This includes people meeting rewilded cattle and horses. However, not all people see the difference between domestic and rewilded animals. Public education and road signs will deal with these issues.

8.1 PUBLIC SAFETY

Encounters with rewilded cattle and horses under normal conditions are perfectly safe, as long as visitors to rewilding areas stick to certain rules. It is of the upmost importance to respect the animals as 'wild' animals ('wild' meaning: free-living).

To keep the animals wild, interaction between humans and wildlife should be avoided. Petting or feeding animals should not be allowed as this habituates animals to people. Feeding does not only interfere with an animal's natural diet, it also changes its behaviour. At a certain point the animal will start begging for food. The next step will be harassing people for food, which leads to potentially dangerous situations. Unfortunately, once an animal has learned this behaviour, solutions are few; killing the animal, or at least taking it away out of the accessible area. The animal will not unlearn this behaviour and cannot be kept within the rewilding area or be transported to another public area, as it will take its behaviour with it.

A second important rule is to keep a natural distance. For rewilded cattle and horses in the Netherlands a minimum distance of 25 meters is advised. If people come too close to an animal it will start changing its behaviour. As long as you keep enough distance, it will continue its natural behaviour, and - who knows - will offer new observation experiences for the visitor.

It is ill-advised to cross through a herd, even when a herd is spread out over a larger area. For example, you might come in between a cow and its calf, triggering defensive behaviour. Always walk around herds of (re)wild(ed) animals.

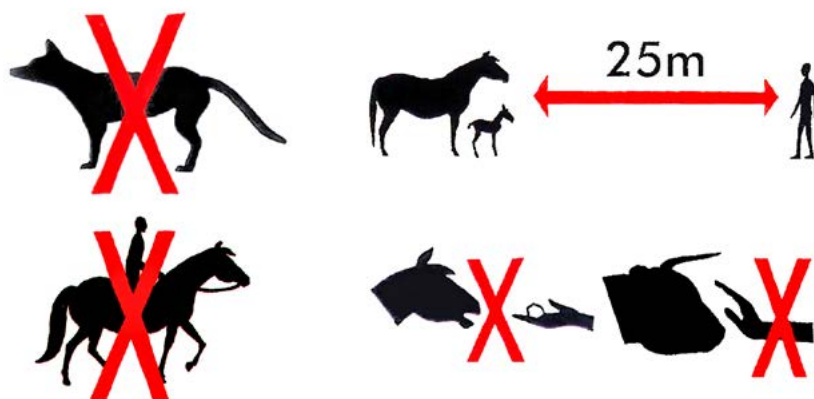
Dogs might be seen as a potential threat due to their resemblance with wolves; the natural predator of wild cattle and horses. Dogs should at least always be on a leash. In bigger rewilding areas or areas further away from urban areas, it is better to not allow dogs at all. These rules are both for the safety of rewilded cattle and horses as well as for the safety for the dog and its owner. Dogs are also a major disturbance for other wildlife such as rodents, deer or (nesting) birds.

Horse riding might interact with rewilded horses. If you ride a stallion, the rewilded stallion might see your horse as a threat to be driven off. If you ride a mare (in heat) a stallion might want to add your horse to his harem. Horse riders in rewilding areas should avoid coming into close contact with rewilded horses. Within smaller fenced rewilding areas horse riding should not be allowed.

All entrances to rewilding areas should have signs explaining the rules. Preferably the rules are explained both in text as well as icons. This raises public awareness, as well as protecting the liability of the manager of the area. A phone number should be added for questions or to report emergencies.

When rewilding animals are still formally kept, someone has ownership of the animals and liability in relation to them. This person is also liable in case an accident does happen. If an individual animal shows unwanted behaviour towards human visitors, one should take the animal out of the rewilding project immediately. Chances of accidents happening are very small, but present.

IMAGE 8.1: Warning icons presenting general rules about public animal interactions



Chances of unwanted behaviour among individual animals are bigger with animals purchased with an agricultural background or when animals have been fed by the visiting public.

Rewilding cattle and horses also means that the interdependence between us and them should be completely broken. In that case the animals just see us as another being passing by, a being which does not threaten nor aid them, and is best to be ignored.

8.2 EDUCATION

Within rewilding areas one of the goals is for nature to be self-managed. This changes the role of the site manager. He or she is no longer active in management schemes and actions, his or her role changes more into becoming a host welcoming the visitors.

Most people within Europe are not used to confrontations with free-living herds of wild cattle, wild horses, bison or deer. Therefore public information and education at the start of a natural grazing project helps not only to avoid accidents, but can also help with acceptance and support of the grazing project.

Public education comes in many forms. The most simple and most important is to be in the field and be visible as often as possible. By being on foot you are more approachable than by being in a car. Within internationally known areas it helps if some of the site managers or rangers have knowledge of different languages.

In advance, as well as during rewilding projects, regular presentations and excursions inform local communities about the process of rewilding. Seek out and involve local communities actively, do not wait for them to come to you. Not only focus on your story, but also listen to their needs and expectations.

Local newspapers, social media and the internet are other mediums through which to communicate with the local and regional public. Information signs and visitor centres inform people in the field. They are an addition to face-to-face interaction, never a replacement.

Rewilding has many meanings. One includes the concept of rewilding the minds and hearts of people. For the wellbeing of your project this is just as important as the ecological rewilding. One should pay an equal amount of attention towards this part of rewilding.

Literature

Goderie, R., Helmer, W., Kerkdijk-Otten, H. & Widstrand, S. (2013). *The Aurochs; born to be wild*. ISBN 978-90-8740-161-0, Roodbont Publiciers, Zutphen, the Netherlands

Hofmann, R.R. (1989). Evolutionary steps of ecophysiological adaptation and diversification of ruminants; a comparative view of their digestive system. *Oecologia* 78: 443-457

Linnartz, L. & Meissner, R. (1994). *Rewilding horses in Europe; background and guidelines – a living document*. Publication by Rewilding Europe, Nijmegen, the Netherlands

Vera, F.W.M. (1997). *Metaforen voor de wildernis; eik, hazelaar, rund en paard*. Proefschrift Landbouw universiteit Wageningen, Wageningen



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