KNEPP CASTLE – LARGE HERBIVORE MANAGEMENT

1. Introduction

The Knepp estate consist of about 1.400 ha (3.500 acres). About 485 ha (1.200 acres) of the Knepp estate is currently managed under the Countryside Stewardship (CSS), in two blocks. Restoration of the first block, the Knepp Park commenced in 2000 with the introduction of fallow deer. Since then cattle, ponies and pigs have been added and all free-roam over about 300 ha (750 acres). In 2005, a further 160 ha (400 acres) at Pondtail Farm was entered into the CSS agreement together with 60 ha (142 acres) belonging to a neighbouring landowner to the north, which is managed under the same prescription and within the same ring-fence. The second phase of parkland restoration currently only has cattle grazing the land, and the initial concept is to allow the land to 'scrub-up' before any other herbivores are included. The CCS prescription has been relaxed to allow the land to be under grazed in the hope that a mantle along hedgerows and woodland boundaries will develop to protect new seedling trees from browsing.
At present in the Knepp park there are about 280 deer (estimated 80 Bucks and 200 Does) + fawns, 7 ponies (soon to be 13 after foaling), 15 cows plus calves and 7 female Tamworth pigs. In the second park, to the North of the A272, there are about 30 longhorns.
The Large Herbivore Foundation has been asked to participate in the Knepp castle Steering Group. Due to an accident Joep van de Vlasakker could not participate in the first steering group meeting on 9 may 2006 and was asked by Charlie Burrell to write down some views points on the grazing species and their densities as discussed together with Charlie earlier, during his stay at Knepp castle.

2. General

A general question often asked, in Nature Conservation, when goals and vision are discussed, is "*What reference are you aiming for*", referring to a type of nature in the past, and the stage of naturalness/human impact. However the reference should not lie in the past, but in the future. Man has had a strong impact on Large Herbivores densities, behaviour, and distribution and on their habitat for thousands of years. The impact has been so strong and long lasting that we can only guess what a natural stage and natural density of large herbivores could be. Certainly this natural stage was never a long-term static situation. The management experiment in the Oostvaardersplassen, in the Netherlands has shown that natural densities in Europe can be much higher then formerly believed. Natural densities of large herbivores have always been determined by acceptance related to commercial activities like agriculture and forestry. De-barking was considered as un-natural and a result of over population of large herbivores. New insights have learned that large herbivores depend on tree material, as part of their natural diet (some species more then others) and de-barking must be seen as a normal natural process.
To determine the optimum density of large herbivores for Knepp castle is not possible, and the solution must be sought in a more flexible approach. Best practise and learning by doing will eventually determine the maximum acceptable number, in relation to the other estate interests. It must be kept in mind that in nature constant density number over long time periods do not exists: number fluctuate not only due to birth and dead but also due to (local) migration caused by social behaviour, predation, insects, weather, flooding, fire, food competition etc... Therefore we should not to talk about number of LH/ha as a static given fact/goal but rather look upon densities as in dynamic processes. Due to the size of the estate, the different large herbivore populations can not grow uncontrolled and conflict of interest in relation to animals welfare and other activities on the estate will determine a maximum acceptable number, primarily of course also determined by the maximum carrying capacity based on food availability, as no additional feeding should be allowed year round. The health of the population should be the goal of the management, rather then a given density number, thus this density number can/should fluctuate over the years. As long as the southern part and northern part of the estate are not linked by an eco-bridge/tunnel it can be considered to move animals (horses and cattle) from one part to the other depending on practical management interests, conservation goals and other estate activities and interests. This will keep both densities as well as the management more flexible.
The question should therefore be asked if an eco-bridge/tunnel is needed to connect the two parts of the estate. In general an eco-bridge/tunnel is only desired if it will be part of a larger ecological network. An inventory is needed as how Knepp castle can be linked to a large scale ecological network. If Knepp estate can be an integrated part of such a network the ecological benefits justify the financial investment in an eco-bridge/tunnel. Until then animals can be better periodically be moved from one part of the estate to the other. This fluctuating density approach

is to be desired above managing the northern and southern part as strictly separate grazing units.

For newly introduced species LHF advices to starts with low numbers and over time bring in new individuals for genetic exchange. Surplus animals can be culled (except the ponies, as this will not be accepted by the general public in this phase of the project) by means of hunting. This can either be done by estate staff or in a commercial way (e.g. sustainable trophy hunting). Preferably some deer (and later wild boar) should be culled all year (what is possible within the (hunting) law) to allow individuals to be left for scavengers for a maximum time period, but especially in the winter. Other surplus animals can be harvested, and through strong branding be, through direct offset, supplied to local (exclusive) restaurants (including London) as exclusive, high quality, free-ranging, organic (healthy) meat.
If possible surplus animals can also be used for other grazing projects.

It will be a challenge for the Steering Group to discuss the pro and cons of the different management approaches. However it should be kept in mind that this pilot project at Knepp castle offers the opportunity to show a more natural approach to management of nature reserves but also helps to develop a future viable and sustainable management, that can go hand in hand with other commercial activities, on estates in Britain. Questions that will arise during the process will be for example: "How wild should a wildland be on an estate, without losing the estate character" and "How can wildland management be compatible with other, commercial estate activities" etc. As a general remark, due to the pilot function of Knepp castle, the intention should be to strive for the maximum wildness, to show new viewpoints and stimulate other initiatives, on a maybe a less 'wilder' scale, but to the benefit of biodiversity.

The large herbivores and specially ones the full natural community of large herbivores[1] has been resorted, including bison, wild boar and red deer, the estate, as a pilot project under the smoke of London, will be an important attraction site for visitors and will offer various commercial opportunities. It is up to the estate management if they want to exploit these commercial opportunities. To optimise the pilot function of the project, the project should be shared with the general public, to gain public understanding and support. Many different commercial activities can be developed (e.g. B&B, restaurant, round trips, guided excursions, safaris). However, again it is up to the management of the Knepp castle if this fits within the overall management of the estate. It must be taken in account that the public will be attracted, in the future, to Knepp castle and that it is needed to offer the public at least a 'view/glimpse' on the project. To share the beauty of the estate without negative impact on the natural values, disturbance and human safety risks, so called 'honey pots' should be developed to concentrate the visitor flows to designated areas, e.g. look out point, visitor centre, marked routes etc. in combination with 'strict reserves' where public is not allowed.

Knepp Castle has chosen a new way in managing an estate in a profitable way that will create higher natural values at lower costs. The challenge will be to further develop this concept to stimulate other landowners to look for new ways in creating more biodiversity in a profitable way to the benefit of not only the landowner himself but also the general public/tax-payer. This pilot project will offer an opportunity to develop a new type of management. It is up to the Steering group to help Knepp estate on the way to find the balance between maximum wildness/biodiversity and long term economic viability of the estate.

3. Existing large herbivores

Horses
Currently a harem group (1 stallion and females) of Exmoor ponies is grazing at Knepp castle. The Exmoor is the right choice as a substitute for the in Europe, in the wild, extinct Eurasian Wild horse and probably a better option for the UK then the, in Western Europe widely used Konik horse:

1) Exmoor ponies are uniform and instantly recognisable. They are more or less identical. Their colouring is very suitable for living in (semi-) wild conditions. The Konik is less uniform and some do have white markings;

[1] *The elk or moose (Alces alces) is not evaluated in this phase of the project, given the current scale of the project.*

2) Exmoor pony colouring is quite similar to that of Heck cattle/auroxen, therefore combined grazing gives the role of these large herbivores a truly wild character;
3) Bones and skeleton of the Exmoor pony have close resemblance with Equine fossil records like that of the wild (Alaskan) horse (Speed & Etherington, 1951);
4) Even though cave paintings do show variation in horse type both Przewalski horses and Exmoors ponies have much resemblance with horses found on prehistoric cave paintings as found for example in the caves of Lascaux in Dordogne, France, more then the Konik horse;
5) DNA evidence shows that the Exmoor pony is truly an aboriginal type and a long-standing feature of the fauna of the British Isles;
6) Exmoor ponies have lived for centuries/generations under wild conditions in Exmoor, much longer then the Koniks;
7) Nature was the dominant force in selecting/shaping the Exmoors. The only interference by man of the free living herds, in the breeding, was the selection of stallions. Koniks were specifically selected and cross-bred with other breeds, to breed a desired type, to represent the characteristics of the so called 'Tarpan'.
8) Today's Exmoor ponies (Moorland type) have no influence of non-Exmoor genes; Koniks do contain the genes of several breeds.
9) Exmoors can be considered as an 'endangered' species, as there numbers are very low;
10) Exmoor ponies have relative, bigger heads. This is important, as a bigger head generally contains stronger jaws, stronger muzzles and bigger teeth to consume very rough plant material of low quality. It might also be a combined result with natural selection as the wild living stallions use their teeth to fight other stallions and is an important weapon in social hierarchy and the claim for mares.
11) Untamed Exmoor ponies, from the right stock, rarely approach humans, whereas Koniks show no fear for humans and generally approach people and tent to beg for food, especially in reserves with high visitor numbers. The fleeing behaviour helps the acceptance of the Exmoor pony as wild animal but more importantly avoids conflict with humans.

The claimed and romanticised descending of the Konik, directly from the Tarpan can be questioned as it is not scientifically proven. Probably the so called Tarpan was already a domesticated horse that became feral. Przewalski horses are the only true wild horse, and probably a subspecies of the Eurasian Wild horse that ones lived throughout Europe. Due to the above mentioned reasons Exmoors are to be preferred in England above Koniks.
However Exmoors might be conceived, by the general public, as a recreational horse and not as a wild horse, as the Exmoor is used for horse riding in the UK. To keep Exmoors under (semi-)wild conditions within grazing projects needs explanation to the public, and the necessary human dimensions work. As these horses will show different conditions throughout the year then their fellow recreational horses e.g. thinner conditions in winter, fighting wounds etc. . Konik horses are used also as recreational horses on the continent, but not in the UK. The Konik might therefore be seen by the public as a 'wild' horse, and thus be easier accepted. The ecological arguments to use the Exmoor in the UK are stronger then the romanticised/acceptance argument of the Konik. Due to the above arguments; the origin of the Exmoor and the experience on the moorlands of Exmoor, it is advisable to use Exmoors to fill in the niche of the wild horse in semi-wild conditions in the UK[2].

To stimulate a more natural behaviour of the horses it is best to have minimum 2 harem groups. This will keep the stallions more active and stimulate a better use of the grazing area. Due to the extra activity from the interactions between the groups, the changes of Laminitis will become less. As the population will develop, so will the normal natural behaviour of the horses. This means that also the natural behaviour of the stallions will become more profound which could lead to conflicts with the polo ponies. To avoid all risks it is best to separate the Exmoors from the Polo ponies permanently and create separate pastures for the polo ponies, separated by double fencing (several meters apart to avoid all possible direct contact). The safest construction is to

[2] *For introduction to the wild (not semi-wild like at Knepp castle) further research is needed to exam if the Przewalski horse (or the Exmoor) can be introduced in very remote areas e.g. some part of Scotland, where after introduction, besides culling (if needed), no other management will take place.*

plant/maintain a hedgerow on the side of the natural grazing (Exmoors) to avoid direct contact and injuries.

Cattle

Currently a group of Old English long-horn cattle (one, bull, several cows and their calves) is grazing the 300 ha area and a group of 30 long-horns at the 220 ha area, at Knepp Castle as substitutes for the extinct Auroch. The long-horns where chosen because it is an old British breed and for their nice appearance. As for their ecological function they function quite well, however within an overall ecological restoration project to create 'wildland' and thus express a wilderness image the appearance of the long-horn, with its white colouring, is too domesticated. This makes it harder to explain the public about their role/niche in the natural ecosystem. Heck cattle are not used in agricultural systems in the UK and have a 'wild' appearance also in colouring. This will help the perception of the general public to view these animals as 'wild' animals, being part of the natural ecosystem and thus also except a more extensive management of the herd, as animals are not additionally fed in the winter and conditions of the animals can be different then that of farm animals.
As with the Exmoors, the Heck cattle should be kept in natural social conditions. For cattle this means that several bulls maintain territories within the grazing area. Cows, with their offspring pass through these territories and stay within these territories for several time.
To keep auroxen (for the difference between Heck cattle and auroxen see the LHF newsletter, the Browser, 2005) in this phase of the project and with the current scale is not feasible (natural selection being the main selection criteria for auroxen!).

A gradual replacement of the Long-horns by Heck cattle is proposed. Heck cattle are considered more aggressive then other cattle breeds. Even though some lines carry more Spanish fighting bull blood then others statistically this aggression has not shown in grazing projects with Heck cattle other then 'normal' incidents were a cow is defending is new born calf. In practise it has been an advantage that Heck cattle look more 'aggressive' and are therefore treated with more respect by the general public. The LHF promotes using 'improved' Heck cattle from the German breeding experiment from the NGO 'ABU' (see the LHF newsletter, the Browser, 2005). To improve the Heck cattle, to closer resemble the aurochs[3] (and provide a broader gene-pole for better adaptation as a wild species) the ABU crosses Heck cattle with Sayaguesa (for Horn shape), Chianina (for height) and Lidia (colouring of bulls and cows). It is preferable if the Knepp castle project participate in this breeding program and uses Heck/Chianina and Heck/Lidia bulls, to bring in the right genes in the founder population. As Sayaguesa is a Spanish fighting breed it is not desirable to bring the aggression characteristics in the herd. The genes of the long-horn will provide the opportunity to make a selection on horn shape, to resemble the horn shape of the Aurochs. As the estate is regularly visited and because of the current size of the grazing area aggression can not be accepted and should be one of the selection criteria for the culling. Brought in bulls will be selected on none-aggressive behaviour.

Pigs

Currently Tamworth pigs are used to replace the role of wild boar in nature at Knepp castle. This is an old English breed and friendly from character. The huge effect of this small group of pigs can be seen throughout the estate, and they due fulfil the niche of the wild boar very well. Until now no boar has been introduced yet. If this will be done the population will grow very rapidly and so will the effect of the pigs on the surroundings. Due to the friendly character, the pigs are a nice attraction and offer currently (without piglets) no risk to the visitor. Wild boars are more aggressive and can cause potential danger when they have piglets. However to allow a more natural social behaviour/structure of the population, breeding should be allowed. As farming is not the objective of the grazing project culling by hunting is the most desired harvesting method of surplus animals that fits in an integrated wildland management approach. Tamworth pigs are domesticated, friendly animals and can/should not be managed by means of culling. Wild boar are wild animals and therefore more suitable within a nature restoration/natural grazing project. As the estate is fenced, this should not be in conflict with the agricultural interests of the

[3] *Domestication is not reversible (as evolution can only make use of genetic material that has been left after earlier selection and possible new mutation material and thus to adapt to current/new situations).*

surroundings. Experience on the continent has shown that wild boars and high visitor numbers can go together without causing conflicts.

Fallow deer

Fallow deer are released on the estate. The scientific question arises if the fallow deer is native to the UK or not. In the Netherlands the status of fallow deer is contradictory as on one hand it is considered an exotic species and on the other hand it is an official red list species. During the last interglacial (Eem/Ipswichian) the fallow deer was found not only in the Mediterranean region (including Greece) but in Spain, France, England, Denmark, Germany, Poland, the Balkans etc.. In the beginning of the last glaciation (Würm/Weichselien) fallow deer left the north but continued to live in the south; there were bones found e.g. in Monaco, Italy and Greece. It is believed by most researchers that the fallow deer this time - in contrast to other glaciations - did not survive the full glacial in all the Mediterranean countries. The Holocene range then seems to have been restricted to Turkey and south-eastern Europe. There are Holocene findings from eastern Macedonia (Sitagroi near Drama), Bulgaria, and probably Cyprus[4]. Even though in other South European countries no bones where found, as a common rule, that does not mean that the animal did not live there. Before Roman times already, fallow deer were bred in captivity and spread around the Mediterranean and later to the north. Without this human help, and without human interference, the species would probably have spread on it's own to its typical interglacial range as it always did before. If the fallow deer would have given the opportunity to distribute naturally then fallow deer would have been considered native not only to southern Europe but also to large parts of Western and Central Europe. Now only some 'primeval' populations of fallow deer in Turkey are considered native. Based on the above the fallow deer could be considered native to large parts of southern, western and central Europe and could the natural distribution during the last inter glacial be considered as the current natural distribution of the fallow deer. Following this argumentation then from an ecological point of view the question; "could fallow deer have reached England after the last glacial period", is not relevant as England, is within the same biogeographic region, with the same climatic situation as Western Europe. This would mean a different conservation approach on the status of the fallow deer as native species and on its role as indicator for future re-introduction programs. Based on the above arguments the fallow deer can/should be considered native to England, and thus an essential species in the restoration of natural large herbivore community and their mutual facilitating bond at Knepp castle. Both from an ecological, as well as educational argument maintaining fallow deer in the grazing project at Knepp castle can thus be justified.

Roe deer

The estimated number of roe deer at the estate (1.400 ha) is 100. The roe deer will probably profit if the grazing areas will shrub up. Even though it is believed that there is some movement of roe deer between the grazing areas, facilities within the fence should be constructed to allow free movement of roe deer. These facilities should be placed away from busy roads/traffic to avoid traffic incidents.

2. Missing large herbivores

Red deer

Until now red deer have not been introduced to Knepp Castle, based on the argument that they can become aggressive towards visitors. Especially in North America deer have been known to show aggression to visitors in National Parks, mainly due to irresponsible behaviour of humans. Examples in Western Europe show that high red deer densities, with the right management, can go hand in hand with high visitor densities (e.g. Jaegersborg Dyrehave, north of Copenhagen) without conflicts. Red deer, is a wild species native to England and should therefore be part of the grazing project and be introduced, starting with a small number (± 10 animals, e.g. 3 males, 7 females in the 300 ha and ± 5 animals, e.g. 1 male, 4 females in the 220 ha grazing area). After several years fresh blood can be brought in the population, depending also on enlargement of the grazing area. Like with the other large herbivores one of the main selection criteria should be aggression and contact with humans. Animals that show these characteristic should be culled,

[4] *It is not sure if that these last animals were not already captive.*

animals that show aggression should be culled immediately, independent from the population numbers.

European Bison

The European bison is largest European mammal and, according to bison specialists, native to southern England[5]. Due to its size and wild character it is an animal that is not easily handled, unlike Exmoors or cattle. The project at Knepp castle has an important pilot function; introducing bison might help stimulate the introduction of bison into large nature reserves in the UK and can therefore be justified, despite the size of the current grazing area. Secondly it would be the first project to restore the natural community of large herbivores in one grazing project in the UK, and thus strengthen the pilot function of the project. It would help to learn more about the ecological role and interactions/bonds of the natural LH community. Bison are generally shy to humans however, like cattle; solitary bulls that do not flee should not be approached as well as cows with new-borns. Generally bison cows, about to give birth (like cattle), will separate from the herd to find a quite place to give birth and hide the new born calves. To avoid potential conflicts visitor access should be limited to designated footpaths. Again, like with wild boar and red deer examples on the continent show that bison can be kept in large enclosures that are open to visitors (e.g. Eriksberg, Sweden and Lake Pape Nature Park, Latvia). As long term and broad experience on bison-human interactions, in fenced in areas does no exists it is advisable to start with an experimental approach. A small group of Bison can be released to the Northern part (220 ha) and replace the 30 long-horns. The long-horn and later the (improved) Heck cattle, together with the Exmoors can graze in this northern part during parts of the season, initially not during the bison breeding season (fall). Either a small group of bulls can be introduced or a small breeding group. Advantage of bulls only is that there will be no surplus animals and experience can be gained on impact on the habitat, relation bison-human and bison-other large herbivores. Advantage of a breeding group (1 bull and a few females) is that it will be attractive to the public, more natural social composition of the herd and surplus animals can be provided to re-introduction projects in the wild and thus the project can help in the conservation of this globally threatened species. However this would require additional infrastructure (catching and handling animals) and financing, as generally transport are expensive.

Important, like with the red deer, is to start with a small group, to make sure that there will be sufficient standing crop in the winter for the group to survive without additional feeding. Besides it will give the opportunity for the land to shrub up, and improve as habitat.

The main argument to introduce bison, in this stage of the project, would not just be ecological one but rather an educational one, on the role of the bison in the natural ecosystem and to strengthen the function of the pilot project as pioneer for a new, more natural approach of nature conservation in the UK. Furthermore, the bison will generate public and media attention to help achieve/strenghten the pioneer goals and hopefully stimulate the re-introduction of the species in the wild in the UK in the future. The bison could thus be an important flagship species for the project, and offer additionally commercial opportunities to help finance this project. As bison is the least manageable LH species it is up to the management of the Knepp castle if this species would fit in the overall management of the estate.

3. Other missing key species

Beaver

Officially the beaver is not a large herbivore, but it is a key species. Its impact on its surrounding is at least as important, due to its positive influence its has on the habitat to the benefit of many plant and animal species. The beaver can/will play an essential role in re-wilding the estate as well as be a very important tool in helping the rivers/streams to meander, thus less financial investments is needed to restore the natural flow of the rivers and still have the same or even more ecological gain. As the estate is fenced, there will be no legal obstacles to release beavers. Initially 2 pairs of beavers can be released. The beaver re-introduction within the fenced estate, together with other initiatives in the UK, will have an import pilot function to stimulate introduction of beavers in the wild in Britain.

[5] *Natural distributions of mammals are generally by scientists, especially in relation to re-introduction, seen as a static given fact. However also mammals are adapting to changing situations, and if not disturbed by man, would expand their distribution given the opportunity.*

Lynx

Lynxes can not be fenced in at Knepp castle and the size of the estate is too small to maintain even a small lynx population. As Knepp estate is surrounded by agricultural areas, urban areas and many roads, given the current situation, lynx introduction is not an option. Due to its behaviour lynx introduction can only be done at a larger scale within the UK. Knepp castle could only be part of a lynx territory, in the future, if it becomes part a large robust region/nation wide ecological network.

Medium sized carnivores

As part of the ecosystem restoration the possibility of conservation/re-introduction of wild cat and otter need to be examined in the future.

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