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De-Domestication: Ethics at the Intersection of Landscape Restoration and Animal Welfare¹

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Abstract

De-domestication is the deliberate establishment of a population of domesticated animals or plants in the wild. In time, the population should be able to reproduce, becoming self-sustainable and incorporating 'wild' animals. Often de-domestication is part of a larger nature restoration scheme, aimed at creating landscapes anew, or re-creating former habitats. De-domestication is taken up in this paper because it both engages and raises questions about the major norms governing animals and nature. The debate here concerns whether animals undergoing de-domestication should be looked upon as wild or non-wild and the affect this has on questions about how they should be treated. It also concerns the value of nature, and the kind and degree of nature management considered appropriate. The paper first describes actual de-domestication practices and considers the character of human duties to animals in process of de-domestication. Secondly, the paper explores the implications of de-domestication for nature management, focusing on notions of naturalness and wildness. Finally,

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because the current division of ethical topics, with its dependence upon whether animals and nature are domesticated, hampers rather than helps, a new perspective is offered on the issues raised by de-domestication. More ‘thinking outside the box’ with regard to animals and nature is recommended.

Keywords

Restoration, ethics, naturalness, welfare, wildness

Introduction

In Holland, thirty miles from Amsterdam, a nature reserve of about 5,600 Hectares of reclaimed land called Oostvaardersplassen has been turned into one of Europe’s largest and most ecologically ambitious – and controversial – nature restoration experiments. The aim is to develop a natural and dynamic ecosystem resembling those of the estuaries of the major European rivers prior to human disturbance. Of particular importance in this landscape-scale exercise in natural habitat restoration are large grazing animals such as horse, elk, wisent and wild boar. Currently, deer as well as special breeds of horse (Konik) and cattle (Heck) are the large herbivores. The Konik and Heck are derived from domestic horses and cattle. However, they occupy an ecological niche similar to that of the Aurochs (wild ancestors of our domestic cattle) and Tarpans (predecessors of today’s horses) that once roamed the open meadows and forests of Europe; and they are therefore used as functional equivalents of these ancient grazers. The self-sustaining populations, with no supplemental feeding, remain out in the open all year and should as such be under selective pressures similar to those of the wild cattle and horses that once lived in this area. ‘Re-wilding’ or de-domestication has allegedly begun.

However, in the absence of sufficient feed in winter time, mortality rates of 30–60% are recorded (Meissner, 2008). Its opponents look upon de-domestication as cruelty: the lack of complementary feeding and withdrawal of veterinary care results in starvation, stress and exposure to parasites. In essence, it is argued, the whole practice sacrifices “the health and welfare of individual animals to ... restore primeval nature” (Keulartz, 1999: 168). According advocates of de-domestication, by contrast, the mortality rates are (in a sense that needs to be clarified, clearly) ‘natural’; they are an expression of population dynamics and not unlike those in comparable wild populations (Vera *et al.*, 2007).

De-domestication is a process, undertaken over generations, of trying to turn domestic animals (or plants: here we are concerned with animals) into self-sustainable wild or semi-wild animals. It can be viewed as an end in itself: as a sort of species restoration, a way of getting populations of animals to resemble their wild ancestors not only in appearance but also in terms of behaviour. But it is most often advocated as means to an end: as part of a complex process of ecological restoration aiming to increase the so-called wildness and naturalness of an area in a long-term nature management strategy (Vera *et al.*, 2007). The Oostvaardersplassen restoration project pursues both goals. It seeks to manage the landscape using an advanced breeding scheme sometimes referred to as ‘breeding back’. This is a process in which the genome of an extinct subspecies is, in effect, re-assembled from genes that are still present in the gene pool (Koene and Gremmen, 2001). This can happen naturally. For example, back-breeding is thought to occur in the wild in feral populations, where, for example, domestic pigs seem to revert to ‘wild boar’ status in their appearance, behaviour and hardiness (*ibid.*).

The Oostvaardersplassen de-domestication project steers right into a long-standing debate among ecologists about how former landscapes, such as European lowland wilderness, looked and functioned, and what the role of natural grazing was in maintaining such landscapes – and, especially, which animals occupied which ecological niches (Vuure, 2005). One line of thought, advocated by the Dutch ecologist Frans Vera, is that European lowland wilderness was not just one dense forest, but more of a half-open

park-like landscape created by the grazing and browsing of large herbivores such as the Tarpan, Aurochs, deer and possibly European bison (Vera *et al.*, 2007). Thus, restoration efforts should take these characteristics into account. This has been done in the Netherlands where Heck and Konik are used as ‘tools’ of nature restoration – as substitutes, or rather, proxies, for their extinct wild cousins. Lately, management resembling the practice of de-domestication has also taken place in other European countries, notably in the UK and Denmark.

Evidently, this new practice gives rise to various problems and questions of a technical or scientific nature. It may be asked, for example, whether the large herbivores undergoing the process of de-domestication will be able to match the ecological role of their ancestors, to what extent different species of large herbivore can live together, and in what ways the environment in which the Aurochs once lived has changed. Questions like these obviously must be tackled, but the practice also raises some important ethical questions. These concern (i) the moral status of the de-domesticated animals, and issues about how they should be treated; and (ii) the value of nature and what kind of nature management is wanted. A special problem here is that the animals and the habitats in which they live, develop between ‘boxes’. In the beginning there are domesticated animals on pasture; by the end of the process there should be wild animals living in open land. However, the familiar norms covering domestic animals and agricultural land are very different from the norms regarding our treatment of wildlife and wild nature.

First, think of livestock, i.e. animals domesticated for food (or other products, such as leather) or work. Here, today, the main norm in most parts of the western world requires us to look after the welfare of the individual animal; whereas when it comes to wildlife the focus is much more on protection operating at the level of species and population (Sandøe and Christiansen, 2008). At present, we lack clear ethical guidance on how to reconcile these concerns; and as Koene and Gremmen (2002) point out, individually focused norms of animal treatment may well conflict with herd-level norms.

Secondly, and turning to the value of nature and desirable kinds of nature protection, two recognisable trends follow the more traditional approach to wilderness preservation: trying to look after whatever is left of original nature, and the more recent ecological restoration approach, which “... initiates or accelerates the recovery of an ecosystem with respect to its health, integrity and sustainability” (SER, 2004). The latter includes reforestation, lake restoration, elimination of non-native species and weeds, and reintroduction of native species. In Europe and North America examples of such projects are plentiful. These include salt marsh restoration in the Wadden Sea, lowland heath restoration in the UK (Madgwick and Jones, 2002) and the gigantic wetland restoration being undertaken across the US under the North American Wetland Conservation Act (Wali *et al.*, 2002).

Assessment of the merits of these approaches involves not only sorting out their ecological consequences but, equally, discussion of the level of human involvement acceptable in areas designated as nature *reserves* or the like (Turnhout *et al.*, 2004; Young *et al.*, 2005). What makes de-domestication different from other forms of nature restoration is that it involves deliberate intervention at the genetic level as well as conventional landscape management. Is populating the landscape with animals through de-domestication too much intervention? Is it merely a reasonable way to make the landscape and nature suit us? And if we restore, do we get a second-rate imitation of the real thing, fake nature (Elliot, 1982), or wildness by proxy?

The aim of this paper is to identify the conflicting ethical concerns about de-domestication. We also consider the impact of the current compartmentalisation of ethical enquiry, and especially the apparent division, roughly speaking, between animal and environmental ethics: here we ask if these categories are adequate to guide contemporary landscape restoration and the specific practice of de-domestication. First, de-domestication and domestication are characterised. We describe how the animals involved are foreseeably changed during this process. Secondly, the question how such animals should be treated is analysed with

reference to influential norms and ideas in animal ethics. Thirdly, de-domestication is examined in relation to issues of naturalness and wildness, and it is asked if de-domestication should be viewed as a legitimate form of nature management. Finally, the possibility and theoretical basis of a more unified view of de-domestication is discussed.

De-Domestication: The *Re*-Creation of Nature's Past?

De-domestication is by no means an uncontroversial practice (Keulartz, 1999). One concern is whether it is, in fact, possible to achieve backward-change in behavioural and genetic characteristics, and whether it is accurate to talk about de-domesticated animals being 'wilder' than their recent progenitors. In other words, is this practice a case of *re*-creation or merely new creation? Rather than being the conservation of existing nature or the restoration of 'old' nature, is de-domestication just another exciting way to form nature, to develop 'new nature'? (cf. van der Heijden, 2005) Consideration of this question entails among other things an examination of the concepts of domestication and de-domestication.

For thousands of years animals have been domesticated for food production, fur and leather, companionship, entertainment, experimentation and so on; varying degrees of dependence on humans for survival have resulted from this. It is not uncommon for domestic animals to escape or be released from a farm or home and live independently, breeding in the wild. Thus, for example, in Northern Europe substantial feral populations of farmed mink have become established in recent times. We even have a name for the outcome of this process: we call the escapees 'feral' (Koene and Gremmen, 2002). Clearly, the practice of de-domestication differs from this inasmuch as, in it, the animals' return to the wild is part of a wider nature restoration project, and there is an expectation, or hope, that genetic changes will come about which reverse the earlier changes through which the animals were domesticated. Furthermore, de-domestication will normally involve species which, unlike mink in Europe, once lived in the relevant area.

Domestication itself is a highly contested concept (Clarke, 2007; Russell, 2002). By some it is regarded as an imposition of “efficiency” seeking to exclude links in the food chain that run between “... consumers and those living things they wish to consume” (De Landa, 1997: 108). As compared with their wild relatives, domesticated species are considerably altered in appearance and behaviour; following many generations of breeding, they become accustomed to human control and provision. According to one definition ‘domestication’ can be defined as “... a process by which a population of animals becomes adapted to man and the captive environment, by some combination of genetic changes occurring over generations and environmentally induced developmental events recurring during each generation” (Price, 1984: 3). The reverse process, by which a population of animals become de-adapted to man and captivity, and adapted (to a degree) to the wild environment from which they came, by a combination of genetic changes taking place over generations and environmentally induced events experienced in each generation, is known as *de-domestication* (*ibid.*). De-domestication is a process that often begins with the *intentional* introduction of animals to an area with the aim of de-adapting the animals to captivity; it involves more or less premeditated genetic change (breeding back) which, over generations at any rate, is expected to turn the domestic animals into self-sustainable wild or semi-wild animals (Klaver *et al.*, 2002). In both practical and theoretical terms, de-domestication is very much a ‘work in progress’. Because the exact definition and actual practice are open to interpretation (Meissner and Limpens, 2001), we may ask whether the practice of re-wilding is really possible, or whether it is just a matter of changed breeding goals and methods which, ultimately, represent a novel variety of domestication.

In the European context, human-initiated breeding back has been of particular interest, since most, if not all, of the original wilderness has now gone. Besides bred back ‘wolves’ such as the Tamaskan wolfdog (not involving cross-breeding with wolves) and the so-called Quagga project, which seeks to bring back an extinct subspecies of a Zebra called Quagga, the most prominent and best examples of breeding back schemes are probably the Heck cattle – a hardy breed of cattle developed in the early twentieth century in

an effort to breed back modern cattle to a presumed ancestral form, the Aurochs, and the Konik – a horse breed from the mid-twentieth century resembling the extinct wild European equine the Tarpan. The key assumption is that “... the wild horse and the Auroch live on in the genes of their domestic off-spring” (Stichting Ark, 1999: 29).

In Europe the last Aurochs were recorded at the beginning of the seventeenth century; in some places, like in Britain, evidence of their use dates back to the tenth century. These animals were able to survive on nutrient-poor plants and endure harsh winters; they were much more robust than many present-day breeds, which are adapted to indoor, high-productivity environments. Such robustness is sought after in the various kinds of nature management in which overgrowth by shrubs and trees is prevented so as to create, or maintain, habitats rich in meadow plants and animals. It is possible to obtain robust contemporary breeds, such as Scottish Highlanders, but they look little like the original wild cattle of Europe. Only recently have information and data been compiled and analysed to build a picture of the physical appearance, behaviour and habitat of Aurochs, and of their supposed impact on the forest structure and habitats in which they lived, as well as the accumulated changes of domestication. The resulting picture has made it possible to compare Aurochs with bred-back Heck cattle and thus initiate a process of de-domestication (Vuure, 2005). It would seem, therefore, that what is particular about de-domestication is the search, over time and through the alteration of genotypes, for an increased degree of wildness and naturalness *within* a given species population.

Wildness might easily be thought of as a quality, in specific individual animals, of being wild or un-wild. But it may also be conceived as a broader concept and equated with parts of nature that are not controlled by humans. The lifecycles of animals that are wild in this latter way are wholly free of deliberate human intervention; the animals are in this sense autonomous (Evanoff, 2005). Consequently, this kind of wildness cannot be preserved in human-run, artificial environments (Jamieson, 1995). Clearly, difficulties arise with de-domestication in landscapes heavily influenced by human activities: in such environments, what is

artificial and what is natural? More fundamentally, it appears to be an underlying assumption of this anti-interventionist conception of wildness that humans are in some sense ‘unnatural’ – an assumption that can certainly be queried (Callicott, 1994).

The related concept of ‘naturalness’ – an equally debated term (e.g. Elliot, 1994) that is much used in connection with restoration ecology – is often defined, correspondingly, as a quality or state of ecosystems without human interference (Peterken, 1996). Somewhat paradoxically, the creation of naturalness is thought to be possible through planned ‘natural’ disturbances (*ibid.*). We shall return to this notion later in the section on environmental ethics and nature management.

As Figure 1 shows, many generations are considered necessary to accomplish real (or as real as possible) de-domestication through changes in genotype at population level.

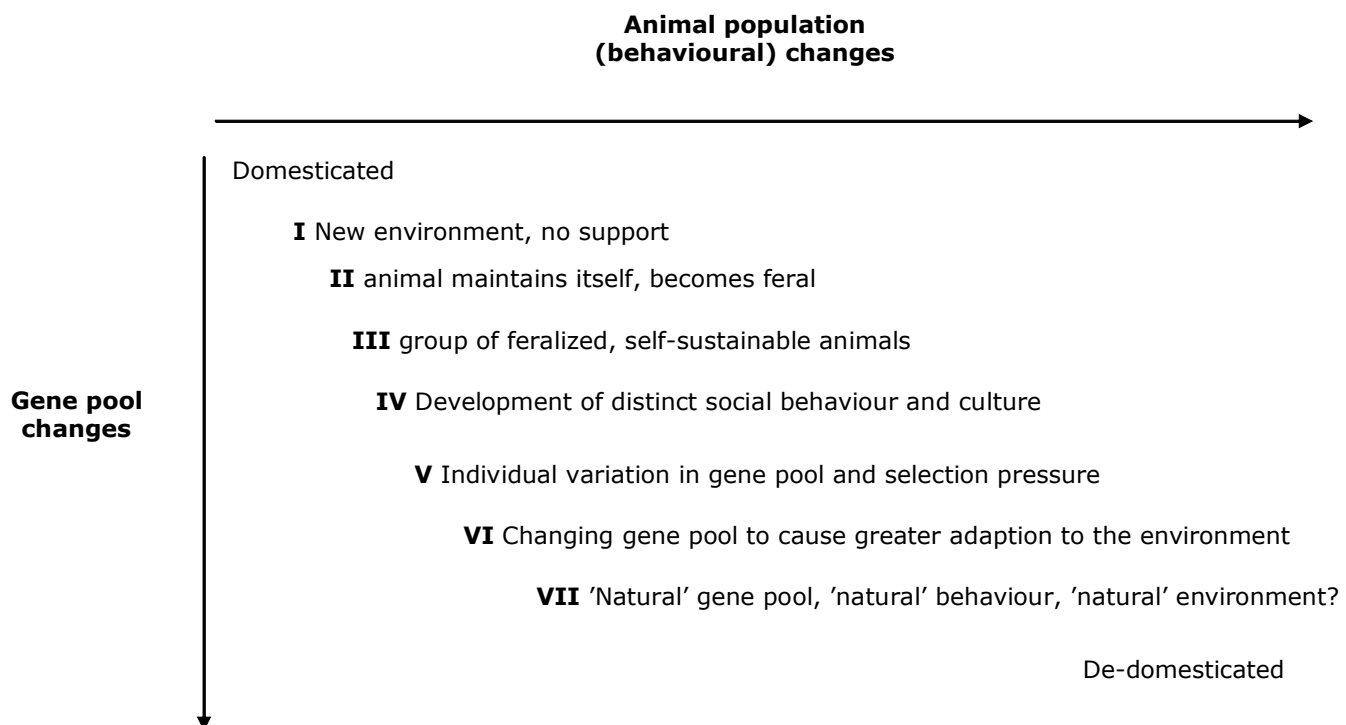


Figure 1. An idealised process of dedomestication in terms of changes in behaviour and in the gene pool. Based on Koene & Gremmen (2002).

The process of de-domestication initially involves the development of distinct, more fully adapted behaviour (in terms of natural group formation, leadership and rutting period, and so on) and selection pressure to initiate genetic changes over generations.

In the Dutch attempts at de-domestication – like those involving the reintroduced Przewalski horse (a descendant of the Asiatic wild horse known as the Taki), the Konik horse, and Heck cattle – only phases up to III or at most IV have been achieved. Here, then, the animals have become feral in a new environment. A population of feralised, self-sustainable animals can be discerned, and changes in behaviour and the development of a culture are recognisable. However, significant *genetic* change has yet to occur. The Ark Foundation in the Netherlands is trying to achieve phases V-VII through a series of genetic management activities, i.e. breeding back schemes (Meissner and Limpens, 2001; Koene and Gremmen, 2002).

Ark Foundation specialists believe that a genetically healthy minimum population requires 50 fertile animals capable of reproducing. They calculate that the minimum area needed for genetic autonomy is 1,000 Hectares. However, they do not have an area of this size yet, and hence they are obliged to consider their 40 small herds as a single virtual herd. Inbreeding can be prevented by removing animals and adding non-relatives to a group. Ark selects its animals by (what they call) ‘looking through the eyes of a wolf’, a method designed to counter the risk that selection will be anthropocentric. The last phase of de-domestication automatically sets a problem, however, because the animal population will only behave like their ancestors if the genes responsible for their natural behaviour are intact and have not been lost during the previous process of domestication.

De-domestication, as here described, shares certain characteristics with ecological restoration: suitable reference points must be found, valid data must be used to flesh the scheme out, and the present state of the environment must be compared with the conditions prevailing when the environment originally existed. De-domestication is therefore an exercise in approximation with an unpredictable result and an end-point that is hard to define.

During these stages of obtaining increased wildness or naturalness, how should the animals undergoing de-domestication be conceived: as wild or un-wild animals? In the early stages of de-domestication, the animals still bear a strong resemblance to domestic animals. On the other hand, they will gradually become more fully adapted to different environmental conditions, and thus, as a population, be more like as wildlife; yet they may still not be considered wild animals in the full sense. When, if at all, should we cease to regard the animals, individually, as domestic animals (with the associated right to be treated in accordance with the welfare legislation covering animals in our care)? When should we begin to regard the populations of which those same animals are members as wild populations?

Animal Ethics: How Should De-Domesticated Animals be Treated?

Looking at actual practices and existing legislation, the animals undergoing de-domestication, such as the Heck cattle and Konik horses in pastoral landscapes in the Netherlands, seem to fall into a sort of grey zone so far as regulations protecting animal welfare and health are concerned. The animals are not covered by wildlife legislation. However, they resemble wild animals in their behaviour (such as less individual and more social herd members, synchronised births and new skills such as swimming), and in being year-round in herds with males and females of all ages, with no supplementary feeding. The animals seem to continue to fall under regulations covering farm animals, requiring the identification of individual animals, the killing of animals in slaughterhouses, the protection of animal welfare and the monitoring of animal disease. In practice, of course, this regulation tends to be adapted to circumstances. Thus on reserves it is common to remove animals, where necessary, by shooting them, if they are too wild to catch or considered dangerous (Meissner, 2008). When it comes to diseases, in practice, there are no vaccination programmes. Reportedly, herders try to find a balance between treatment and natural recovery, evidently thereby jeopardising

the health and welfare of individual animals (*ibid.*). Lately, practitioners working with de-domesticated animals have asked for a new official status to be given to the de-domesticated horses and cattle. But what should this status be? How should these animals be regarded, ethically speaking? How ought they be treated?

In the mainstream literature on animal welfare and ethics it is difficult to find clear, unanimous answers to these questions. Unanimity is elusive because, when it comes to animals, we live in a pluralist world where different ethical views compete; and clarity is limited by the fact that, in one way or another, most writers draw a distinction between the duties to domestic animals and the duties to farm animals. In the following we will take as our starting point the dominant view expressed in recent European animal welfare legislation. After that we will consider alternative views.

Since the 1950s there have been considerable developments in animal protection in the western world. On the one hand, human wealth in this region has reached unprecedented heights; on the other, the way animals are bred and raised has been hugely intensified. The wealth, which involves products becoming (in both relative and absolute terms) cheaper and cheaper, has been achieved partly at a cost to animal welfare.

Particularly in Europe a perceived need for legislation at EU and national level, and other initiatives which place limits on the use of animals for purposes to which most people agree, has emerged. Such initiatives fall under the heading of ‘animal welfare’; they may be viewed as an addition to the traditional, much older, ‘anti-cruelty’ legislation. The point of the newer legislation is to prevent farmers from doing what is, economically speaking, the most rational thing to do. Farmers are required by it to ensure high standards of animal welfare during the life of any animal in human care, even if this entails inefficiencies, and hence less profit.

In *animal husbandry*, depending upon the species, there are in practice different degrees of focus on the individual animal, even in countries with elaborate animal welfare legislation. For example, in broiler chicken production the main focus is on the flock, whereas sometimes in cattle it might be on the individual. Despite failures to conform with the intentions of regulation, what is worth noting is that the rationale behind animal welfare legislation is to secure a decent minimum of animal welfare for each individual animal; and this includes looking after the physiological as well as the behavioural needs of the animals (Sandøe and Christiansen, 2008).

Let us turn to *game animals* such as pheasants and partridges, which are raised or bred – but not domesticated – for hunting purposes. These animals are, to an extent, in human care before they are released. Periodically responsibility may be assumed by the keeper by, for instance, feeding wildlife in severe winter conditions or culling when epidemics occur. But most of the time the focus is on the *population dynamics* of a certain animal species group in an *ecosystem*. Much the same goes for other kinds of game animal, such as deer, which are in places raised or ‘assisted’ by humans, but controlled through intensive culling. In many European countries, deer populations have grown substantially over the last 50 years, and it is well known that the ecological pressure exerted by high concentrations of them hinders natural regeneration of forest trees – one of the key measures of the now increasingly sought ‘close-to-nature forestry’ (Gamborg and Larsen, 2003). In consequence, deer culling in many parts of Europe has increased. More generally, conservation practices revolving around such wildlife have the aim, not necessarily of sustaining a certain population, but simply of keeping a habitat, such as a forest or meadow, in a certain state.

With *other kinds of wildlife* the case is clearly less hedged around by moral demands. Here the moral requirements that do apply are usually aimed at the entire population. In the past wild animals were used as hunting animals, or as game, or were killed as pests or vermin. Attitudes were far more straightforward

in their ethical anthropocentricity than they generally are today, as can be seen in the following credo (Wesenberg-Lund, 1939: 198, our translation):

“The law of all fauna in our strictly economically managed forests is as follows. If you can be of benefit – which in most cases means: can you bring us the joy of hunting – we will protect you. If you do damage – that is to say, if you harm our [other] game animals – or if you damage the forest as we want it, we will eradicate you for as long as possible, and a bit more. And if you are of no immediate value to us, then hang on if you can! However the demands you have for life will always have to give way to whatever serves our purposes.”

Today, increasingly, wild animals are objects of fascination and grave concern. This is, of course, closely related to general concern about man’s destruction of nature and the environment. Efforts are being made all over the world to protect wild animals and their habitats. Here, humans are not instrumental or active in bringing the relevant animals into the world, nor is there any direct involvement in their upbringing. Thus, as reflected in legislation, less direct responsibility than we have for domestic animals is assumed. Any measures here are indirect and operate at the level of the population. Consequently, conflicts are prone to arise between considerations of wildlife management and considerations of individual animal welfare (Jamieson, 1995). Incidental care for the wildlife, while often anticipated, is secondary, or integrated with the larger purpose of nature conservation (Norton, 1995).

The current European regulatory apparatus governing animal use is bound to create problems for de-domesticated animals like the Konik horses and the Heck cattle in Oostvaardersplassen. They fall between two thoughts: about *animal welfare*, with a focus on the

well-being of each individual animal, and about *wildlife management*, with a focus on the well-being of population and/or species. To deal with the issues here, it may help to draw upon some of the better-worked out moral views presented by philosophers interested in animal ethics. Here we will briefly consider three such views: utilitarianism, rights views, and contextual views.

According to the utilitarian, what matters in our dealings with animals is our impact on their well-being. We should always aim to act so as to achieve the largest total sum of well-being (Singer 1991). Leaving out complications following from the fact that what we do may affect the number of animals which will come to exist, a utilitarian view may consider de-domestication as an opportunity to develop varieties of animal which, in effect, foster overall animal welfare.

From a utilitarian perspective there is no clear divide in principle between the way we are required to treat domestic animals and the way we are required to treat wild animals. As effectively as possible, we should look after the well-being of animals, whether domestic or wild. The only difference is a pragmatic one: in practice, it may be more difficult to look after the well-being of wild animals than it is to look after the well-being of animals our direct care. Thus from a utilitarian perspective one is morally obliged to look after de-domesticated animals as well as possible; for example, one might be required to cull weak individuals rather than allowing them to die on their own.

According to animal rights advocates (Regan, 1984; 2007) many animals, including all vertebrates, have an *inherent value* of their own, based on their nature and capacities. They are not to be treated as instruments for someone else's use and benefit. Inherent value cannot be traded off, factored into calculations about consequences, or replaced. Creatures that possess it have basic moral rights, including the right to life and to liberty. On this view animal production should simply be stopped because it is bound to violate animal rights. When it comes to wild animals we may not kill these animals for our own purposes; and it seems that the main policy call coming out of a rights view is a 'hands-off' recommendation. According to the rights view we are responsible for what we do to

animals in our care, but it is less clear that we have any duty to look after individual wild animals. Therefore even though a defender of rights view may well object to the starting point of de-domestication, it is much less clear how he or she would consider later stages of the process.

Finally we shall here consider one form of the so-called contextual view² focusing on *relations* between humans and animals. On this approach, humans have quite different relations – and hence moral obligations – to wild animals than they have to domestic ones. This is not, primarily, due to differing human emotional responses (though these may be a consideration). Rather, it is because humans are responsible for the very existence of domestic animals (unlike wild ones), and, additionally, through selective breeding, for their natures; and because the latter often render the relevant animals dependent and vulnerable in ways wild animals are not. This kind of special obligation is not owed to animals struggling as the result (say) of natural drought or heavy snowfall.

This relational approach takes into account a variety of factors – in particular, however, human interactions with, and causal responsibility for, the situations of particular animals – before coming to a judgment about what obligations might arise in any particular context. It is well placed to deal with animals falling in the boxes ‘domestic’ and ‘wild’. However it seems rather useless when it comes to awkward contexts between these boxes such as the context of de-domestication.

Recently, a more integrated perspective on domesticated and wild animals has been described (Swart, 2005). In this ‘care-based’ view, which is really another form of a contextual view, care for domestic animals is dubbed ‘specific care’ because it is directed primarily towards the individual animal’s needs. However, the main focus here is not on care and what it consists of, but on the distinction between having taken human responsibility for certain animals once and for all and a sense of optional responsibility towards an animal group. In connection with wild animals, Swart uses the

² Thanks to Clare Palmer for guidance at this point; the text draws on material currently being prepared by her and Peter Sandøe.

label ‘non-specific care’, because this kind of care involves attending to the animal’s relationship to the natural environment.

This raises issues about the natural environment in which the animals being de-domesticated are placed, the level of human involvement acceptable in such areas, our conceptions of nature. In other words, it prompts discussion of environmental ethics. What kinds of management practice are acceptable – the active restoration type or only the more passive wilderness preservation type?

Environmental Ethics: Should De-Domestication be Viewed as a Legitimate Form of Nature Management?

In the Dutch example of de-domestication, the Konik horses and Heck cattle were brought in not only to ensure the long-term ‘survival’ of a past species, but also as *agents* promoting variation in the natural environment, and, allegedly, fostering biodiversity and naturalness. An interesting feature of the discussion is that appeals to biodiversity are made by both the advocates and opponents of de-domestication practices. However, they are made on the basis of different background assumptions and entail very different conceptions of the kinds of practice that are ethically acceptable. Thus de-domestication moves us into a discussion, running within environmental ethics, about the way nature is looked upon and how nature should be treated. In particular, one is drawn into a long-standing restoration *versus* faking nature debate. This debate originated with Elliot (1982) and was subsequently revived, and expanded upon, by among others, Katz (1991; 1992; 1996), Elliot (1994; 1997), Light (2000) and Chapman (2006).

The fakery discussion can be framed within two paradigmatic views of nature and biodiversity: the *historical* view and an *end-state*, or *consequentialist*, view (Gamborg and Sandøe, 2004). To say what is good and right judged by end-state principles, we do not need any information about the way

this state of affairs was brought about. On historical principles, by contrast, legitimacy or acceptability depends entirely on past developments. Here information about events of the past is not merely relevant, or interesting, but essential to the determination of moral value (*ibid.*).

Model advocates of the historical view would take naturalness to be a goal in itself, or end value. They would attach no value to restoration schemes involving de-domestication – at least, as long as there were ‘true’ preservation initiatives to support. By contrast, a straightforward consequentialist would judge end-state principles sufficient and would welcome restoration practices as an instrument to create more genetic and landscape-related diversity. The elaboration of this simple distinction between historical and consequentialist views allows us to define a number of hybrid positions on the value of de-domestication (see Figure 2).

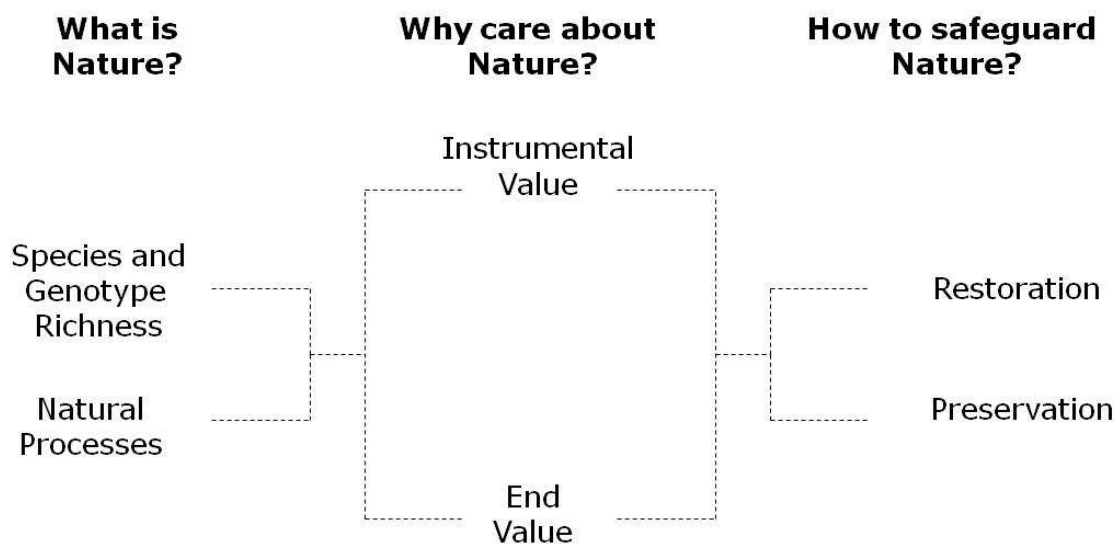


Figure 2. Key questions about conceptions of nature and biodiversity allowing for the definition of a number of hybrid views between judging nature from purely end-state principles and from a historical view.

In Figure 2, the first question is: *what is nature?* Vis-à-vis de-domestication the figure shows that once there is agreement about the desirability of more naturalness and wildness, the underlying conception of nature, and of naturalness, has to be specified. Do we see nature as an (eco)system with elements, structures and

functions – something indirectly or directly represented through species and genotype richness? Or should we emphasise natural processes, in a way entailing that human interference cannot add to naturalness, regardless of its observable effects (e.g. overgrown meadows or lack of rare species)?

In the consequentialist perspective, it is still necessary to specify what is meant by the idea that there is more or less nature. Many attempts have been made to categorise and operationalise the notably slippery notion of naturalness (Siipi, 2008). Peterken (1996) describes five degrees of naturalness. These include ‘original-naturalness’ (i.e. the state that existed before people became a significant ecological factor) and ‘future-naturalness’ (i.e. the state that would eventually develop if human interference were to cease.) Granted that it is possible to quantify degrees of naturalness, different characteristics still have to be balanced here (Gamborg and Rune, 2004). Anderson (1991) describes naturalness as ‘conservation potential’. A determination of the degree to which a system would change if humans were removed from it could be used to assess this potential. Alternatively, and from a management point of view, one could try to determine the amount of cultural work that would be needed to fulfil the potential. In a similar vein, and somewhat paradoxically, the creation of wildness requires intervention management.

Secondly, *why care about nature?* Closely related to the first issue – i.e. the question what nature is – are the reasons for our interest in nature and connected explanations of what we find valuable. The value of diversity and naturalness may be predominantly instrumental, in the sense that we promote certain elements in nature, such as ‘wild’ horses, because they help us to achieve other goals, like the maintenance of tall-grass meadows. In a contrasting attitude, the emphasis is placed on greater diversity, wildness or naturalness in its own right, as an end value regardless of where it takes us (cf. the view of Rolston (1989) on intrinsic value).

Finally, there is the issue of *how we should safeguard nature*. The methods used to safeguard what is considered valuable in nature must be carefully considered. Given that it is possible to find a suitable benchmark against which to set targets and measure progress, practices such as de-domestication can be seen as commendable tools for gaining greater stability, resilience or functionality in nature. (This is true, at any

rate, if we disregard breaks in historical continuity of the sort occurring when we try to de-domesticate, say, a certain cattle species after a gap of 6,000 years without the original, wild ancestor.)

In contrast with this, preservationists hold that regardless of the qualitative success of the ‘copy’ – that is, independently of whether certain genotypes can be recreated, whether a certain type of behaviour can be brought back, and whether the physical environment resembles past its condition – *authenticity* is always missing. Evaluation and appreciation of natural areas, and of the biodiversity they contain, depends on knowledge “... that can be acquired through education and experience, just as one learns the history of art (Katz, 1991: 92, cf. Elliot, 1982). The only way authenticity can be secured, it is argued, is to retain continuity, and to try to preserve what is here now.

So how do the two conceptions of nature and biodiversity with which we are concerned here – the end-state view and historical view – connect with questions about the way nature should be regarded and treated in relation to de-domestication? The invocation of end-state principles to judge certain types of nature, or certain practices, is compatible with the idea that man is an integral part of nature and the view that restoration efforts like de-domestication make sense as an element in nature management. By contrast, the historical view seems to go hand in hand with a notion of nature that excludes de-domestication as part of nature protection. Between these two extremes lie various hybrid views, each of which is defined by a distinctive combination of answers to the three questions presented above.

A Unified View of De-Domestication?

So, is it possible to distinguish between the authentic and the fake when it comes to de-domestication?

Does it make sense to talk about a general view of our duties to animals and nature? Is it reasonable to

try to differentiate wild animals and animals in our care? And to what extent, and in what ways, can animal and environmental ethical concerns fruitfully be combined to answer such questions?

In Figure 3 some of the key issues raised by the setting, management and value questions relating to de-domestication are listed. De-domestication itself is placed somewhere between agriculture and nature protection with regard to its objectives, management intensity and interests.

		Agriculture	De-domestication	Traditional nature protection
S E T T I N G M A N A G E M E N T	<i>Sub group</i>	Animal husbandry	-	Wildlife management
	<i>Animal species</i>	Domesticated animals (e.g. cattle, horse, sheep, goat)	Extinct, bred-back species (e.g. Heck cattle, Konik horse)	Wild animals (e.g. deer, wild boar, hare)
	<i>Where</i>	Agricultural, productive land	Marginal, abandoned agricultural land, existing or new nature reserves	Protected areas, nature reserves
	<i>Socio-economic context</i>	Subsidies for environmentally friendly managed farms	New type of management (e.g. grazing herds where agriculture is too intensive or where agriculture is disappearing)	Natural foraging
	<i>Aim</i>	Value production	Nature management	Nature protection
	<i>Interests</i>	(Short term) economic interests	Sustainability of populations and ecosystems	(Long term) ecological interests
	<i>Key issues</i>	Veterinary	Veterinary <i>and</i> ecological	Ecological
		Animal health	Animal welfare	Biodiversity
		Animal welfare	Wildness	Habitat/nature quality
			Authenticity	
	<i>Action status</i>	Active	Active, then passive	Passive
V A	<i>Degree of management</i>	Managed	Human intervention and natural processes	(Un)managed
	<i>Management type</i>	Production	Restoration, (re-)creation	Conservation/preservation
		Creation		
	<i>Animal's role</i>	Element of production	Sustainable management tool	Ecosystem component
V A	<i>Value of nature and landscape</i>	Cultural landscape	Value judged by end-state principles or by historical view	Semi-natural landscape
		Richness		Natural dynamics

L U E S	Type of nature considered valuable	Productive nature	Authentic nature	Untouched, unspoiled nature
	Focus is on the	Individual animals or herd of animals	Individuals, populations and ecosystems	Populations or ecosystems
	Norms found within	Animal/agricultural ethics	Elements from animal ethics/agricultural ethics or environmental ethics	Environmental ethics

Figure 3. Comparison of setting, management and values associated with the practice of de-domestication against agriculture and traditional nature protection.

The preceding discussion, as this figure brings out, suggests that three potentially unified views need to be considered.

The first view says that, at the end of the day, what matters are human and animal interests only. Thus the focus, in de-domestication projects, should be on high standards for each individual animal's health and well-being; and this will remain the focus until we are satisfied that the de-domestication process is completed (assuming that can be satisfactorily determined). The value of the landscape, and of nature as an abstract ideal, is secondary to the concern for the welfare of animals in our care.

The second view sees the key concern in ethics as that of maintaining species, ecosystems, habitats, and so on – not individuals or herds. Hence animals undergoing de-domestication should be treated exactly as other wild fauna is treated. It should, for example, as is already practice in the Oostvaardersplassen, contemplate the possibility of leaving sick or dying horses and cattle to cope naturally, without human assistance. The priority should be a semi-natural landscape with a high degree of habitat/nature quality.

Finally, there seems to be room for a kind of pluralism in which different standards exist for, on the one hand, dealing with humans and domestic animals and, on the other hand, nature management, as suggested by Klaver, *et al.* (2002). However, this kind of pluralism would mean that certain kinds of view about animals – particularly those cast in biological and moral terms – need to be reconsidered, and that the seemingly key value of animal welfare must be revisited. Moreover, a discussion and clarification of conflicting views of nature, of the ways in which the ‘wild’ and the ‘natural’ are conceived, and of the kind of protection this entails, must be pursued. In furthering such discussion, we can deploy two archetypical perspectives on nature and biodiversity productively: the historical and the end-state views.

Conclusions

De-domestication is a practice caught between two sets of norms governing animals and nature. As such, it shakes up a range of commonly made assumptions about current nature conservation practice and our treatment of animals within it. Besides the more technical problems and the scientific challenges of identifying traits that should be altered, of saying when the process of ‘re-wilding’ is complete, and of determining what the natural behaviour of Heck cattle and Konik horses is, a number of ethical questions arise. These concern human responsibilities to animals and the specifically human conception of nature’s value. To these questions no simple answers can be given.

As an ethically assessable practice, de-domestication does not comfortably engage established principles of nature conservation or contextual standards of animal treatment. De-domestication animals are generally handled in a way to serve the needs of nature management. The management is a very active form of *nature* protection in terms of human involvement; it not only attempts to increase the level of biodiversity, but also seeks to increase wildness and naturalness.

In practical terms, consideration of these ethical issues ought to improve discussion in this difficult area, and, eventually, inform any subsequent decisions. It hardly needs saying that, whatever one's views, it is important to get clear about whether, to what extent, and why, it is acceptable for de-domestication to bring about reduced animal welfare for the domestic animals in nature reserves. We also require principled answers to questions about when, in the de-domestication process, animals move from domestic to wild status, and what kinds of duty owed to wild animals. Consideration of the ethical issues will promote proper debate about whether constant human involvement in nature reserves and other wild areas is desirable, and about where to draw the line between 'good' and 'bad' nature.

De-domestication challenges the current division of nature ethics into the neat, bipolar categories of 'animal ethics' and 'environmental ethics'. In the long term, it will be necessary to consider whether that division hampers the resolution of issues raised by contemporary practices, and whether the boxes into which the issues are currently placed are adequate. A bit more 'thinking outside the box' with regard to animal and environmental ethical frameworks might well prove valuable.

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