National Sheep Association

# The wider consequences of the introduction of Eurasian lynx (*Lynx lynx*) to the UK

Eurasian lynx pictured in a wildlife park in Leipzig, Germany.

(Picture credit: Wikimedia Ad Meskens)

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## National Sheep Association

National Sheep Association (NSA) is an organisation that represents the views and interests of sheep producers throughout the UK. It is funded by its membership of sheep farmers and its activities involve it in every aspect of the sheep industry.

In 2015, the Lynx Trust UK proposed the reintroduction of the Eurasian lynx (*Lynx lynx*) with the aim of boosting rural economy, ecology and regenerating forests. The initial trial period of five years would see four to six wild adult lynx released at three sites in Aberdeenshire, Northumberland, Cumbria or Norfolk.

NSA has a number of concerns about this project, not just because of the anticipated predation on sheep. These concerns are discussed in this paper.

## 1. Introduction

The Eurasian lynx is thought to have been extinct from the British Isles for 1,300 years due to a decrease in forest area and persecution by humans. The species is in the category of 'Least Concern' on the International Union for Conservation of Nature (IUCN) Red List due to its large range (Western Europe, the boreal forests of Russia, central Asia and the Tibetan plateau).

The European Union's Habitats and Species Directive 92/43 makes it a requirement for Member States to assess the desirability of reintroducing certain native species. Restoration of the full range of the Eurasian lynx is also encouraged by the Bern Convention (1979) and the Rio Convention (1992) (Hetherington & Gorman, 2007).

The Eurasian lynx (*Lynx lynx*) is 90-110cm in length and 60-70cm in height, making it the largest lynx species and the third largest predator in Europe after the brown bear and wolf (National Geographic. 2016). They are ambush hunters (Hetherington & Gorman 2007), generally using woodland edges, and have been found to take prey ranging from perching birds to small ruminants. Their main prey is roe deer (Gervasi et al., 2014). Their potential ability to control deer populations and the consequences this will have on woodland regeneration is given as the main benefit of their reintroduction in the UK.

As it currently stands, NSA is not in support of this trial going ahead for a number of reasons: the lynx will likely take sheep; compensation will not make sheep mortalities acceptable; previous reintroductions have been problematic; suggested mitigation measures are not practical and engagement with the agricultural sector has been lacking.

## 2. Impact on sheep

The hunting behaviour of Eurasian lynx is complex and its tendency to take sheep depends on many factors (sex, age, geography, season and density of prey populations). Because of these factors, it is hard to predict exactly how released lynx would behave in the British Isles. This is problematic as it means there will be inherent limitations with regards to planning to prevent sheep losses.

Lynx are opportunistic and, where both domestic and wild prey is available to them, the interaction between prey and predator becomes complex. In a Norwegian study, sheep were shown to make up the majority of the lynx's diet during the summer when sheep were readily available, returning to a mostly roe deer diet in the winter (Gervasi et al., 2014). As there is currently a move towards later outdoor lambing in the UK as a method of improving resource efficiency, this temporally variable diet could be problematic. It is unlikely lynx would be able to reduce the deer population enough to contribute towards sufficient woodland regeneration. The species of deer causing the most damage to woodland in the Scotland, which is arguably the most suitable potential area for lynx reintroduction due to its size, is red deer which are not generally preyed on by Eurasian lynx (Thomas, 2015) and live on open hillside (Rowe, 2015).

Lynx populations are not likely to be limited by prey availability and will base their diet on what is obtainable. This will determine the extent to which the lynx impacts on social and economic factors. Deer may respond to the reintroduction of lynx by altering their ranges (Hetherington, 2008), thereby altering the ratio of wild and domestic prey and consequently leading to increased predation of sheep. The scientific literature highlights the inadequacies of research in this area (Gervasi et al., 2014). In addition to the inconsistencies in their diet, lynx behaviour is also variable. They will generally only kill what they need to fulfil their energy requirements (Gervasi et al., 2014) however one study showed male lynx were killing but not fully utilising sheep (Odden et al., 2006). Forder (2006) said Eurasian lynx have sometimes been known to kill more than they could ever eat, typically following the reintroduction of a predator not previously present in an ecosystem with naïve and vulnerable prey.

On the whole lynx predation of sheep is expected to be low in areas where there are high populations of deer, particularly roe, but to a farmer any premature deaths, as well as the other associated impacts discussed in this paper, are unacceptable. Farmers take all reasonable efforts to keep welfare as a top priority and the UK is 'A' rated for its animal welfare, in particular farm animal welfare, according to the Animal Protection Index ranking (World Animal Protection, 2014). This is the highest rank available. UK farmers take exceptional pride in what they do, going above and beyond the basic welfare legislation, and often lead the way in improving standards. Introducing the lynx adds another challenge for farmers to contend with.

A problematic behaviour within lynx populations that has been observed is that of 'hot spots'. At these locations individual lynx seem to take more sheep than would ordinarily be expected. Even after the control of what was thought to be problem individuals, the behaviour was continued, therefore suggesting the ultimate factors causing these hot spots were inherent to the sites. Further investigation is needed to identify the causal factors in order to be able to prevent or mitigate them. They may relate to landscape features, animal husbandry practices or the behavioural ecology of lynx, in particular, the presence of unattended, free ranging sheep in areas highly populated by roe deer and close to forests (Stahl et al., 2001). Woodland has a positive role to play in and around farmed land, as discussed elsewhere in this paper, but this would quickly become a negative if it heightened the opportunity for lynx to ambush sheep.

## Case study: Big cats

*Almost 20 years ago, Martin and Pauhla Whittaker began experiencing mysterious and devastating losses to their sheep flock in Gloucestershire. Over a period of around three years, young or weak lambs that had just been turned out into the field were being taken at night, sometimes up to six lambs at a time.*

*Martin and Pauhla believed there was a crafty fox at work and had no choice but to take the losses on the chin, but two trustworthy sightings proved that there was in fact a big cat loose in the area.*

*At the time there was no means of getting compensation for their losses, but Martin and Pauhla say this would not even have come into it, as no amount of money could compensate the distress of bringing young animals into the world only for them to be killed a few days later. Martin firmly believes his lambs were a source of easy prey for the beast, as opposed to being the only source of prey available.*

*If lynx were to be reintroduced to the UK, Martin says he would consider leaving the sheep industry. He finds it hard to believe that sheep, which have been a large part of human existence for hundreds of years, are now being blamed for many of the environmental problems we encounter.*

Another area of limited research is that of the impact on a prey species' behaviour when a predator is introduced. Studies on wild prey species have shown that vigilance increases, which decreases their foraging effort, particularly when they have young at foot (Laundré et al., 2001). Although this has not been tested with regards to domestic livestock a similar impact could not be ruled out in sheep, highlighting an area requiring further investigation in order to determine the full cost of a reintroduction programme.
NSA puts a considerable amount of effort into helping the prevention of dog-attacks on sheep. Sheep are valuable assets and any losses directly impact the farmer's livelihood. When these incidents occur they are stressful not only for the individuals that are attacked but for the flock as a whole. Ewes that are chased can miscarry their unborn lambs or be injured or killed in their attempt to escape. Lambs that become separated from their mothers can die of starvation or hypothermia if they fail to find her again. If bites from dogs do not cause death, they create ongoing health problems, such as infections and flystrike, leading to increased vet bills and even ultimately having to be put down anyway. Attacks on sheep are a welfare issue, and the NSA sees no difference between these attacks and those that may result from a lynx reintroduction.

When animals are introduced to areas alongside species they are not used to, they are exposed to novel pathogens and parasites to which they will not have a natural defence (Edwards, 2014) meaning the health of both sheep and lynx would be compromised. The proposed health screening of the lynx before release will not necessarily be effective, particularly if diseases develop over a longer period, or if they are carriers of the disease but show no clinical symptoms (Edwards, 2014). Studies in Finland have shown lynx to be hosts of parasites such as tapeworms (*Taenia spp*., and *Diphyllobothrium spp*.), and while not affected by them, spread their eggs into the environment (Deksne et al., 2013). Such parasites would cause display of clinical signs in sheep, reduce growth rates in lambs and cause losses when carcases are condemned at slaughter (Bates, 2012). Previous cases of canine distemper, a serious and contagious viral illness, have also been recorded in large cats after contact with domestic dogs (Edwards, 2014).

When it comes to sheep losses, farmers are subject to strict EU legislation on the correct disposal of carcases and animal by-products. Any fallen stock must be collected, identified for records and transported from the farm as soon as possible. The legislation states that the farmer is responsible for ensuring no wild birds or other animals are able to feed on the carcase. Important traceability and biosecurity factors would be compromised by lynx predation, particularly if a carcase has been removed from its original location. It is important that carcases are disposed of quickly and safely, to

reduce the risk of potential disease from residues in soil, ground water and air (Defra/APHA, 2015).

NSA appreciates the importance of not exaggerating the impacts lynx may have on the sheep industry, but the uncertainties discussed above do pose a concern and the impacts on some individuals in certain locations may be considerable due to hot spots. NSA members have expressed their concerns about the already fragile state of the industry being further jeopardised by the introduction of a high level predator. The UK has more sheep than any other country populated by lynx, as well as different farming systems and husbandry practices, making the figures on sheep attacked by lynx in places like Norway not directly transferrable to a UK situation. Sheep are arguably slower and less agile than deer, making them much easier prey.

Also at risk of predation are reared game birds, such as pheasant and red-legged partridge. Although the potential impacts are unknown, as no other lynx-populated area is comparable to the UK in this way, lynx have been known to prey on birds such as passerines, partridges and pheasants (Forder, 2006). It is likely that juvenile lynx (Milner & Justin Irvine, 2015) will become a problem in areas where lynx habitats merge with or are nearby game rearing establishments. The conservation of black grouse is also a concern, as they thrive in low density, highly localised, small populations (Milner & Justin Irvine, 2015). Reintroduced lynx have shown a dietary preference for the western capercaillie or wood grouse *(Capercaillie Tetrao urogallus)* (Forder, 2006) which is now at risk of extinction from Scotland for a second time (RSPB, no date). Reintroduced lynx in Sweden have shown the highest predation rate on game, such as the Western capercaillie and the black grouse (Forder, 2006) whose population in also in decline in the UK (RSPB, no date).

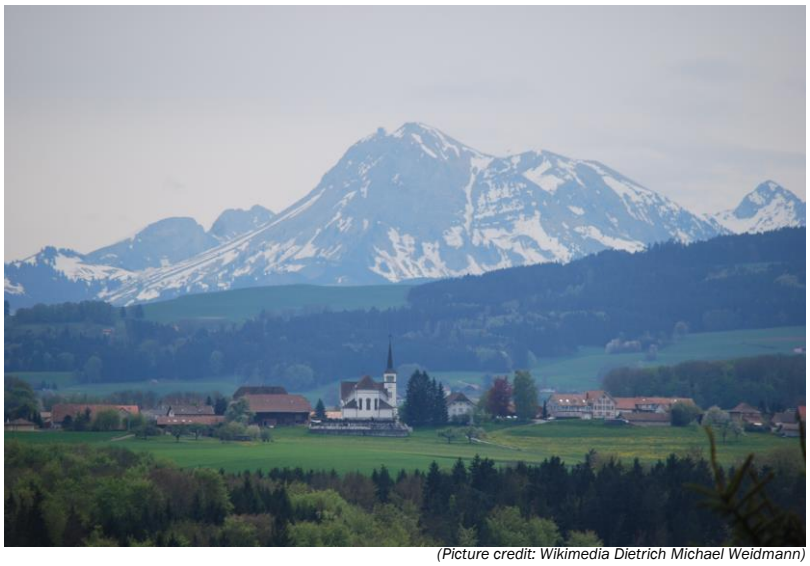
Eurasian lynx have also been known to attack dogs that approach their kittens, whether accompanied by humans or not (Forder, 2006) and prey on brown hare (White et al., 2015).

## 3. Previous Eurasian lynx reintroductions

In order for lynx and humans to co-exist in a multi-use landscape, lynx numbers in a given area need to remain low and yet maintain a viable population across a large area (Anon, 2001). In order for this to work there would need to be sufficient areas of well-connected and suitable habitat (without major obstacles) and the availability of these provisos in the British Isles can be questioned. A viable population of 250 individual lynx would require a sufficient area of contiguous woodland, examples of which is only found in the Scottish Highlands, but further studies are required as to whether the structure and understory vegetation of these areas would be suitable (Milner & Justin Irvine, 2015). None of the reintroduced populations in Europe have yet reached a size of over 200 individuals, possibly due to habitat fragmentations and geographic isolation between populations. For a population to self-sustain it must habituate an area large enough and contiguous

enough for good genetic mixing (Milner & Justin Irvine, 2015). Britain, as an island, is geographically isolated from continental conspecifics (Milner & Justin Irvine, 2015).

There have been 15 reintroductions across Europe since 1971, only five of which have been fully successful; six categorically failed and four are of 'uncertain status' (Linnell et al., 2009). Many of these reintroductions were poorly researched with an ad hoc or 'let's see' approach rather than scientific coordination (Linnell et al., 2009). Little or no consideration was given to the genetic origins of the released lynx and the chosen sites were too small and isolated to support a viable population (Linnell et al., 2009).



*(Picture credit: Wikimedia Dietrich Michael Weidmann)*

In certain areas the lynx were in relatively high numbers making their presence more intolerable to sheep farmers. These honeypots were a result of lynx being poor colonisers, especially where connectivity between habitats is not suitable or there are major obstacles such as roads and mountain ranges. NSA believes Britain would not be a suitable location for the proposed reintroduction as it cannot accommodate the size of population required. Small populations that are restricted geographically are highly vulnerable (Traill et al., 2007) due to low genetic diversity and an inability to maintain a minimum viable population (Schadt et al., 2002).

In the 1970s there were efforts to reintroduce the Eurasian lynx in Switzerland with 30 lynx being released (Committee, 2004). This programme was carried out with limited public involvement leading to a sense of exclusion. This is thought to be one reason behind illegal poaching (Hetherington, 2008). In a reintroduction to the Swiss Alps (1987-1999), 40% of the lynx died from infectious disease (Edwards, 2014). A reintroduction of 30 lynx to the Kampinos area of Poland (1993-2000) saw 13 die over the first three years and at least one lynx persistently killing livestock after failing to develop natural hunting skills (Linnell et al., 2009). A release of 24 lynx into the Harz Mountains in Germany (2000-2006) resulted in four deaths from starvation and sarcoptic mange, and two having to be recaptured for displaying a 'lack of shyness' towards people (Linnell et al., 2009). Six lynx were unofficially released from a zoo in Podyji, Czech Republic, in 1993-1994. One was found dead from malnutrition after two months and by 1995 there was no sign of the rest of the group (Linnell et al., 2009).

## 4. Current UK models for protected species

NSA is concerned by the lack of thought given to controlling a reintroduced lynx population, or that its initial protected species status would be a permanent feature regardless of how big individual populations may grow. As seen in the cases of ravens and badgers in the UK, once a species becomes protected it does not become 'unprotected' when numbers are high and there are laws in place to prevent human control of the population without special exception (RSPCA, 2016).

A very pertinent example is the reintroduction of sea eagles, which has led to the establishment of more than 100 breeding pairs in Scotland and, so far, there is no plan in place for controlling a population explosion, despite pleas from local farmers.

NSA believes the reintroduction of sea eagles and the protection of badgers and ravens should not have gone ahead without considered measures for appropriate population control and exit strategies in the result of population explosions. This has resulted in detrimental effects on the sheep industry, other livestock sectors and the wider ecology.

### Case study: Ravens

*Perin and Sonja Dineley run an outdoor lambing flock of Romneys in Dorset and have experienced increased devastation from ravens over the past seven years. Specific breeding pairs cause the most problems and are easily identified by their extreme territorial nature.*

*On one side of the farm, the problem birds wait for a pregnant ewe to lie down to give birth to her lamb before swooping in and attacking her eyes, and the eyes and tongue of the emerging lambs. The picture shows one of their blinded ewes. The lambs require immediate euthanasia and the ewe is left in agony, often eventually having to be culled from being blind. On the other side of their farm, the birds attack the ewe by pulling guts from her back end when she is cast or lambing, meaning both ewe and lambs have to be put down. Perin and Sonja describe how difficult it is to avoid these attacks, even with constant shepherding, as the ravens wait and act quickly.*

*Recently Perin and Sonja, along with their shepherd Martyn Fletcher, became the first UK sheep enterprise to obtain a control licence for ravens from Natural England. With help from Martyn's links to NSA, this was achieved and Perin commends Natural England for its helpful and executive approach. They are permitted to shoot up to four ravens a year, and ideally target one or both of the pairs that cause the most trouble. If the problem persists, this limit is open to increase in the future.*

## 5. The inadequacies of compensation

The associated costs of lynx reintroduction are considerable, and full account of them would go some way to showing the proposals by Lynx UK would be far from a cheap and easy option for deer control. NSA is concerned by some of the figures in the cost-benefit analysis produced by White et al (2015), as it puts the estimated cost of compensation over the proposed Kielder Forest, Northumberland, and Thetford Forest, Norfolk, sites at just £757.44 per year over a 25-year period. In practical terms, this would go little way to compensate for the losses experienced. The stress on a typical 500-ewe flock during the mating season could see a 2% rise in abortions, costing the farmer £200-£250 in losses. The death of just three commercial breeding ewes would cost £270-£360, plus £400-£500 for a commercial ram. Registered pedigree stock in the UK has been known to sell for several thousand pounds, which would exceed the estimated yearly compensation quota immediately. Sheep from hefted flocks in the uplands, which are the result of generations of learnt behaviour, are irreplaceable.

Concern over how potential compensation has been calculated leads NSA to doubt the other estimated costs, which puts expenses for holding enclosures, capture, monitoring staff, consultation, management and an exit fund, to name a few, at £57,880.32-£69,456.40 per year (White et al., 2015). The cost-benefit analysis states these costs would not be covered by the Government but funded by donations with vet time organised on a voluntary basis. A trial cannot go ahead on the assumption there would be sufficient donations to cover costs, especially given there is no longer-term plan for the future if the lynx stay resident after the five-year trial. The current compensation scheme in place in Norway only covers three fifths (60%) of the losses reported by farmers, and there are those that do not report losses due to the red tape involved in making a claim (Harrison, 2015).

Aside from the challenges of guaranteeing indefinite financial support for the additional costs to sheep farmers, a compensation scheme would be complicated and controversial. NSA believes justifying the reintroduction of lynx by having a compensation system in place undermines the efforts that farmers go to in order to protect their flocks and maintain high welfare standards, as strived for by the farmer, required by legislation and demanded by the consumer.

Creating a compensation scheme with current levels of knowledge could not take into account all costs sheep enterprises would potentially bear, such as the impacts of increased vigilance, stress, lack of thrive, reduced pregnancy conception and abortion of

lambs. It compromises the basic welfare standards of animals as described in the Farm Animal Welfare Council's 'Five Freedoms', in particular the freedom from pain, injury and disease, and the freedom from fear and distress. Any unexplainable disappearances of sheep would prove difficult, if not impossible, to be compensated for. And even if the dead sheep was found, determining its value is complicated. Fairly reasonable estimates could be attributed to the loss of a lamb ready for slaughter but the value of breeding stock and pedigree animals can vary considerably. If young lambs are taken which were destined for breeding, replacements may have to be bought at a higher price than the lambs themselves would have been valued at. The value of a standard, commercial neonatal lamb is calculated at £20-25 up to the point of lambing (AHDB, 2015). Although less frequent, if a ewe with lambs at foot was taken, there is very little chance of the lambs surviving. If they are old enough to cope without their mother, they will show reduced growth rates.

There are also practical issues to consider such as the time and effort taken to go through the compensation system, the costs of having to dispose of carcases if they are not fully utilised by the predator and the difficulty of making a claim if the carcase has been dragged from its original location. The suggestion of fitting lynx with radio collars to help determine liability is concerning due to the possibility of interference from other GPS systems, not to mention the risk of lynx GPS collars interfering with important systems for military training and search and rescue operations. An additional challenge with compensation is that it cannot just cover the value of the sheep. It must also cover consequential loss and additional staffing or shepherding time.

### Case study: Dog worrying

*NSA's ongoing work to highlight the welfare and business consequences of sheep worrying by dogs provides numerous case studies of the devastating impact on flocks and flock owners. Calculating the cost of these attacks is incredibly difficult, as not only are ewes and their lambs mauled and injured, but there are catastrophic unseen losses too.*

*The stress of chasing can cause in-lamb female sheep to miscarry their lambs, which John Wood, a sheep farmer from Dorset, knows to his detriment. He experienced 10 separate incidents over a period of 18 months, ranging from sheep being chased to serious facial injuries. He estimated his losses from pregnancy scanning to lambing in 2014 to be a minimum of £6,000.*

*Dominic and Bethan Klinkenberg from East Sussex experienced more than death and injury to their sheep flock after a series of dog attacks. The picture shows just one of the injuries caused. The first attack on a field of in-lamb ewes caused the death of six females and saw a 20% drop in their pregnancy scanning percentage. A second attack where a ewe was pinned down and attacked by a dog was followed by the devastating realisation that only 40% of the ewes were in lamb. Mr and Mrs Klinkenberg reported both incidents to the police, but no prosecution was made and so financial recompense was not forthcoming.*

## 6. The inadequacies of suggested mitigation measures

There is some suggestion that keeping sheep 250m away from woodland edges will prevent or reduce sheep depredation based on the lynx's hunting preferences. Although this may well be the case, this would involve farmers sacrificing valuable farmland and going to great expense to fence the area off. The typical cost of material for livestock fencing is £204 for 100m roll of livestock fencing and £2.89 per wooden stake (Jarrett Fencing, 2016) and the average cost for a contractor to erect a post, stock net and two-row barbed wire fence is an additional £5.80/m (NAAC, 2014). Maintenance costs are on top of this. Even without the cost of fencing, the practicality of doing it in some areas and on some terrains makes it impractical, such as on Scottish estates where woodland areas can be thousands of hectares in size.

Keeping sheep from woodland edges would result in substantial areas not being grazed and the encroachment of scrub, harming the biodiversity by shading out less competitive plant species. This would have consequences with regards to the management of that land and work-load for farmers, and could result in land being ineligible for direct support payments if it is no longer supporting agriculture.

Woodland edges can be important and sustainable ways of improving livestock welfare by providing shelter and shade, thereby increasing lamb survival and also decreasing the risk of mastitis in ewes (Woodland Trust, 2014). There is also an increasing interest in restoration of traditionally grazed woodlands to enhance biodiversity (Mayle, 1999) and new silvopastoral agroforestry enterprises. Reintroducing predators that are associated with woodland could be detrimental to these desirable practices.

Other suggestions have been to concentrate sheep into pastures above the tree-line, where lynx are less active, using electric fencing or predator-proof night-enclosures (Odden et al., 2006). The cost of this renders the suggestion impractical. In addition, pastures above the tree line cannot sustain sheep all year round, if at all for less-hardy breeds, and housing would be required to enable indoor lambing.

The suitability of the Scottish Highlands and Southern Uplands was assessed by Hetherington (2005) and Hetherington & Gorman (2007) (Milner & Justin Irvine, 2015) and found suitable to support 400 lynx (2.63 lynx 100/km$^2$) and 50 lynx (0.83 lynx

100/km$^2$) respectively, reflecting assumed prey availability (Milner & Justin Irvine, 2015). However, the poor habitat connectivity between the two areas, inhibiting the long-term existence of the South Upland population (Milner & Justin Irvine, 2015), renders this area unsuitable. The released individuals would spread from the release sites and there is no feasible way of this being controlled. In a review by Rowe (2015), Simon Jones, Scottish Wildlife Trust Director, is quoted as saying: "We have doubts over the sites and the scale of the landscapes in Scotland. The lynx is a challenging species to introduce because you should not underestimate the scale of the territory it needs." Between the years 1982-1989, 18 lynx released over the Czech border from Germany have since been found to cover an area of 18,000km$^2$ (Linnel et al., 2009). Those released into the Harz Mountains and Switzerland have also been found to recolonise other areas (Turner, 2015).

A traditional method of protecting flocks against predators was to use guard dogs and this practice is still used in areas such as America, Australia and central and Eastern Europe. These are normally large breeds such as the Pyrenean Mountain dog. They are effective but have to grow up alongside the flock, which means that there is no immediate protection. There is no expertise linked to this practice in the UK and the process required would be expensive and lengthy. In the USA it costs an average of US$400 (approximately £270) to raise the dogs to four months of age, after which they are sold for US$800 (£550). Adult dogs then cost around US$300 (£200) a year to feed (Wilkes, 2016). The required breeds are not available to buy in the UK, importing of suitable dogs would be expensive and involve strict regulations, and once here the dogs would need to be securely housed and carefully bred, all requiring expense and knowledge. The presence of guard dogs is not ideal in areas which are also used for recreation, particularly in the British Isles where footpaths are common and walking a popular pastime.

*An Akbash guardian dog,*
*pictured on a working sheep farm in Colorado, USA.*

Using people to guard flocks at times of risk would also be expensive and, with farm labour not always easy to find, a challenge in many instances. Farmers would either have to make use of unpaid family labour or look to hire a farmworker. Average wages for farmworkers were calculated at £8.74/hour for an average of 52.1 hours per week (Farmers Weekly, 2014). The provision of accommodation, transport, training, holidays and National Insurance would also have to be taken into consideration.

### *Case study: Guardian dogs*

(Wilkes, J. 2016)

*Predators are an issue for sheep farmers around the world causing, for example, one-third of all sheep losses in the USA; around 60% of these are from coyotes. This costs their industry $33.3 million a year (£22.5 million). As a result, it is estimated that 40% of sheep farmers in the USA now use guardian dogs to protect their sheep from attacks from the like of mountain lions, coyotes, wolves, bears and eagles. The picture shows a Colorado farm that does just that.*

*By law, farmers are unable to even scare eagles away, but there is nothing that stops their dogs from doing so in order to protect young and injured sheep. Farmers suggest a lambing percentage of 115% would be decreased to 80% or lower without the presence of guardian dogs.*

*Tamarack Lamb & Wool, a USA sheep enterprise, has successfully used livestock guardian dogs since 1982. Problems arose due to federal protection of the wolf population in the 1980/90s. When wolves predate on lambs there is no evidence left behind and so it was impossible for them to be compensated. There was also a rise in coyote population at this time, and they too became more desperate for food due to the direct competition with wolves. Janet McNally of Tamarack Lamb & Wool says it is not suitable to use guardian dogs on small acreages and situations where neighbours are likely to be disturbed by barking.*

## 7. The case for sheep farming in the UK

Sheep farming in the UK is a fragile industry and sheep numbers have declined significantly over the last two decades. The keystone to the industry is the hills and uplands, characteristically areas of natural constraint, with harsh weather conditions and geographical handicaps. Farmgate prices are increasingly volatile and sheep farmers in the UK are disadvantaged by aggressive marketing campaigns by retailers offering price promotions on imported lamb products. It is a challenging time for farmers to remain in the sector and maintain sheep numbers.

It is not appropriate to choose the reintroduction of lynx at the expense of the well-established and valued role of sheep in grazing and conservation of areas that would become prime lynx habitat. Sheep grazing at appropriate stocking densities allows for a species-rich environment, clean water and carbon storage (NSA, 2011). Under-grazing of semi-natural habitats through the removal of sheep in upland areas would result in a loss of biodiversity. As a result of the latest round of Common Agricultural Policy reforms, increasing areas of grazing in lowland areas has been incentivised with the aim of creating more heterogeneous agricultural landscapes in predominantly arable regions. Introducing the lynx may act as a disincentive, working antagonistically against these policy aims. The iconic landscapes formed through hundreds of years of sheep farming bring valuable tourism to rural areas. The EU funds the current agricultural environment as it is recognised as a desirable landscape, and this would be undermined by a privately funded lynx trial.

The current direction of travel for flood mitigation, amongst other benefits, is for more woodland in farmed land, and NSA supports this at a sensible rate that still allows sheep farming to thrive. Sheep are needed in order to make this successful and the presence of lynx would totally undermine these efforts.

NSA disagrees with the promise that lynx would add to eco-tourism, boosting the local economy and bringing wider community benefits such as media attention. Lynx are naturally shy animals, preferring to hunt at night or during dawn and dusk periods, meaning tourists and media would rarely see them.

The concerns of sheep farmers are legitimate and therefore the sheep industry and agricultural sector as a whole should be properly consulted.

## 8. Conclusion

The impacts that lynx would have on sheep are completely unjustifiable when farmers already work tirelessly for the welfare and performance of their livestock, and also to maintain their own livelihood. Sheep play an important part of maintaining the biodiversity of the current, perfectly functioning ecosystem, which would be disrupted by the introduction of an unnecessary predator. Reintroduction of lynx would be a costly, complex process, with little benefit to the woodlands or ecosystems as a whole.

As the Eurasian lynx has been deemed a species of least concern on the IUCN Red List, it does not seem that the proposal to reintroduce it into the UK is necessary. Priority should be given to ensuring existing reintroduction schemes, such as in Switzerland, are a success.

Rallying public support in the UK without establishing transparent dialogue or being clear about the negative impact is not a positive approach or the basis for a successful reintroduction of the species. More work needs to be done to ensure that the public are fully aware of the positive and negative attributes of a reintroduction programme involving a predator, and the potential welfare problems that would arise due to an unsuitable habitat.

The conservation gain from a reintroduction programme needs to be balanced against the avoidance of conflict with other species, ecosystems and human interests.

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