

# Contemporary Improvements to the Housing Conditions and Welfare of farmed Blue Fox (*Vulpes lagopus*) by encouraging typical Species-specific Behaviour

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## Introduction

The Blue Fox (*Vulpes lagopus*) has been bred for fur production for more than 70 years (IUCN, 2011), but traditional housing practices for this species have been questioned as they prevent species-specific behaviour. Recent research suggests that alternative housing practices, such as providing sand flooring (Ahola *et al.*, 2009), activity objects (Koistinen *et al.*, 2009), and nest sites (Pyykönen *et al.*, 2010) can encourage the expression of species-specific behaviour. This paper summarises these new insights and discusses their welfare implications for farmed Blue Foxes.

## Discussion

Ahola *et al.* (2009) recognised the welfare implications that the traditional housing method of mesh floors had for Blue Foxes. In particular, these authors argued that mesh floors could prevent Blue Foxes from digging, which may increase their stress levels. The three welfare metrics that Ahola *et al.* studied were adrenal cortex function, claw growth and fur properties. Male-female sibling pairs (n=16) of juvenile foxes were exposed to one of two conditions: (1) eight pairs were exposed to mesh floors in both cages they had access to (control group), and (2) eight pairs were exposed to one mesh floor cage, and one cage with 30-40cm deep sand (treatment group). Environmental preference was also to be studied, and so a 14-day sand-floor deprivation period was incorporated.

The results of the experiment indicated that adrenal cortex total mass differed between control and treatment groups, but in the opposite direction to that predicted. When provided with sand, total mass of the adrenal cortex was lower than in the control group, but this was attributed to a "rebound effect", since there was a lack of access to clean unfrozen sand floor during periods of sub-zero temperatures. Furthermore, the value of sand in encouraging species-specific behaviour was supported by the animals' willingness to perform different activities, such as digging, scratching, and sniffing when reunited with unfrozen sand in September. Significant claw breakages were seen in the control group, and also during the sand-floor deprivation period. The natural growth and wearing down of claws in the sand treatment probably contributed to an increase in blood flow to the digits, providing greater claw strength, and hence facilitating digging behaviour. Examining patterns of fur development provided evidence for an overall higher quality coat in the sand group, demonstrating that the control group had to invest more resources into coping with environmental conditions. Although providing sand within cages encouraged species-specific behaviour, it was acknowledged that the upkeep of sand floors in sub-zero temperatures was demanding, and that the improvements shown in this study would require unlikely warm environments in many regions where Blue Fox are farmed.

In a second study, Koistinen *et al.* (2009) evaluated the alternative of using bones as a replacement for wood blocks as enrichment objects. Wood blocks provide a hazard for Blue Foxes in captivity, occasionally causing splinters, irritations, and mucous membrane bleeding within the stomach. In the wild, Blue Foxes gnaw bones, which was the basis for providing a selection of bones as an alternative. For eight male/female pairs of Blue Foxes, two bones (cattle femur) were provided, and as a control, eight pairs were not provided with a bone. There were also two 10-day bone-deprivation periods to gather experimental preference data. A five-minute sampling interval was implemented to observe rest, stereotypic activity, and activity with the bone.

The Blue Foxes with bones demonstrated more playing and fewer stationary activities, providing evidence that bones are a source of entertainment and thus enhance species-specific behaviour. This is important because higher levels of play are indicative of positive welfare levels. During the observation period, 3-4% of the time was spent interacting with the bone, and this is significantly more time than previous wooden block studies have shown (Korhonen *et al.*, 2000). The results showed that foxes engaged in common activities, such as gnawing, sniffing, licking and scratching bones, especially after bone-deprivation periods, and there was also increased social interaction in Blue Foxes that had bones available. Despite the fact that this study concluded that species-specific behaviours were encouraged as a result of providing bones, a potential limitation is that competition for bones can arise between fox pairs. Bones would therefore be more suitable for solitary housed foxes, or if more than one fox is to be kept in a cage, then at least two bones should be provided.

Pyykönen *et al.* (2010) aimed to assess the reproductive effects of providing Blue Foxes with familiar and unfamiliar nests. A single unfamiliar nest was provided to 29 vixens, and an unfamiliar and familiar nest were provided to another 29 vixens. This study was based on the natural species-specific denning behaviour of wild Blue Fox vixens whereby vixens have the opportunity to select between two nests.

Vixens with access to two nests are more likely to demonstrate calm behaviours, possibly due to feeling more in control of their surroundings. Although differences between nest manipulations were not significant in terms of reproductive characteristics, there was evidence for improved welfare with two nests. Half the Blue Fox vixens took advantage of the opportunity to frequently move their cubs between nests, and two even split their litters between the two nests, a behaviour commonly seen in the wild.

The findings of Korhonen and Koistinen (2009) support the importance of a nest box within the cages of farmed Blue Foxes. These authors simultaneously tested the preference of foxes for various enrichments, such as an earthen floor, a nest box, extra space, a platform, and an activity object. It was found that the enrichment most commonly used by the animals was the nest box. Foxes used nest boxes both for resting and for lying on the roof while watching over cubs.

## Conclusion

The results of these contemporary studies confirm that suitable flooring, activity objects, and providing additional nests can encourage species-specific behaviours in farmed Blue Foxes. Collectively, these findings suggest that such sources of enrichment should be incorporated into the Blue Fox fur industry in order to improve Blue Fox welfare.

## References

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