

## Why should environmental enrichment be used to improve welfare on mink farms?

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### **Abstract**

The aim of this review paper is to present a general scientific and political argument for the greater enrichment of mink cages. I first give an overview of the animal welfare issues common to many husbandry systems, before assessing how mink farming compares with other sectors. I highlight two ways in which mink farming (like many other forms of farming) could be improved in welfare terms: in its use of restrictive feeding, and the barren, unenriched nature of many animals' cages (common in some countries, though now rare in others). I will also review in more detail what we know – both scientifically and practically – about specific possible enrichments for farmed mink. Even simple enrichments like wire cylinders, year-round straw, and lengths of rope may have marked effect on mink behaviour and welfare, and, especially in a climate where fur-farming seems scrutinised more closely and harshly than many other animal sectors, finding functional, cost-effective ways of enriching environments and reducing abnormal repetitive behaviours are to be encouraged.

### **Introduction**

In this paper I first give a brief overview of the animal welfare issues common to many husbandry systems, before assessing how mink farming compares. I highlight two ways in which mink farming (like many other forms of farming) could be improved in welfare terms: in its use of restrictive feeding, and the barren, unenriched nature of many animals' cages. I review literature on other species to explain why this last is important in terms of both stress reduction and proper forebrain development, and then review the extent to which we see abnormal repetitive behaviour like stereotypic pacing on mink farms. In my plenary talk itself, and also a subsequent companion paper (Mason in prep.), I will additionally review in more detail what we know – both scientifically and practically – about specific possible enrichments for farmed mink. The aim of this present review is to present a more general scientific and political argument for the greater enrichment of minks' cages.

*Welfare issues in captive animals: on a spectrum from 'good' to 'bad', where does fur farming sit?*

Animal welfare relates to an animal's affective (colloquially, 'emotional') state: what it feels. Good welfare thus means experiencing positive emotional states and negligible suffering, while poor welfare entails experiencing severe or prolonged states of suffering (e.g., Dawkins 1980, 1990; Mason & Mendl 1993). Worldwide, more than 22 billion individuals are currently kept by humans for food, for research, for companionship, and in zoos (cf. the few million farmed mink). For these animals, being housed very differently from how they would live if free or wild, is near ubiquitous. Although the aims and methods of these various husbandry systems differ, common welfare themes therefore recur. Veterinary expertise, scientific research and common sense all show, for example, that hygiene, vaccination regimes, nutrition, handling regimes, stress and

genotype have major effects on physical health – with animals that are in pain, nauseous, or otherwise in discomfort from disease or injury obviously having poor welfare. Being unable to maintain homeostasis, due to insufficient access to food, water or a suitable thermal environment, causes both psychological stress and welfare problems from impaired physiological functioning. Housing conditions which restrict movement and/or present little opportunity for naturalistic behaviours, are typically non-preferred by animals, induce stress, and cause the development of abnormal repetitive activities like stereotypic pacing and fur- or feather-plucking (all behaviours which I discuss in more detail below). Housing animals in groups, be they mothers with their offspring, or unrelated similar-age conspecifics, may help solve this problem, but often brings with it others: particularly competition for food, and aggression that subordinate animals cannot escape from. Finally, handling, transport and slaughter are often stressful processes for animals.

These welfare issues occur and recur in many systems from the familiar to the exotic: laboratory mouse breeding units, poultry farms, pig farms, even timber camps using working elephants – and a myriad others. These recurring welfare concerns have therefore prompted the ‘Five Freedoms’ (Brambell 1965) to become generally accepted tenets for ensuring good welfare, across a host of diverse systems; these are: (1) freedom from injury and disease; (2) freedom from hunger, thirst and malnutrition; (3) freedom from fear; (4) freedom from thermal or physical distress; and (5) freedom to express most ‘normal’ behaviors. These recurring welfare concerns also allow the exchange of ideas, opinions, techniques, data and welfare evaluations between scientists working on similar problems, even when the species and system they are studying varies.

Such exchanges would suggest that in many ways, a well-run mink farm compares extremely favourably with many other animal industries -- particularly with those in food animal agriculture (cf. Spruijt 1999; also SCAHAW 2001 and Pedersen et al. 2002; Hansen 2007), but arguably also with many research animal facilities, and even some (the most environmentally restrictive) forms of pet- and zoo animal housing. For example, infant mink are left with their mothers until they have transitioned to solid food (unlike piglets and calves, for instance); left physically intact (not castrated, branded, tail-clipped, tooth-clipped or given any other type of painful mutilation, unlike e.g. piglets, calves, lambs, laying hens, and many research rodents); and often housed with siblings beyond that. Overall kit mortality to weaning age has been estimated at between 20 and 35% (reviewed SCAHAW 2001); fairly similar to that seen in piglets without farrowing crates (reviewed Mellor & Stafford 2004), and lower than rates seen in some bear and ‘big cat’ species in zoos (Clubb & Mason 2003, 2007). Levels of fear are typically low. Mink cages give animals space to move, separate resting/nesting areas, and separation from their faeces (unlike typical poultry, pig and some dairy systems). Stereotypic behavior on mink farms is less prevalent than in say, tethered dry sows, isolated laboratory macaques, or even zoo-housed giraffes (surveyed in Mason & Latham 2004, Mason et al. 2007), and when mink are well-fed, it is also less time-consuming than that performed by many carnivore species in zoos (Clubb & Mason 2003, 2007). Adult mink mortality rates are on average 2-5 % per year (reviewed SCAHAW 2001); this contrasts with, say the 16-17% first and second litter sows that are culled for lameness (e.g. Gill 2007; to give just one example; data from intensive dairy cattle or aviary laying hens would provide poorer contrasts still). Finally, mink are hardly ever transported (unlike the vast majority of food animals); and euthanasia is on-farm, and typically an extremely swift process.

So on a spectrum from ‘good’ to ‘bad’, where does fur farming (as best practiced) sit? ‘Firmly in the middle’ would be my judgment. Thus many millions or even billions of food animals would benefit if their housing and husbandry involved more of the attributes of a well-run mink farm, while millions or even billions of many other animals, from caged parrots to racing horses, arguably have welfare that is fairly similar. These comparisons are not here to induce complacency, but instead to illustrate that welfare issues are widespread across many systems, with mink farms far from standing out as ‘worst offenders’: indeed in certain ways, as highlighted above, mink farms are really rather good. There are, however, two notable ways in which mink farming fails to be better than other practices: in the restrictive feeding of breeding females, and in the barren, unenriched nature of most cages. I will focus primarily on the latter topic in the rest of this paper.

### *The restrictive feeding of breeding females*

One of the most important welfare issues on mink farms is the restrictive feeding of breeding female mink, to ‘condition’ them over the winter. I will deal with this just briefly here. A major welfare issue for female broiler breeders and breeding sows (e.g. de Jong et al. 2003, Bergeron et al. 2006), in Europe at least it has long been recognized as, similarly, a major welfare concern for female mink. On mink farms, feed restriction greatly elevates stereotypic behaviour, increases animals’ chances of dying over the winter, and also increases risks of ‘greasy kits’ once the litter is born (reviewed SCAHAW 2001). The best-researched solution to this problem is to use more graduated, gentle over-winter slimming (reviewed SCAHAW 2001); while new possible solutions include increasing the bulk of feed without increasing its energy content (e.g. reviewed SCAHAW 2001; also e.g. Damgaard & Hansen 2004), and using a combination of weighing and feeding technology to help the precise feed levels needed by each individual animal be supplied and adjusted more appropriately (e.g. Sønderup & Bækgaard 2005, Møller et al. 2007). Other potential solutions for the future might include finding ways to select breeding stock earlier in the fall (so that they can avoid being excessively ‘fattened up’ during this time; e.g. Møller et al. 2007), and perhaps selecting for animals whose fall growth involves less fat deposition. Reducing stereotypic behaviour (e.g. via enrichment) should also be beneficial – since it is the positive feedback between hunger and hyper-activity (with food deprivation triggering stereotypic activity, but stereotypic activity in turn using up energy reserves) that seems particularly likely to put some females on a ‘knife-edge’ over the winter. Last but not least, where there is still a culture of ‘*if females aren’t dying, they’re not being slimmed hard enough*’, I seriously urge that this is dropped: it is unlikely that this belief is supported with actual evidence, and, more importantly, its ethical/welfare implications are impossible to defend. Overall, it is a moot point as to whether feed restriction for female mink is a more or less serious welfare issue than is the feed restriction of females in the pork and meat chicken industries. It is probably safest to conclude that it is serious issue in all three, and perhaps one that may best be reduced via more correspondence in the future between researchers trying to address this issue in all three sectors.

### *Lack of enrichment: why is this a problem in principle?*

A second major welfare issue for farmed mink is the barren and unstimulating nature of their cages. Barren and unstimulating cages cause concern to the general public, but there is also now much scientific data as to their deleterious effects. An overview of these is given below.

First, barren, unstimulating environments may prevent natural activities that are essential for good welfare within the cage – if these are prevented, animals display evidence of chronic stress (e.g. endocrine and immunological changes; e.g. Dawkins 1990). Examples of such ‘behavioural needs’ are social contact for primates and many other group-living species (e.g. rats, horses); nest-building for peri-

patrurient sows; climbing structures that allow vertical flight for some zoo animals (e.g. clouded leopards; some primates); and appropriate nests or shelters for laboratory rodents and also farmed mink. Second, barren, unstimulating environments prevent activities that are definitely rewarding when performed (e.g. Dawkins 1990, Mason et al. 2001), even if the absence of these activities does not seem to cause chronic stress. Examples of such behaviours might include dust-bathing for hens, playing, copulation and maternal care in many species, and, some have argued (though see Mason in prep.), swimming in mink. Third, barren environments reduce welfare in an additional way: by making animals less resilient to stressful events that happen to them once they are removed from the cage. This reduced ability to cope has been best studied in laboratory rodents. Elevated anxiety if exposed to frightening situations outside the cage (as manifest in physiological responses, approach/escape behaviours, and even wound-healing rates) is seen when gregarious animals (e.g. rats; female mice; some hamster species) are isolation-housed. Similar effects are typically also seen when simple laboratory cages fail to be enriched with shelters and others forms of physical complexity (e.g. reviewed by: Olsson & Dahlborn 2002, Smith & Corrow 2005). Fourth, barren, unstimulating conditions compromise the development and functioning of the mammalian forebrain, as evidenced in physical indices such as reduced dendritic branching, as well as in cognitive indices like impaired learning (reviewed by e.g. Van Praag et al. 2000, Nithianantharajah & Hannan 2006). This may perhaps not in itself be a welfare issue, but it does seem very likely to exacerbate a well-known sign of poor welfare: stereotypic behaviour (e.g. Mason 2006, Tanimura et al. 2008). Stereotypic behaviour is the fifth and final reason to advocate environmental enrichment. ‘Stereotypies’ or ‘stereotypic behaviours’ have long been inter-changeably defined as repetitive, unvarying and apparently functionless behaviour patterns. Behaviour meeting these criteria is statistically associated with environments or husbandry practices that cause other signs of poor welfare (see meta-analysis by Mason & Latham 2004), and statistically reduced in frequency by environmental enrichment (see meta-analysis by Swaisgood and Shepherdson 2005).

Precisely how ‘unvarying’ or how ‘functionless’ an activity has to be for inclusion has led to debates as to what to label such behaviours as over-grooming, which involve quite variable motor patterns, or wheel-running which involves an enrichment. I have therefore suggested that the broad term ‘stereotypic behaviour’ be used instead to cover all ‘repetitive behaviour induced by frustration, repeated attempts to cope and/or C.N.S. (brain) dysfunction’ (Mason 2006), with the term ‘Abnormal Repetitive Behaviour’ being used when we do not have data on biological causation. Many stereotypic behaviours specifically involve altered functioning of the forebrain’s basal ganglia which cause behavioural symptoms such as ‘perseveration’ – the functionless repetition of evoked responses (e.g. reviewed Mason 2006; see also e.g. Tanimura et al. 2008).

Overall, it is currently unknown in general (let alone for mink *per se*) how the five effects of impoverished environments that I have listed here inter-relate. For example, is impaired brain function necessary for the emergence of stereotypic behaviour? Is the meeting of specific behavioural needs needed to reduce stereotypic behaviour, or to induce the ‘out-of-cage’ stress-protective effects of environmental enrichment? We do not know. One thing is certain, however: there is a strong welfare case – as well as, pragmatically, a public relations case – for enriching barren cages.

#### *Abnormal Repetitive Behaviour (ARB) in farmed mink*

To start with the least well understood, and the least common form of ARB: occasionally large portions of the front part of the back and/or neck will be clipped of top hair, sometimes leaving only the head and back of the neck untouched. Pelt-clipping may be directed to the self or a cage-mate. In one study no pelt-chewing was observed in well-provisioned kits, only those experimentally fed at low intensities, and it also seems to be absent from wild pelts (reviewed SCAHAW 2001); although little is really

known of the cause or welfare significance of this particular behaviour.

Another, more common form of mink ARB is tail-sucking or -chewing, which is typically self-directed and results in a clipped or bald tail-tip. Unlike locomotor stereotypic behaviour (see below), and possibly pelt-chewing (see above), tail-biting/-sucking does not seem to be reliably affected by feeding levels, but it does decrease with certain enrichments (Hansen et al. 2007) and increase if swimming enrichment is provided but then withdrawn (reviewed SCAHAW 2001, Vinke et al. 2008). It also seems to be absent from wild pelts (reviewed SCAHAW 2001). It is therefore probably best described as a true stereotypic behaviour, although much more work is needed as to biological causation. Its prevalence differs greatly across farms, e.g. as few as 10% of kits or more than 50% (Møller 2000 cited by SCAHAW 2001), may have bitten or sucked tails by pelting time. Other assessments of tail-biting in adults show that as with kits, its prevalence varies greatly between farms (e.g. between 19% and 66%) and even between years (e.g. from 10% to 22% at the Research Center for Mink of the Dutch Research Institute for Animal Husbandry; de Jonge et al. 1986 cited by SCAHAW 2001).

Farmed mink commonly perform locomotor stereotypic behaviour, which typically involves pacing along the cage wall, vertical rearing in a cage corner, repetitive circling or nodding of the head/front half of the body, and/or repeatedly entering and leaving nest-box. Pacing (often called 'pendling' in Danish studies) seems to be the most common (reviewed SCAHAW 2001). This behaviour is, again, absent in the wild, as well as exacerbated by feed restriction, and also reduced by delaying weaning and some forms of environmental enrichment. Some instances also suggest underlying perseverative changes, or involve self-harm (for example, kits may transiently continue to stereotype for some seconds after the arrival of food, and adults may – albeit rarely – perform forms that involve repeatedly crashing down from the cage-top onto their backs; Mason 1994; reviewed SCAHAW 2001). It is for these reasons that I class these as true stereotypic behaviours, although precise biological bases are as yet unknown. Note that a subsidiary but important reason for aiming to reduce this behaviour in mink is that highly stereotypic lines are more vulnerable to over-winter mortality (SCAHAW 2001).

The degree to which adults stereotype in this way varies greatly. Some animals perform none, others perform them for over four-five hours a day. Thus during the seven hours before feeding, mink in some populations spend on average 49% of their time in the behaviour, while pre-feeding levels have been reported of between 4% and 32% on five different Dutch farms (reviewed SCAHAW 2001), and 13% - 35% on five different Danish farms (e.g. Møller & Hansen SW 2001). In one survey, focusing on non-feed-restricted animals only, the mean level was under 10% of the day (Clubb & Mason 2003, 2007). Females show consistently higher levels than males (reviewed SCAHAW 2001). The prevalence of adult females with the behaviour also varies, averaging 98.3% on one site studied 61.6% on another, but under 10% on yet another. A range of 31–85% has also been reported for farms within the Netherlands (reviewed SCAHAW 2001).

Overall, ARBs including stereotypic behaviours thus have been common on mink farms, and are common still in more traditionally run establishments (though for exceptions and recent changes in Europe see e.g. Vinke et al. 2002; Jeppesen 2004).

## **Discussion and Conclusions**

Poor welfare is often presented by campaigning groups as a reason to single out fur farming. The HSUS, for example, states on its website that *'suffering is a common ingredient in all methods of procuring fur, from fur factory farming to trapping'*<sup>1</sup>. In condemning some of the worst practices seen worldwide (not

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<sup>1</sup> [www.hsus.org/furfree/cruel\\_reality/](http://www.hsus.org/furfree/cruel_reality/), accessed July 20<sup>th</sup> 2008.

least the skinning of animals that are injured but not dead), the HSUS and similar organizations are absolutely right: in countries where fur farming is completely unregulated, practices may occur which are simply indefensible. But another extreme by far are those farmers who work under regulation (in some countries meeting very specific legal husbandry requirements), and/or with a personal ethic that the animals in their care should not suffer. How do welfare standards on such farms objectively compare with the ways that food animals, research animals, pets and zoo animals are treated in those same countries? They are similar to many, and considerably better than some. There are therefore lessons that other sectors could learn from the mink industry.

However, by the same token there are lessons that even the most responsible elements of the fur industry need to learn from other sectors. Alleviating the hunger caused by food restricting breeding females is one. Enriching cages (and modifying other aspects of husbandry) to reduce stereotypic behaviour, along with other benefits, is another. Some enrichment of cages is becoming standard practice in, for example, some Scandinavian countries, but in others (e.g. the US and Canada) it is far from the norm. Even simple enrichments like wire cylinders, year-round straw, and lengths of rope may have marked effect on mink behaviour and welfare (e.g. Jeppesen 2004, Hansen et al. 2007, Mason in prep.), and, especially in a climate where fur farming seems scrutinised more closely and harshly than many other animal sectors, finding functional, cost-effective ways of enriching environments and reducing ARB are to be encouraged.

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