**Mink**

Scientific Papers summary

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*Note: All presented information come from scientific papers collected in Mendeley “Fur farming (scientific evidence)” database and are accessible by using the citation references.*

1. **BIOLOGY OF MINK**

Feral mink which have escaped from farms have become established in Europe. Extensive studies of such animals indicate that kits do not leave their natal territory until 11 or 12 weeks of age, that climbing, swimming and diving are significant aspects of their lifestyle, that they regularly engage in travelling and foraging over distances of at least 1-3 km, that they make use of a number of different dens and that they probably make extensive use of scent-marking and olfactory cues.

1. **WHY MINKS ARE NOT SUITABLE FOR FARMING**

Minks are highly active animals, in nature they are covering large areas, using multiple hidings, actively swimming, hunting and exploring they environment. Therefore farm conditions compromise their welfare in many aspects. Cage enrichment is not enough to reduce stereotypic behaviour in mink **(Axelsson, Aldén, & Lidfors, 2009)**

* a positive correlation between species stereotypic behaviour levels and the distances they typically travel in the wild and/or their natural home-range sizes; and that territorial carnivores will display more pacing than non-territorial species **(Clubb & Mason, 2007).**
* The American mink in the wild, for example, often criss-crosses its entire territory in just one single day; will do so repeatedly, day after day, month after month and sleeps in regularly used dens scattered within what must be an extremely familiar, intimately known patch of land **(Clubb & Mason, 2007).**
* The important missing variables in captivity could actually be the stimuli and the challenges that are encountered when ranging widely in the wild: for example, it could be that regular or substantial variation in the visual, olfactory, auditory and tactile cues coming from the surroundings is important; or the cognitive challenges of decision-making, and/ or of spatial learning and navigation **(Clubb & Mason, 2007).**
* Indeed, some mink on every farm show self-mutilation in the form of fur chewing (Joergensen 1985; de Jonge & Carlstead 1987) and many show high levels of stereotypies (de Jonge et at 1986): neither of these problems occur in the wild (Mason 1991b; Dunstone 1993), nor have been mentioned in relation to other captive conditions, such as zoos (eg DonCarlos et at [1986]) **(Nimon & Broom, 1999).**
* Most mink activity in North America and Europe occurs in water, or within 100-200 m of it (Dunstone 1993). A radio-tracking study of 19 mink in southern Finland found that both sexes swam distances of 250m almost daily, sometimes twice a day (Niemimaa 1995), and a large proportion of the wild mink's diet is generally derived from aquatic sources (Day & Linn 1972; Poole & Dunstone 1976; Birks & Dunstone 1985; Dunstone & Birks 1987; Niemimaa & Pokki 1990, cited in Niemimaa [1995]; Dunstone 1993). It seems clear that swimming and diving are highly significant aspects of the mink lifestyle **(Nimon & Broom, 1999).**
* Mink have been noted for their agility and flexibility (Rice 1967) and for their ability to climb trees (Burton 1979). *Cited in* **(Nimon & Broom, 1999).**
* Mink spent 5 per cent to 20 per cent of the 24h period (on average, approximately 3h) actively foraging outside their dens **(Nimon & Broom, 1999).**
* Home range lengths of individual radio-tracked feral mink have been found to vary from 0.5-5.94 km (Gerell 1970; Birks & Linn 1982), although Birks and Linn (1982) considered these upper estimates to have been affected by the behaviour of males with unstable social environments (such males travel distances up to 30km [Niemimaa 1995]). They estimated mean home range length to be between 1 and 3km. A recent study of five mink in eastern Tennessee measured mean home range lengths of between 5.6 and 11.1km in autumn and early winter (Stevens et a/1997). Mink use a number of dens within these ranges: Gerell (1970) recorded mink using between two and five dens, changing dens on successive nights to a den usually 500m distant (although sometimes as far as 2000m); Stevens et a/ (1997) recorded the use of between 8 and 24 dens per mink, with overnight trips between them of up to 4300m **(Nimon & Broom, 1999).**
* Travelling and the use of several den sites are, therefore, significant components of feral mink behavioural biology. The fact that physical activity is important to mink has also been suggested by experimental studies showing that caged mink will run on a wheel for no reward **(Zielinski 1986).**
* It is not known for certain that mink actively defend their home ranges as territories, however male territories never overlap (Dunstone 1993). Females may tolerate the intrusion of kits for part of the year, and can on occasion have territories partially overlapping with males, especially during the breeding season (Dunstone & Birks 1983; Dunstone 1993). Cited in **(Nimon & Broom, 1999).**
* The biology of feral mink indicates that various olfactory, auditory and visual stimuli may have significant effects on mink, although such effects may be unrecognized by humans. Dunstone (1993) has commented that given the mink's (likely) high dependence on olfactory stimulation in detecting and even recognizing conspecifics, the overwhelming aroma on farms might be a source of chronic irritation. **(Nimon & Broom, 1999)**
* Undoubtedly, the olfactory environment and lighting conditions on farms also differ greatly from conditions in the wild **(Nimon & Broom, 1999).**
* The nest in farms usualy have a net roof. Mink in standard cages without nest boxes had a lower level of circulating eosinophil leucocytes than mink with nest boxes - a reaction seen in mink subjected to acute immobilization (Heller & Jeppesen 1985). The effects of the absence of a nest box were comparable with those produced by 30-min immobilization sessions. Furthermore, female mink housed without nest boxes also had higher cortisol levels than those housed with nest boxes **(Nimon & Broom, 1999).**
* Bigger cage won’t help: Research does not suggest that increases in cage size in the absence of further enrichment improve the welfare of farmed mink **(Nimon & Broom, 1999)**
* Toys won’t help either: The toys had no effect on physiological measures (e.g. eosinophil or cortisol levels ), on the extent of bite marks recorded on pelts, or on levels of stereotypy, although the method of recording mink behaviour (involving an observer close to the cages) may have reduced the incidence of stereotypic behaviour **(Nimon & Broom, 1999)**

Fur farmers often use the argument that the welfare of mink must be good because otherwise animals wouldn’t reproduce:

* Successful breeding alone however cannot indicate whether welfare is good, as many animals which are successfully bred under farm conditions are found to have severe welfare problems **(Fraser & Broom 1990)**

1. **IT IS NOT POSIBLE TO SIGNIFICANTLY IMPROVE WELFARE OF MINK**

There were multiple ideas to improve welfare of farmed mink but all of them failed. Most of them reduces stereotypy (a syndrome of low welfare) but does not eliminate it completely. And even if it does, the lack of stereotypies in itself does not mean that the welfare is high:

* Studies aimed at improving housing conditions for mink have, on the whole, been conceived and conducted within the framework of the standard cage environment. This has limited the aspects of mink housing welfare which have been subject to scientific investigation **(Nimon & Broom, 1999)**
* If mink doesn’t show stereotypies it doesn’t necessarily means that it has better welfare **(Steffen Werner Hansen & Jeppesen, 2006).**
* Highly stereotyping female mink had lower baseline levels of plasma cortisol than those showing low levels of stereotypy (Bildsoe et al 1991) cited in **(Nimon & Broom, 1999).**
* Animals in very poor conditions often don’t show stereotypies **(G J Mason & Latham, 2004).**
* Complementary insight into basis of stereotypies. Also overview and criticism on research methods **(R. Clubb, 2006).**
* Food restriction and immobilisation result in more stereotypies and abnormal behaviour. Animals that show less stereotypies have higher cortisol levels than those that show more stereotypic behaviour in the same circumstances. **(Bildsøe, Heller, & Jeppesen, 1991).**
* Mink females with high stereotypy have higher fertility rates, more offspring and lover offspring mortality, also lover weight. Interesting, this suggests that animals without stereotypies are maybe not lest stressed but just don’t show symptoms **(L.L Jeppesen, Heller, & Bildsøe, 2004).**
* Running wheel substitutes for stereotypies in mink. But no change in cortisol was noticed. This could suggest that stereotypy is just one way to deal with extreme stress and harsh living conditions **(Steffen W. Hansen & Damgaard, 2009).**
* Larger and enriched cages reduce stereotypic behaviour in young minks (but does not eliminate it completely) **(Reepalu, 2008).**
* Cage enrichment reduced stereotypies in mink **(Malmkvist & Palme, 2007).**
* Mink in large enriched environment show less stereotypies and tail biting **(Lindberg, 2004).**
* Early weaning, individual housing and small cages promote the development of stereotypies in farmed mink **(L.L Jeppesen, Heller, & Dalsgaard, 2000).**
* Pair rising vs Family rising of mink. Less injuries and aggression in pair housing but lower cortisol and feed consumption in family **(Hänninen et al., 2008).**
* Climbing cages result in more bite marks than standard. It is a little better if minks have access to two nest boxes (one is not good) or there is only 2 animals in cage **(Leif Lau Jeppesen, 2008).**
* Kiling of mink with usage of CO2 is highly aversive for mink and not humane **(Cooper, Mason, & Raj, 1998)**

1. **SWIMMING IS ESENTIALY IMPORTANT FOR MINK WELFARE**

Swimming is essentially important for mink. Most mink activity in North America and Europe occurs in water, or within 100-200 m of it (Dunstone 1993). A radio-tracking study of 19 mink in southern Finland found that both sexes swam distances of 250 m almost daily, sometimes twice a day (Niemimaa 1995), and a large proportion of the wild mink's diet is generally derived from aquatic sources (Day & Linn 1972; Poole & Dunstone 1976; Birks & Dunstone 1985; Dunstone & Birks 1987; Niemimaa & Pokki 1990, cited in (Niemimaa [1995]; Dunstone 1993). It seems clear that swimming and diving are highly significant aspects of the mink lifestyle **(Nimon & Broom, 1999):**

* Even 70 generations of breeding didn’t changed basic instincts and needs of mink. Thereforedeprivation from water results in the same stress level as deprivation from food (after 70 generations of breeding without water) **(Georgia J Mason, Cooper, & Clarebrough, 2001)** *(NATURE article)*
* Swimming reduces stereotypy. Need to swim can be stronger/weaker, it depends on genetics **(Mononen, Mohaibes, Savolainen, & Ahola, 2008)**

1. **GENETIC SELECTION TO IMPROVE WELFARE**

There are some ideas to genetically improve minks to cope better with the environment in fur farms however it is probably not possible as:

* Genetic selection of mink to reduce stereotypy increase fearfulness. This suggests there is no way to improve welfare with genetics. You can only try to eliminate the symptoms (stereotypy) but not the cause **(Leif Lau Jeppesen, 2007)**
* Genetic selection of mink to reduce stereotypy reduce cortisol level but increase fearfulness **(Svendsen et al., 2007)**
* In contrast to the thousands of years during which animals such as cattle or pigs have adapted to farming by humans, mink have been kept in captivity for only 80 or fewer years **(Nimon & Broom, 1999)**
* Even 70 generations of breeding didn’t changed basic instincts and needs of mink. Thereforedeprivation from water results in the same stress level as deprivation from food (after 70 generations of breeding without water) **(Georgia J Mason et al., 2001)**
* Natural fear of humans affects mink welfare **(Kirkden & Pearce, 2010)**

There are however some arguments for genetic selection:

* Selective breeding for temperament in mink can lead to reduced fearfulness **(Malmkvist & Hansen, 2001)**

(But there is still no evidence that eliminating fearfulness by itself would improve welfare of mink. There is also a possibility that fearfulness is correlated with another gene and this type of selection could result in some further changes).

1. **HEALTH PROBLEMS IN FUR FARMING**

Minks die of a wide range of diseases which suggests that the breeding conditions and methods are far from optimal:

* Minks most often die of: emaciation (starvation), infections, stone formation in the bladder and kidneys, enlarged fatty liver and biting trauma. Females additionally die from: emaciation, birth problems, mastitis and especially “diegivningssyge” **(Clausen, Forskningscenter, & Herningvej, 2007)**
* An incidence of ulcers in 35 per cent to 40 per cent of kits, and in 55 per cent of adults, was reported by Wahlstrom (1987, cited in HaITiet al [1995]). Ulcers were the result of stress and an inability to cope with farm conditions (Kollberg & Bjorkland 1989, cited in Harri et al [1995]). Cited in **(Nimon & Broom, 1999).**
* The unsuitable conditions are so hard for young mink that even details like drinking device too far from nest for mink kits results in that they don’t drink enough. Mortality in mink kits is high (physical and physiological underdevelopment, hypothermia, infectious diseases, starvation, and dehydration) **(Brink, Jeppesen, & Heller, 2004)**

Some practices in fur farming industry are increasing stress and compromising welfare of animals even more:

* Female mink are slimmed during the winter to best prepare them for flushing (process of feeding a lot of food after period of starvation to force estrus) immediately before the mating season. Slimming result in increase in stereotypies **(Damgaard, Hansen, Børsting, & Møller, 2004)**

Separation from mother at low welfare conditions result in self mutilations in young mink:

* Animals separated from mothers at earlier stage showed more self tail-biting behaviour than those that stayed longer with mother **(G J Mason, 1994)**

1. **MINK IS A SOLITUDE ANIMAL**

Minks are not meant to be kept in groups:

* There is more fur damage if animals are kept together hovever it ocures that even if kept in solitude skin damage ocurs as a result of self mutulation or injuries caused by cage elements **(“Hansen Houbak Malmkvist 1998 Fur damage” 1998)**
* Group cages in mink increase body damage **(A. S. W. Hansen & Møller, 2010)**
* There is acceptable evidence that kits on mink farms are weaned too early. Such mink may be deprived of an aspect of social development which could lead to them becoming better-adjusted adults.

1. **ITS GOOD TO KNOW THE ARGUMENTS OF THE INDUSTRY**

A big part of fur farming industry arguments are presented in: “Short communication some comments on the review of Nimon and Broom on the welfare of farmed mink” as a comment to article “Domestication of mink, unnatural environment, stereotypies” **(Communication, 2001)**

Another article that can be used by fur industry is a review of researches on mink need to access water. Final conclusion is that mink will miss water only if it has ever experience it in its life **(Vinke et al., 2008).** This is not true, see article by Georgia J Mason, Cooper, & Clarebrough, 2001 in prestigious scientific journal NATURE)

Different ideas to improve welfare has been tested in Leif Lau Jeppesen article. Their examined: selection for confident animals, additional feeding during winter-time, placement of mated females in every second cage, later weaning and later placement of kits in male female pairs, fitting out cages with shelves and detached occupational objects. The conclusion is that it is possible to significantly improve animal welfare with some of those enrichments and that this small improvements are better for welfare that more drastic changes like access to swimming area as they can even induce more stress **(Leif Lau Jeppesen, 2005).**

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