

ASSESSING ANIMAL WELFARE IN A STRICTLY SYNCHRONOUS PRODUCTION SYSTEM: THE MINK CASE

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Abstract

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Most on-farm welfare assessment systems have been developed for use in dairy and pig farms. These production systems are non-synchronous, in the sense that the same processes occur continuously throughout the year. Animal welfare during most or all phases of production may therefore be assessed at any time of the year, except for some effects of season. Many domesticated farm animals such as sheep, goats, deer and mink are seasonally synchronised in their production, in the same way as were their wild ancestors. A comprehensive welfare assessment system including animal-based indicators for these species must therefore take an entire production cycle into consideration. This can be illustrated by a welfare assessment protocol developed and tested by the Danish Institute of Agricultural Sciences (DIAS) for mink production. The DIAS concept is based on indicators from four sources: the system, the system's management, animal behaviour, and animal health. An advantage of seasonality is that the measurement of welfare indicators can be optimised and standardised in terms of age/season and sample size, making reliable results relatively cheap to obtain. Furthermore, there is ample time to plan the requisite interventions. A disadvantage of seasonality is that the entire herd may have been at risk when a welfare problem is disclosed by direct animal-based indicators; for example, the entire herd may have been exposed to a social grouping causing bite marks, which can be observed at pelting. Based on observation of the social grouping, this can be corrected before fighting and biting occurs. Based on observation of the bite marks, corrections are postponed until next season. Welfare assessment intended for decision support in a synchronous production system should therefore include a higher proportion of early indicators based on the system and management, in order to prevent the development of potential welfare problems involving the entire herd. The assessment of animal-based indicators may be relatively cheap and more reliable in synchronous production compared to non-synchronous production, and these indicators are therefore given high priority as they reflect the welfare resulting from the corrections made based on indirect system and management indicators.

Keywords: *animal welfare, mink, synchronous production*

Introduction

Most farm animal welfare assessment systems have been developed for use in cattle and pig farms (eg Bartussek 1999; Bracke 2001; Capdeville & Veissier 2001; Rousing *et al* 2000). These production systems are non-synchronous, in the sense that the same processes may occur continuously throughout the year. Welfare in most phases of production may therefore

be assessed at any time of the year (except for seasonal effects, such as temperature in open housing systems). If a welfare problem is disclosed in a particular production period, only the group of animals actually within this period is affected. Often, management action is taken in order to improve the welfare of the next group of animals entering the production period in question.

Some domesticated farm animals such as sheep, goats and mink are seasonally synchronised in their production in the same way as were their wild ancestors. The objective of the present paper is to illustrate the implications of a seasonally synchronised production system on welfare assessment using a protocol developed and tested by the Danish Institute of Agricultural Sciences (DIAS) for mink production.

The DIAS concept is based on selection of indicators for a welfare protocol through a three-step evaluation process. In first step the independent welfare relevance of potential indicators is evaluated. In the second step the added marginal information value of each indicator, given the other indicators, is evaluated. In the third step the indicators' suitability for on-farm use, in terms of reliability and cost of measurement, is evaluated (Møller & Hansen 2000; Rousing *et al* 2001).

Welfare assessment in seasonally synchronised animal production

An operational welfare assessment system is built by aggregating welfare indicators from four sources: the system, the system's management, animal behaviour, and animal health (Rousing *et al* 2001). The production system does not usually change with the season, and welfare assessment based on indirect measures is less dependent on the degree of seasonal synchrony of production. A comprehensive welfare assessment system including direct animal-based indicators, however, must take an entire production cycle into consideration, as welfare problems may occur during any production period around the year.

The seasonality also has some implications for the management cycle. In general, management at the tactical level differs between synchronous and non-synchronous production systems, because of the time lag between each step in the chronological sequence of measurement, comparison and adjustment in the feedback loop of the management cycle (Møller & Sørensen 2003). Because of this time lag, there may not be time to complete the management cycle within short seasonal production periods. If this is the case, the adjustment is postponed until the next cohort of animals enters the production period in question next year. A welfare assessment protocol intended for decision support must therefore take this time lag in the management cycle into consideration.

Direct animal-based welfare indicators such as health and behavioural measures, which have a high information value regarding the actual welfare status of the animals, often do not allow the stockman to take action in time to improve the welfare of the actual group of animals. As a consequence, the inclusion of indirect welfare indicators that may disclose a potential welfare problem in time to allow for management decisions could be justified in synchronous production systems. If the purpose of the welfare assessment is to provide decision support for the farmer, early indirect indicators reflecting potential welfare should therefore be included, even if they have low marginal information value given the direct animal-based indicators reflecting the resulting welfare. For example, the entire herd may have been exposed to a social grouping causing bite marks, which can be observed at pelting. Based on observation of the social grouping, this can be corrected before fighting and biting

occurs. Based on observation of the bite marks, corrections are postponed until next season. In a strictly seasonally synchronised animal production system, all animals are exposed to the production factors prevailing during the production period and year in question. The entire herd is thus prone to welfare problems that may arise during a given period, which gives further motivation to a principle of precaution by inclusion of early indirect welfare indicators in order to prevent potential welfare problems.

In the development of a welfare assessment protocol for a strictly seasonal production system, the time factor is therefore more important than the information value of a given indicator. Furthermore, a greater number of actions to prevent risk factors threatening welfare can be justified in seasonal species, where the whole herd may be at risk.

Development of a welfare assessment protocol for the strictly synchronous mink production system

The purpose of the present welfare assessment system for mink production is to serve as an advisory tool to allow the farmer to evaluate welfare at farm level and, further, to identify welfare problems in a context that facilitates problem-solving. Measurements of health status and behaviour relate directly to the animals in question, whereas system description and system application may provide information on potential welfare problems and their causes. The DIAS on-farm welfare assessment systems were developed by aggregating relevant indicators into a welfare indicator protocol using a “bottom up approach” (Rousing *et al* 2001). Potential welfare indicators were evaluated step by step regarding their independent relevance, their marginal welfare information value and their applicability for on-farm studies (Møller & Hansen 2000). Because of the strictly synchronised mink production system in which all animals follow the same annual cycle of different production periods, welfare was evaluated within each of the three major periods:

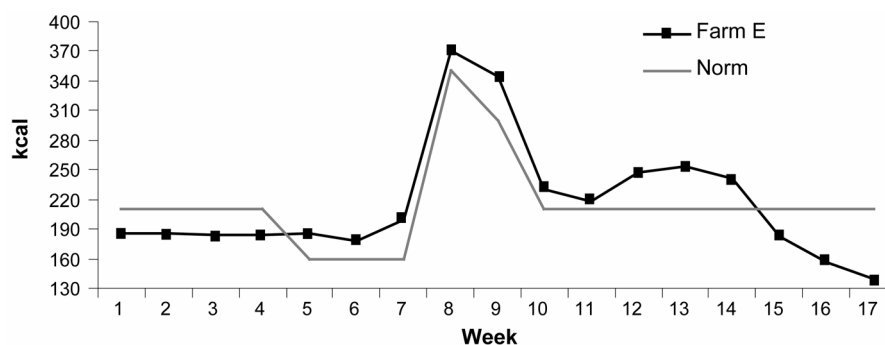
1. January–March: winter, nutritional flushing (Tauson 1993) and mating.
2. April–June: gestation, birth, lactation and weaning.
3. July–December: growth, selection and pelting.

An advantage of seasonality is that measurement of welfare indicators can be optimised and standardised for age/season and sample size — for example, recording of injuries may be carried out when the mink are pelted in November. Inspection of large samples and use of standardised procedures makes the results reliable and comparable between years and between farms. Furthermore, there is ample time to plan the requisite interventions.

A disadvantage of seasonality is that the entire herd may have been at risk when a welfare problem is disclosed by direct animal-based indicators. In order to increase the chance of discovering a potential welfare problem in time to allow for adjustments in management within the production period, several welfare indicators, which would otherwise have been disqualified because of their marginal information value, were included in the protocol. For example, average daily feed allowance (Figure 1) was included in order to predict potential weight loss, although actual weight loss or the development of stereotyped behaviour are more precise indicators of the resulting welfare. Similarly, the strategy for separating kits and the ratio of cages to breeding females and to kits born were determined in order to estimate whether all kits could be separated into welfare-optimal male–female pairs during the growth period, although the number of bite marks is a more precise indicator of sub-optimal social grouping (Table 1).

Table 1 Welfare indicators related to separation of kits, used in welfare assessment at farm level on six Danish mink farms in 1999–2000.

Indicator	Relevance as welfare indicator
Management indicators	
<i>Separation (Period 3)</i>	Separation into anything other than male–female pairs increases the frequency of stereotypy and bite marks, indicating reduced welfare.
<i>Strategy (Period 1)</i>	
System indicators	
<i>Number and type of cages (calculated per mated female in Period 1; per kit in Period 2)</i>	For optimal welfare the number of cages must allow for all breeder mink to have separate cages and for all kits to be separated into male–female pairs. Furthermore, provision of 5% extra cages will allow for separation of kit pairs that fight (or for a small increase in expected litter size). The minimum number of cages may therefore be calculated as: (number of breeders kept during summer) + [(number of (expected) kits × 0.5) + 5%].
Animal health indicators	
<i>Physical injuries and bite marks (Period 3)</i>	Physical injuries and bites penetrating the skin are painful, irrespective of the cause. Bite marks in the tail region of female skins are a good indicator of fighting.

**Figure 1** Energy allowance in kcal per mink per day during weeks 1–17 (January to April 1999). Weekly average to males and females based on feed delivered to farm E.

Discussion

The difference between on-farm welfare assessment of seasonally synchronised and non-synchronised animal production is related to the purpose of the welfare assessment. If the purpose is solely to assess the welfare for external use, the only difference is that indicators have to be taken all year round in seasonal species. If the purpose of the welfare assessment is to provide decision support for the farmer, the importance of an indicator increases with the relevance as management information, relative to the welfare information value. Because of the time lag of the management cycle, there is a trade-off between the information values relative to management and relative to welfare. This trade-off is less relevant in non-synchronised productions where only a fraction of the animals is ‘at risk’ in each phase of production at a given moment.

As shown, the indirect indicators with low marginal information value allow for management decisions such as the reduction in number of breeders or the provision of extra cages. Direct observation of the number of kits in each cage, or the animal-based observation of bite marks in the skin, are more precise indicators of the resulting welfare if two mink of the same sex are caged together after August.

Animal welfare implications

The inclusion of indirect welfare indicators into the welfare assessment protocol allows for management decisions that may prevent the entire annual herd of synchronous animals from being subjected to potential welfare-hazardous factors.

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