

ON-FARM ASSESSMENT OF THE EFFECT OF MANAGEMENT AND HOUSING TYPE ON BEHAVIOUR AND WELFARE IN DAIRY CATTLE

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Abstract

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There is a trend toward increasing intensification in dairy farming in the United Kingdom. In particular, there is concern over systems in which cows are housed throughout the year, as the behavioural restriction implicit in these systems is associated with poor welfare in other species. The aim of this on-going project is to determine how this affects the behaviour and welfare of dairy cattle. A range of behavioural, physical and health measures are being used to assess cow welfare on about 40 commercial British dairy farms. Initially, five farm types were identified from analysis of returns from a farmer questionnaire. Milk production level and housing type were the principal factors explaining variation in farm type. The sample groups are: high-, mid- and low-production cubicle-housing units, mid-production straw-court units, and cubicle-housing high-production zero-grazing units. Observations will take place over three winter housing periods (2000/01 to 2002/03), with recording on each unit taking five days. Our main hypothesis is that the behavioural and physical responses of 'at-risk' younger cows provide a sensitive indication of farm-level 'stress'. Cows are marked according to age, and the feed-face videotaped continuously to record feeding time and social interactions. Temporal organisation of behaviour will be analysed using fractal mathematics and qualitative assessment approaches used in a human interaction test. Cow cleanliness, condition score, response to a novel object and the incidences of lameness and leg injury are recorded, and building quality is assessed. Ultimately, multivariate methods will be used to test our underlying hypothesis and to assess effects of housing and production type on behaviour and welfare. This analysis may identify key objective measures of welfare for use in farm assurance schemes.

Keywords: *animal welfare, behaviour, dairy cows, welfare assessment*

Introduction

In some sectors of the dairy industry in the United Kingdom there is a trend toward increased intensification. This is characterised by an increase in mechanisation and, importantly for welfare, a longer housing period, with some herds housed throughout the year. This trend is of concern as intensive husbandry conditions are associated with poor welfare in other species, particularly broiler chickens and pigs. The opportunity for animals to perform natural behaviour in these systems is restricted and animals may develop stereotypies. The impact of more intensive systems on cow welfare needs to be assessed while the systems are not yet widely used, so that any detrimental aspects of the system can be dealt with. There are other factors that also affect animal welfare, such as level of milk production, type of

housing and management system, which need to be taken into account. Our aim was to assess these effects on welfare in an on-farm study of dairy units across the country, with an emphasis on animal behaviour. The study began in 2000 and will be completed in 2003.

Any welfare assessment scheme should include measures of the system and measures of the effects on the animal, so that welfare impacts can be detected and their causes determined (Rushen & de Passillé 1992). To achieve this, our study assesses the quality of the buildings and the management and feeding regime, as detailed below. Measures are taken of health and behavioural traits such as levels of competition. Although overt behavioural indicators of poor welfare, such as the performance of stereotypies, are not generally associated with loose-housed dairy cows, there is evidence that certain groups of animals may be at risk. Our hypothesis is that heifers are such an 'at-risk' group, and that their welfare state will be an indicator of overall farm-level 'stress'. Heifers are often smaller than the other cows, and may face high levels of competition for resources such as space at the feed troughs and for cubicles. Therefore, while many of our measures of welfare are carried out on all cows in the group, some of the more intensive sampling techniques focus on heifers, with an equal number of older animals assessed as a control.

Methods and results

To determine whether management factors affect animal welfare, we needed to compare groups of farms with similar characteristics. However, farms vary a great deal in aspects such as the housing and management system and the type and number of cows. Therefore we needed to find some way of grouping farms, with the groups being representative of farm types in the UK. To do this, we sent out a questionnaire to dairy farmers across the country. The questionnaire consisted of twenty-eight questions asking about the physical and geographical aspects of the farm, the cows, the housing and the feeding system. A principal components analysis was used to analyse the data from the questionnaire. Two components, level of milk production and type of housing system (cubicle housing or straw courts), accounted for 35% and 21% of the variation in farm type, respectively. Therefore we chose sample groups of farms with the following key characteristics: high levels of milk production and cubicle housing, medium levels of milk production and cubicle housing, low levels of milk production and cubicle housing, and medium levels of milk production with straw-court housing. Most of the farms which housed cows throughout the year had high levels of production and cubicle housing, so these criteria were used to define our fifth group.

The farms are sampled during the winter housing period to standardise conditions. Sampling on each farm takes place over a five-day period. Over three winter sampling seasons (2000–2003), we aim to sample between thirty-five and forty farms. One early or mid-lactation group of cows is sampled, as there is evidence that this is the period when the cows are the most stressed (Nielsen *et al* 2000). All cows in this group are marked with their lactation number. The following measurements are taken:

(1) Behaviour

Time budgets: in four 3 h periods (two morning and two afternoon periods), the behaviour of all cows in the group is recorded every 15 min.

Test of reactivity/fear: reaction to a novel object is assessed.

Qualitative assessment of state: the individual animal's reaction to the approach of a novel human is assessed in a sub-sample of heifers and older cows.

Aggression and positive interactions: the number and type of displacements from the feed trough and age of aggressor and recipient, and the number of positive interactions between cows, are scored from videotape of the feed trough.

Feeding patterns: the temporal sequence of feeding patterns of heifers and older cows will be assessed using fractal mathematics. This method has been shown to be capable of distinguishing stressed from non-stressed animals (Rutherford et al 2001).

(2) Health

Lameness or locomotion score.

Condition score.

Cleanliness score.

Incidence of physical injury.

Somatic cell count taken from milk recorder data.

(3) Management and buildings

Quality of stockpersonship (see Rennie *et al* 2003, pp 591–597, this issue): observations are made of the stockhandler moving the cows to milking, and an attitude question is given to the stockhandler.

Buildings audit: measurements are made of features that affect welfare, such as width of passageways and dimensions of cubicles (see Howell *et al* 2003, pp 547–552, this issue).

Farmer breeding records and milk recorder data are taken.

Discussion

At the end of the project a number of analyses will be carried out. The effect of farm type on welfare indicators, such the level of aggression or lameness, will be assessed. To determine how design and management factors contribute to welfare, correlations between the relevant variables will be calculated. The impact of these factors on heifers will be compared with their impact on older cows. Additionally, a multivariate analysis will be carried out to determine how additional factors such as group size, milk production level and quality of stockpersonship affect welfare. These analyses may also identify key objective measures of welfare for use in farm assurance schemes.

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