How Now Brown Cow?
Advances in Dairy Cattle Welfare Assessment

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Introduction

The accurate assessment of dairy cattle welfare is crucial to a scientific understanding of current conditions of welfare on dairy farms, and to enable subsequent improvements in this industry. Obtaining accuracy in welfare research may be difficult in terms of experimental design, data collection, interpreting results and dealing with confounding variables. Research may be qualitative or quantitative and includes diverse techniques, such as preference testing, observational studies, measurement of parameters such as cortisol levels, or surveying animal handlers. This article reports on several recent advances in the welfare assessment of dairy cattle, with examples of both novel procedures and technologies, and of refinements in existing research methods.

Discussion

Waiblinger *et al.* (2006) have reviewed the assessment of human-animal interactions across a number of livestock species. The quality of human-animal interactions may have a significant impact on cattle welfare and dairy farm productivity, and has been found to account for up to 19% of the variation in milk yield between farms (Breuer *et al.*, 2000). Methods for assessing human-animal interactions have included measuring and observing cattle responses to the presence of stationary or active humans, and positive or negative handling, and surveying the attitudes of farmers (Breuer *et al.*, 2000; Waiblinger *et al.*, 2006). Waiblinger *et al.* found that in measuring interactions there are numerous important and potentially confounding variables, many of which have not been fully investigated. Several areas were emphasised as requiring more research, including the significance of animal vocal and olfactory signals. Additionally, it was suggested, there needs to be measurement of positive interactions between humans and cattle, as previous research has focussed on negatives. Such research is important, as educating animal handlers may have a significant impact on welfare and productivity at a relatively low cost.

As well as human-cow interactions, cow interactions with conspecifics have an enormous impact on their ability to access resources, such as food and resting spaces, and thus their welfare (Webster, 2005). An ethogram is a description of the range of activities, and time allocated to these activities, by a species and class of animal (Webster, 2005). Rousing and Wemelsfelder (2006) devised an ethogram for dairy cattle, and investigated the reliability of qualitative assessment by observers. Qualitative assessment was carried out by observing cows and using descriptors for their behaviour, such as ‘calm,’ ‘aggressive’, or ‘sociable’, and quantitative assessment of these cows was carried out using video footage of the observed behaviour. It was found that the qualitative assessment closely correlated with the quantitative results, suggesting that observational studies of cow interactions are a reliable means of welfare assessment.

Time pressures on cattle may influence the priority given to the acquisition of different resources. Melin *et al.* (2006) used an observational study to assess effects of

social rank on dairy cattle in an automatic milking system. It was found that cows of low rank spent significantly longer waiting to be milked, reducing the time they could spend on other activities. Munksgaard *et al.* (2005) conducted a quantitative study of 80 cows, measuring the relative priorities given to eating, lying down and social behaviour, by altering the time available for performance of these behaviours. Cows were placed for varying periods in solitary pens where they were prevented from lying down, eating, or having any contact with conspecifics. For the rest of the day, cows were placed in a pen where they could have social contact, feed, or lie down, but not concurrently. It was found that lying down was of higher priority for cows than eating time and social contact, and that cows partially compensated for reduced eating time through increasing eating rate. Changes to time-budgets may be particularly significant in Australia, where increasing herd sizes may be correlated with long waiting times for milking. This may negatively affect low-ranked cows or heifers disproportionately.

To complement and as an adjunct to traditional research methods, technology has great potential as a means of regular, reliable monitoring of welfare. Additionally, many technologies require little input or labour from farmers. Monitoring production characteristics for dairy cattle has been made easier in recent years through increasing use of technologies, such as milk meters, and automatic identification in the milking parlour. Pastell *et al.* (2006) suggest that in-parlour technology may also be used to assess welfare. Balances placed under each foot of the cows were found to be able to accurately collect data from cows approximately every second milking. In an automatic milking system, this data provided information on weight, weight on each leg, number and frequency of kicks, and length of milking. Such data may be used to identify problems, including lameness and, through the kick recordings, even illness such as mastitis (Rousing *et al.*, 2004; Tasch and Rajkondawar 2004; Pastell *et al.*, 2006).

The weighing system proposed by Pastell *et al.*, in combination with other measurements, such as milk cell count, shows great potential for monitoring cattle welfare on farm with minimal labour requirements. This system is designed for use in robotic dairies, which are rare in Australia. As such, a walk-through system as described by Tasch and Rajkondawar (2004) may be more appropriate for lameness detection in Australian extensive dairy systems. Other technological advances in welfare assessment include the use of activity monitors on cows, as described by Müller and Schrader (2003), who successfully used a device attached to cows' legs to obtain research data. While behavioural assessment has traditionally been carried out through observation, technology holds great potential for future research.

Conclusion

Dairy production is an intensive process, putting considerable pressure on the animals involved. With changing practices, such as increasing herd sizes and new milk extraction technologies, it is critical that cattle welfare can be accurately assessed. This report has discussed some of the recent advances in welfare assessment, including both innovations in technology and refinement of experimental techniques. There is scope for using many approaches to welfare assessment, and ongoing research is required to ensure that cattle welfare can continuously be monitored, evaluated, and improved in commercial dairy production.

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