Qualitative assessment of social behaviour of dairy cows housed in loose housing systems

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Abstract

This study evaluates the qualitative assessment of dairy cows' social behaviour on farm with regard to its inter- and intra-observer reliability and its correlation to quantitative ethogram-based assessment. Qualitative behaviour assessment is a method based upon the integration by observers of perceived animal behaviour expression, using descriptors such as 'calm', 'aggressive', 'sociable' or 'indifferent'. Cows' behaviour at the drinker was video recorded in five commercial dairy herds with loose housing systems. Qualitative assessment of 25 video clips showing various types of cows' interaction was provided in two replicate studies by 12 experienced dairy cow observers, through the use of a methodology called free choice profiling (FCP). This method gives the observers complete freedom to choose their own descriptive terms. Furthermore, an ethogram was used to quantify the cows' social behaviour in the same 25 video clips. The ethogram included frequency and duration of social licking, head and body sniffing, pushing, head butting, fighting and behavioural response to pushing or head butting. Data of the qualitative assessment were analysed with generalised procrustes analysis (GPA), a multivariate statistical technique associated with FCP. The correlation between qualitative and the quantitative assessment of the 25 video clips was investigated by calculating Spearman rank correlation between the qualitative assessments and the calculated frequencies and proportional durations of the ethogram measures. The results indicate that observers showed significant agreement in their qualitative assessments ($P < 0.001$) and could accurately repeat these assessments ($P < 0.001$). The GPA found two main dimensions of assessed social behaviour expression in dairy cattle which together explain 74% of the variation observed. Dimension 1

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was characterised as 'relaxed'/'calm' versus 'aggressive'/'bullying' and dimension 2 as 'passive'/ 'indifferent' versus 'playful'/'sociable'. The qualitative scores of individual social interactions on these dimensions were correlated significantly to the quantitative measurements of cows showing social licking, head butting and response to pushing or head butting in the respective video clips. Thus, cows showed more social licking in social interactions characterised as 'relaxed'/'calm' ($r_{frequency} = 0.68$; $r_{duration} = 0.68$; both $P < 0.001$) and 'playful'/'sociable' ($r_{frequency} = -0.58$; $r_{duration} = -0.59$; both $P < 0.01$) while in 'aggressive'/'bullying' social interactions cows showed more head butting ($r_{frequency} = -0.55$, $P < 0.01$; $r_{duration} = -0.62$, $P < 0.001$) and response to pushing and head butting ($r_{frequency} = -0.42$, $P < 0.05$). These results suggest that qualitative behaviour assessment may be a reliable method for the assessment of on-farm social interactions in dairy cows.

1. Introduction

Loose housing systems provide dairy cows with the possibility for locomotion and allow them to express a variety of natural behaviours. Furthermore, a well-established social environment may have a positive effect on the adjustment of individuals to the environment through social facilitation and learning, and it has been suggested that a stable social relationship within a herd may be beneficial in reducing the effect of generally stressful conditions (Bouissou et al., 2001). However, when dairy cows are housed in groups there is also a risk of aggression and social disturbance. Aggressive interactions occur in response to establishing and maintaining social order in dynamic groups. Competition for resources (food, water, resting areas, etc.) as well as inexpedient housing design are important causal factors that may induce and increase social stress and aggressive behaviour. (Bouissou et al., 2001).

Social behaviour is thus an important welfare issue in loose housed dairy cattle herds. Although different aspects of social behaviour have been thoroughly studied, the inclusion of social behaviour in on-farm welfare assessment systems is not yet widespread. Some researchers (e.g. Winckler et al., 2002; Haskell et al., 2003) have included measurements of social behaviour in their on-farm welfare assessment systems. Furthermore in a recent study Plusquelle and Bouissou (2001) used detailed social behaviour measurements to characterize temperament differences in two dairy cow breeds. What these approaches have in common is that they address social behaviour measurement quantitatively, based on the use of ethograms that consist of social behaviour elements with varying incidence. Plusquelle and Bouissou (2001) for example assessed fighting ability and dominance in cows by quantifying the latency, frequency and duration of fights, butts, threats, spontaneous withdrawals, head to rump orientation, mounting, sniffing, licking, rubbing, mock fighting, eating, and social distance in different situations including test situations. The authors summarised these data by pointing out whether one breed showed more or less of the listed behaviours than the other breed, and on this basis characterised the fighting and dominance ability of the two breeds.