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Long-term consistency of selected animal-related welfare parameters in dairy farms

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Abstract

It was the purpose of this study to assess the consistency of selected animal-based welfare parameters for dairy cattle throughout a one-year period. Eight cubicle-housed dairy herds were visited five times, at two-monthly intervals. At each visit, lameness, injuries to the carpal and tarsal joints, cleanliness, social behaviour and the avoidance distance towards an unknown person were assessed by the same observer in a random sample.

At herd level, lesions of the carpal joints, udder cleanliness and frequencies of agonistic and cohesive behaviour showed low consistency. However, correlations between consecutive recordings as well as between single visits and the average were moderate to satisfactory for lameness prevalence, lesions of the tarsal joints, cleanliness of the hind leg and avoidance distances towards an unknown person in two different locations. The integration of these parameters into on-farm welfare assessment protocols seems to be justified.

Keywords: *animal-related parameters, animal welfare, consistency, dairy cattle, on-farm assessment, reliability*

Introduction

On-farm welfare assessment schemes, which are based on animal-related parameters (Winckler *et al* 2003), are currently being discussed with regard to reliability issues such as intra- and/or inter-observer repeatability and with regard to the feasibility of elaborated assessment protocols. Furthermore, the question remains how representative single recordings are with regard to potential changes over a longer period. Such changes may occur due to seasonal effects and/or be related to management, thus potentially reflecting changes in the welfare situation of a specific farm. This is less relevant when welfare assessment systems are used as decision support tools (Sørensen *et al* 2001). However, if welfare assessment protocols are going to be used for certification purposes with infrequent or even single assessments only, the representativeness of recordings with regard to the longer-term situation on the farm becomes especially important. The aim of this study was to 1) assess the consistency of selected animal-related welfare parameters for dairy cattle throughout a one-year period and 2), to check the representativeness of one-point recordings with regard to the mean of repeated recordings.

Materials and methods

Between January and October 2003, five half-day visits were carried out in eight cubicle-housed German Holstein herds at bimonthly intervals. The herd size ranged from 29 to 102 lactating cows and the average annual milk yield was 9,262 litres per cow (range 8,426-10,045). Housing differed mainly with regard to the cubicle system (eg lying surface); all but one farm had slatted floors. In four farms, the cows had access to pasture (2-6 hours per day) throughout the vegetation period.

The animal-related welfare parameters used in this study are given in Table 1. Behaviour observations were carried out on the whole herd and avoidance distances were assessed on average in 80% of the cows. For the remaining parameters, a random sample of at least 30% of the lactating animals was assessed (minimum sample size 20 cows). For this purpose the cows were randomly marked in the milking parlour; the sample was re-chosen at each visit. All recordings were carried out by the same two observers.

Data were analysed at herd level (n = 8) using Spearman rank correlations between consecutive visits, as well as between single visits, and for the average of all visits, respectively.

Results

Correlations between consecutive recordings ranged from r_s = 0.48 to 0.78 for lameness prevalence, and from 0.49 to 0.78 and 0.07 to 0.37 for scabs and wounds at the tarsal and carpal joints, respectively (Table 2). Cleanliness scores for the hind leg were more consistent (r_s = 0.60 to 0.83) between consecutive visits than those of the udder (0.10 to

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Table 1 Animal-related welfare parameters used in the study.

Parameter	Method	Reference
Lameness	Gait-scoring, 5-category numerical rating scale.	Winckler and Willen 2001
Skin lesions	Visual examination and palapation of the tarsal and carpal joint, distinction according to size and severity.	Wechsler *et al* 2000
Cleanliness	5-point numerical scale.	Faye and Barnouin 1985
Social behaviour	Direct observations for 2 hours, continuous behaviour sampling	Winckler *et al* 2002
Avoidance distance towards unknown person	a) when cows left the milking parlour, b) at the feed rack.	Waiblinger *et al* 2003

Table 2 Spearman rank correlations between consecutive recordings, and correlations between single recordings and the average for selected animal-related welfare parameters (n = 8 herds).

Parameter		Correlations between visits				Correlations between visits and average				
		v1/v2	v2/v3	v3/v4	v4/v5	v1	v2	v3	v4	v5
Lameness prevalence		0.78*	0.48	0.68	0.71*	0.62	0.91**	0.76*	0.93**	0.71
Skin lesions[1]	Tarsal joint	0.49	0.78*	0.62	0.65	0.86**	0.85**	0.86**	0.72*	0.88**
	Carpal joint	0.29	0.37	0.05	0.07	0.93**	0.29	0.66	0.41	0.17
Cleanliness	Udder	0.10	0.10	0.48	0.61	0.18	0.86**	0.38	0.73*	0.69
	Hindleg	0.83*	0.60	0.74*	0.62	0.97**	0.81*	0.93**	0.60	0.83*
	Total	0.94**	0.54	0.05	0.13	0.94**	0.95**	0.69	0.24	0.79*
Social behaviour	Agonistic	0.38	0.52	0.17	-0.48	0.69	0.76*	0.76*	-0.17	0.26
	Cohesive	-0.29	0.38	-0.14	-0.45	0.71*	0.14	0.79*	0.19	0.69
Avoidance distance[2]	Parlour	0.79*	0.76*	0.81*	0.76*	0.81*	0.80*	0.95**	0.74*	0.85**
	Feed rack	0.79*	0.91**	0.88**	0.86**	0.88**	0.98**	0.93**	0.88**	0.81*

* $P < 0.05$, ** $P < 0.01$.

[1] Scabs and wounds with a minimum size of 2 cm.

[2] Parlour = assessed at exiting the milking parlour.

0.61). High variablity was also observed for both agonistic (-0.48 to 0.52) and cohesive social behaviours (-0.45 to 0.38). However, avoidance distance correlated highly both when it was assessed on cows exiting the milking parlour (r_s = 0.76 to 0.81) or at the feed rack (0.79 to 0.91).

When the results of the single visits were correlated with the average of all five assessments, again lameness prevalence (r_s = 0.62 to 0.93), skin lesions at the tarsal joint (0.72 to 0.88), cleanliness of the hindleg (0.60 to 0.97) and avoidance distances (0.74 to 0.95 and 0.81 to 0.98, respectively) were the most consistent parameters.

Discussion

Based on correlations between consecutive visits, as well as between single visits and the average, the highest consistency was found for lameness prevalence, hock lesions, cleanliness of the hindleg and avoidance distance towards an unknown person.

In contrast to Clarkson *et al* (1996) no clear reduction in lameness prevalence was observed during the summer months (data not shown); although on four of the eight farms the cows had access to pasture. Hock lesions also remained stable during the study period. These findings might be explained by the rather short time spent on pasture per day which probably did not allow for a recovery of the pathologies due to increased walking activity and/or improved floor and resting site quality.

In contrast, the prevalence of wounds and scabs at the carpal joints was far less consistent. Such lesions are less prevalent than at the tarsal joint and small changes in numbers of animals affected lead to rather pronounced relative increases or decreases. On the other hand, the on-farm assessment of lesions at the carpal joint is often difficult, and this might also lead to false recordings.

Cleanliness of the body is dependent on climatic and management factors such as cubicle maintenance. De Rosa *et al* (2003) reported moderate degrees of repeatability for cleanliness scores in cattle farms (2 to 3 week intervals), but did not differentiate different regions of the body. Udder cleanliness can be considered important with regard to cattle welfare, since it may increase the risk of mastitis. However, in this study this parameter was highly variable and the average condition could not be reliably predicted from single visits.

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Short-term on-farm observations of social behaviour may be critical with regard to methodological aspects (eg duration and time frame). Social behaviour is known to be influenced by many factors such as stocking density, the introduction of new animals or the presence of animals in heat and behaviours show a large day-to-day variation (Winckler *et al* 2002). This is possibly reflected in the inconsistency regarding incidences of agonistic and cohesive social behaviours in the study farms.

Avoidance distance towards an unknown person in the home pen has been shown to be highly repeatable when retested after four to five days (Rousing & Waiblinger 2004) or two to three weeks (de Rosa *et al* 2003). Our data provide evidence that this also holds true for avoidance distance measures taken from cows exiting the milking parlour or standing in the feed rack when retested at longer intervals of about two months. There were no consistent correlations of avoidance distances with both agonistic (parlour: r_s = 0.07 to -0.91; feed rack: r_s = 0.02 to -0.74) and cohesive social behaviour (parlour: r_s = 0.91 to -0.74; feed rack: r_s = 0.05 to -0.62). Together with the lack of consistency for social behaviours, a more pronounced effect of the social behaviour of the herd on avoidance distance measures in the feed rack, as suggested by Waiblinger *et al* (2003), could therefore not be found.

Conclusions

In the present study the following selected welfare parameters showed satisfactory to high consistency in the course of five bimonthly recordings, if correlation coefficients above 0.7 are regarded as indicators of 'good' repeatability (Rousing & Waiblinger 2004): lameness prevalence, lesions of the tarsal joint, cleanliness of the hind leg and avoidance distance towards an unknown person. Their integration into on-farm welfare assessment protocols therefore seems to be justified.

On the other hand, valid parameters such as skin lesions at the carpal joint, cleanliness of the udder and social behaviour turned out to be less reliably recordable during single farm visits as regards the average situation on the farm. This indicates that welfare indicators, which may be used in welfare certification schemes, should not only be checked for validity and inter-observer reliability but also for consistency across longer periods of time. However, the degree of accuracy and prediction expected for such assessment systems needs to be further discussed.

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