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Behaviour of dairy cows on organic and non-organic farms

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Summary

There is an increasing number of organic dairy farms in the UK. The aim of this study is to compare behaviour of dairy cows on organic and non-organic farms. Twenty organic and 20 non-organic farms throughout the UK were visited over two winters (2004/05 and 2005/06). Organic and non-organic farms were paired for housing type, herd size, milk production traits and location. The number of cows feeding was counted every fifteen minutes for 4.5 h after new feed was available post morning milking. Behaviour at the feed-face was recorded for 60 minutes and aggressive interactions between cows were quantified. Farm type had no effect on numbers of cows feeding. There were more interactions between cows feeding at open feed-faces compared to head-bale barriers. At open feed-faces, there were more interactions on organic farms than non-organic. It is possible that organic cows were hungrier than non-organic cows after the arrival of new feed.

Key words: Organic farming, animal welfare, behaviour, dairy cows

Introduction

Recent years have seen an expansion in the numbers of dairy farms that have converted to, or are in the process of converting to, organic farming. Organic produce appeals to consumers who are concerned about their health, animal welfare and the effect of conventional agricultural systems on the environment. Not only are organically farmed cows fed on foodstuffs grown without pesticides, but also there are different regulations for drug use and housing standards. Although many organic producer groups claim that the level of animal welfare is higher on organic farms compared to non-organic farms, independent research is required to address this issue.

The EC Regulation (2092/91) on organic production specifies that disease prevention should be based on management systems that promote resistance to disease and recovery from infection, and which should be appropriate for the requirements of each species (CEC, 2004). As part of this general requirement, the Regulation also specifies minimum space allocations per head, with the aim of minimising health problems. There is evidence that reducing stocking density may have a positive impact on dairy cow welfare (Kondo *et al*., 1989). High stocking densities affect the cow's ability to access feeders and lying areas, although housing design also affects aggression and access to these resources.

Assessments of welfare on farm ought to include measures of the system and measures of how the system affects the animals (Rushen & de Passillé, 1992). To that aim, both building audits and behavioural observations at our sample farms were undertaken, in order to determine if

organic farms had lower stocking densities than non-organic farms and, if so, whether this affects behaviour.
The present study was part of a larger project investigating many aspects of health and welfare in organic and non-organic dairy cattle.

Materials and Methods

Twenty organic and 20 non-organic farms were identified for the study, located throughout the mainland UK. These farms were visited over two winter periods (2004/05 and 2005/06). Organic and non-organic farms were paired as far as possible for housing type (i.e. cubicle or straw yard housing), herd size, milk production traits and for location. Farm pairs were visited within two weeks of one another. Behaviour was sampled on each farm on two consecutive days. On farms where all lactating cows were housed in one group, all cows were sampled. On farms were the groups were split by lactation stage, only the high lactation group was sampled. The numbers of individual cows in the groups were noted. The feed face barrier type (i.e. open sections with a lower board and a neck rail, or 'head bales' with individual sections), length and length per cow were recorded.

Proportion of cows at the feed face

Feed-face observations on all 40 farms were commenced when new feed was made available to the cows after morning milking. On some farms, new feed was available to cows exiting the milking parlour, and in these cases the scans started when approximately 75% of the herd had finished milking. The number of cows feeding at the feed-face was counted every 15 mins for 4.5 h from when new feed was available to the cows. For simplicity, cows were counted as 'feeding' when they had their head through the feed face barrier.

Aggressive social interactions

Aggressive behaviour was sampled on 31 out of the 40 farms (14 organic, 17 non-organic). The feed-face length was divided approximately into 3 m sections. The sections were numbered along the length or lengths of feed-face. Six sections were chosen at random. Ten minutes of video of the feed-face were recorded from each of the chosen sections. The video clips were recorded during the first 90 minutes after new feed became available. Social interactions between cows were quantified by continuous observation of the video tapes. A basic ethogram was used to quantify types of aggressive social interactions. However, for these preliminary results all types were grouped together.

Data analysis and statistics

Comparisons of feed face dimensions were made using the 2-sample *t*-test for normally distributed data and the Mann-Whitney test for data that was not normally distributed. Proportion of cows at the feed face was analysed using a repeated measures mixed model by REML where 'feed face per cow', 'time point' and 'farm type' and interactions were fixed effects and the interaction between farm and time was the random effect with an auto regressive structure. A mean of each two consecutive sampling points was taken, so there were nine time points in the analysis. Aggressive interactions were analysed using a linear mixed model where 'feed face per cow' and all interactions between 'farm type' and 'feed face type' were the fixed effects.

Results

Description of feed faces

There were 23 farms (10 organic, 13 non-organic) with 'open' feed-faces and 15 farms (8 or-

ganic, 7 non-organic) with 'head bale' type barriers. There were also two organic farms with self-feed silage clamps, which were not included in the social interaction analysis. There was no significant difference in feed-face length (mean ± SE –organic 49.7 ± 6.6m; non-organic 56.5 ± 4.0 m). Non-organic farms had higher group sizes than organic farms (Median, Q_1-Q^3 –organic 74.5, 53-96; non-organic 101.5, 74-136 W= 270, $P < 0.05$). However feed-face length per cow was not significantly different between organic and non-organic farms (mean ± SE –organic 0.62 ± 0.05m; non-organic 0.56 ± 0.04 m).

Proportion of cows at the feed face

Farm type (organic v non-organic), feed face type and the feed face space per cow had no effect on the proportion of animals feeding following new food arrival ($P > 0.05$). Sampling time point had a significant effect on the proportion of cows feeding, from over 60 % at the first time point after the arrival of new food, to 30 % at the last time point (Fig. 1)

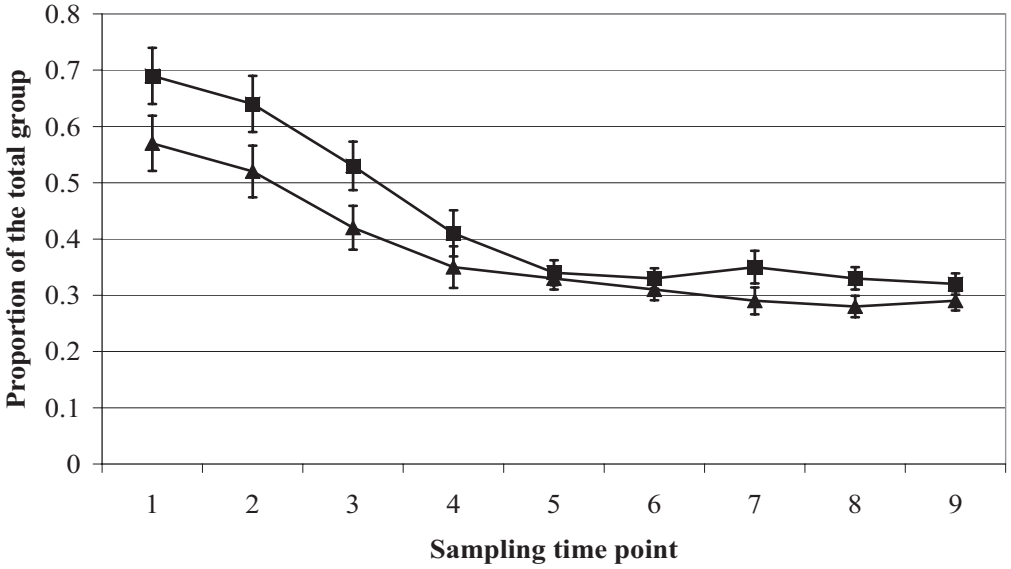

Fig. 1 The mean (SE) proportion of cows feeding at each of the nine time points after the arrival of new food post-morning milking. Organic farms ■ Non-organic farms ▲

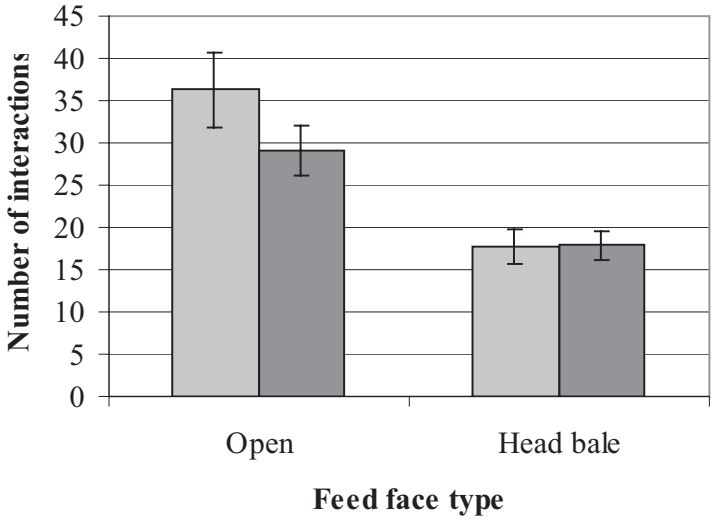

Fig. 2. The mean (SE) number of aggressive interactions in 60 mins of observations for feed face type and farm type. Organic farms □ Non-organic farms ■

Aggressive social interactions

There was a greater number of aggressive interactions between cows at the feed face on farms with 'open' barrier design compared with 'head bale' barriers (32.2 ± 2.6 cf 17.8 ± 1.2 for 'open' and 'head bale' feed face types respectively)(Wald = 21.1, $P < 0.001$). Farm type had no significant effect on the numbers of aggressive interactions ($P > 0.05$). However, there was a significant interaction between farm type and feed face type (Wald = 4.65, $P < 0.05$) (Fig. 2).

On farms that had 'head bale' barrier feed faces, farm type had no effect on the numbers of interactions between cows. Of farms that had 'open' barrier feed faces, organic cows had a greater number of aggressive interactions than non-organic cows (36.3 ± 4.4 cf 29.1 ± 3.0 for organic and non-organic farms respectively).

Discussion

These preliminary results suggest that there was no difference in feed-face dimensions between organic and non-organic farms. However, we did find that there were more cows in the sampled groups from non-organic farms compared to the organic farms. Further analysis will show whether this was due to larger overall herd sizes on non-organic farms, or smaller lactation-stage groups on organic farms. Additionally, the feed-face length per cow did not differ between organic and non-organic cows and did not affect the number of cows feeding after the other factors had been taken into account. Fig. 1 appears to show some difference in the numbers of cows feeding between organic and non-organic cows, especially during the first three time points. However, there was no farm type effect seen in the overall model. Further analysis on the first three time points alone, may show some difference between organic and non-organic cows in the first 90 mins after the arrival of new feed.

The analysis of aggressive interactions suggests that there is some basis for saying that organic cows were hungrier during the first 90 mins after the arrival of new food. Although all cows showed more aggression in the 'open' type feed-faces than the 'head-bale' type barriers (also shown by Endres *et al*., 2005), organic cows showed more aggression at 'open' feed-faces than non-organic cows. Analysis of other factors (e.g. non feed-related behaviours and body condition scores) may help to determine what was affecting organic cow behaviour.

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