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Behavior of cows during and after peak feeding time on organic and conventional dairy farms in the United Kingdom

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ABSTRACT

The behavior of groups of housed, lactating dairy cattle was observed over 2 winter housing periods on 20 organic farms and 20 conventional farms in the United Kingdom. Three methods were used: (1) 6 video-clips of 10 min duration were captured of cows feeding at sections of the feed-bunk face during the peak feeding period (0 to 90 min) and continuously observed for aggressive interactions among cows; (2) the proportion of cows at the feed-bunk face was scanned every 15 min for 4.5 h to include the peak feeding period (0 to 255 min); and (3) all nonfeeding behaviors were scanned every 15 min for 2.5 h after the peak feeding period (120 to 255 min). The latter scans were analyzed post hoc for measures of cow comfort (freestall farms only). Management and health data were collected on each farm. On farms with open-fronted feed-bunk faces, a greater number of aggressive interactions occurred at the feed-bunk face at peak feeding time on organic farms than on conventional farms (organic = 36.3 ± 4.4; conventional = 29.1 ± 3.0). Higher proportions of cows were at the feed-bunk face at peak feeding on organic farms than on conventional farms (organic = 0.58 ± 0.04; conventional = 0.48 ± 0.03). Housing type (freestall versus straw pen) explained most differences in postfeeding behavior (proportion of ruminating cow in alleyways: freestalls = 0.16 ± 0.06 vs. straw-pen = 0.08 ± 0.03), with few differences between organic and conventional herds. On freestall farms, the proportions of cows on organic farms lying down postfeeding was smaller than in conventional herds (organic = 0.38 ± 0.09 vs. conventional = 0.43 ± 0.07). Differences in behavior around peak feeding time could be associated with the reduction in food "quality" on organic farms compared with the energy requirement of the cows, with cows on organic farms being highly motivated to feed. A correlation was observed between farms that had high amounts of lying and farms that had high lameness prevalence ($R^2 = 55.3$), suggesting a complex relationship between comfort and pain. Overall, the behavior of dairy cows on organic farms was not different from that of conventionally reared cows, and the results suggest that most behavioral welfare problems relating to housing could be alleviated by management practices.

Key words: dairy cow, behavior, organic production

INTRODUCTION

Organic produce appeals to consumers who are concerned about their health, the effect of farming on the environment, and animal welfare (Harper and Makatouni, 2002; Yiridoe et al., 2005). There are concerns that, in practice, some of the regulations governing organic milk production may compromise animal welfare (Weller and Bowling, 2000; Hovi et al., 2003; Vaarst et al., 2005). One particular concern is about the use of high-yielding breeds (such as the Holstein-Friesian) in organic dairying, as it is thought that high-yielding animals are more sensitive, in terms of health, to inadequate DMI (quantity and quality; Sundrum, 2001). Cows on organic farms are fed foodstuffs grown without pesticides or fertilizers. During this study, UK regulations dictated that farmers provide between 90% (in 2003) and 95% (in 2005) of all feed from organic sources (100% from 2007) and that the proportion of DMI fed as concentrate was restricted to 40%. These changes in quality of feed given to cows on organic farms can affect energy balance if DMI is insufficient (Thompson, 2008) and, therefore, has the potential to alter cows' motivation to feed and associated behaviors.

Additionally, different regulations apply to housing standards for organic farms. Organic livestock farming in the UK comes under a European Commision Regulation (2092/91), which specifies that disease prevention be primarily based on management systems that promote resistance to disease and recovery from infection (CEC, 2004). The quantity and quality of the housing space can be one of the factors that affect an individual cow's ability to access and maintain resources such as lying and feeding areas (Huzzey et al., 2006).

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The objective, as part of a larger overall project investigating the welfare of cows on organic and conventional farms, was to ascertain if differences between the farm types affect aggression and comfort during and after peak feeding time. This study focused on the behavior of cows that has the potential to be most affected by the main differences in regulations between the farm types; that is, motivation to access feed and cow comfort.

MATERIALS AND METHODS

Recruitment and Farm Selection

Twenty organic and 20 conventional farms throughout the UK (13 farms in southwestern Scotland, 25 farms in western England, 2 farms in Wales) were visited during 2 winters (2004–2005 and 2005–2006). Dairy farmers on organic farms were recruited from the membership lists of organic producer groups (Organic Milk Suppliers Co-Operative, Worle, Somerset, UK; Scottish Organic Producers Association, Edinburgh, UK), and an organic certifier (The Soil Association, Bristol, UK). Details of the recruitment process for organic and conventional farms can be found in Rutherford et al. (2008). The farms were limited to those that had predominantly Holstein-Friesian cows and a mature herd size of >50 cows. All farms grazed for at least part of the summer period and housed their cows during the winter. All farms milked their cows twice daily in the morning and afternoon. The organic farms had been certified as organic for at least 2 yr before the start of the study to minimize the effects of conversion.

Once an organic farm was recruited, a matching conventional farm was sought. The criteria upon which a matching farm was selected were housing type (freestall or straw pen), herd size, genetic merit, and as far as possible, location within the UK, taking into account local rainfall profiles. Thirteen pairs of freestall farms and 7 pairs of straw pen farms were recruited. The median (and first and third quartile) milking herd size was 156 cows (97 to 184) on the organic farms and 151 cows (117 to 194) on conventional farms. The median production per cow in 2004 was 7,200 kg (6,059 to 8,773) on organic farms and 8,521 kg (6,789 to 9,219) on conventional farms. Matched pairs of organic and conventional farms were visited within a 2-wk period during winter housing. All farms housed their cows for at least 1 mo before the visit; each farm visit lasted 2.5 d.

Supplementary Information Gathered On Farm

Each farmer was asked to provide the following information regarding the feeding of their cows: the ME of the first cut of silage for the study year, the amount of forage fed per cow/year, the amount of concentrates used per cow/year, and the concentrate constituents. A building audit, which involved the collection of a wide selection of building measurements (freestall dimensions, feed-bunk face length, height, head-space, type and number of feed-bunk faces, area of alleyways, flooring type, and alleyway scraping frequency), was carried out on the winter housing of the lactating cows (Langford et al., 2009). Additionally, the following animal-based health and welfare measures were scored on the farm visits: lameness prevalence and BCS (Rutherford et al., 2009a,b). The feeding information, building measurements, lameness prevalence, and BCS farm averages were used as univariate measures in the process of building the statistical models for predicting the proportions of animals at the feed-bunk face and the postfeeding behavior as explained below.

Behavioral Observations

Behavioral observations were carried out on 2 consecutive mornings of the farm visit. On farms where all lactating cows were housed in one group, all cows were sampled. On farms where the groups were split by lactation stage, only the early lactation group was sampled. The numbers of individual cows in the groups were noted.

Behavioral observations on all farms commenced when new feed became available to the cows after the morning milking. On some farms (organic = 6; conventional = 7), new feed was available to cows exiting the milking parlor, meaning that cows milked early were able to access food before cows milked later in the milking process. In these cases the behavioral observations began when approximately 75% of the herd had exited the milking parlor. This time point is referred to herein as time zero, and it varied from 0550 to 1120 h.

Proportions of Cows at the Feed-Bunk Face

The feeding areas were split into equal sections approximately 2.5 m long by visually marking the sections with chalk. All feeding areas were included. The median number of sections was 10 (7 to 16). On 29 farms this was 1 side or 2 sides of a feed-passage or feed-bunk. On 11 farms a variety of feeding devices was available, including troughs; free-standing feeding rings; portable, free-standing rectangular feeders with metal head-spaces for cows that were filled with silage or TMR; and areas where cows could self-feed from silage bunker silos. Each section, either part of a feed-passage or part of a free-standing trailer, was numbered in a consecutive manner, traveling clockwise around the