

## **The effect of farming system on dairy cow cleanliness in the UK and the implications to udder health**

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### **Summary**

The cleanliness of dairy cows was assessed using a 20 point hygiene score system at different times in the year on 14 organic and 14 conventional farms in the UK. Overall, cows were dirtier during winter housing compared to summer grazing. Farming system had no effect on cow cleanliness when cows were at grass, but when housed in the winter, organic cows were more likely to be cleaner. There was a link between cow hygiene scores and milk hygiene, with herds having lower bulk tank somatic cell counts (BTSCC) tending to have cleaner cows. This relationship was strongest for the organic herds. There was no significant link between hygiene score and Bactoscan (BS) count or mastitis incidence.

**Key words:** Dairy cow, hygiene score, somatic cell count

### **Introduction**

Poor dairy cow hygiene score indicating dirty cows has been linked to an increase in sub-clinical mastitis (Schreiner & Ruegg, 2003) and bacterial contamination of milk (Sanaa *et al.*, 1993). Cow cleanliness may be affected by housing design, bedding type and provision and faecal consistency, which in turn reflect cow nutrition and digestion (Ward *et al.*, 2002; Howell *et al.*, 2003; Grove-White 2004). Based on the known differences of management between organic and conventional dairy cows, this study aimed to investigate whether cow cleanliness was affected by farming system or the transition from summer grazing to winter housing, and whether cow hygiene score affected the hygiene parameters of the milk produced and the clinical mastitis incidence.

## Materials and Methods

Fourteen farms (7 organic and 7 conventional) were visited in August and October 2003, and 28 farms (14 organic and 14 conventional) were visited in January 2004 for assessment of cow hygiene score. Within-observer repeatability of scoring was assessed by duplicate scoring of cows, and the degree of the observer agreement was calculated. Cow hygiene scores were compared over time using a generalised linear mixed model (GLMM) analysis of variance. Proportional odds logistic regression (POLR) was used to analyse the factors affecting cow hygiene score at each time point. Farm management and milk quality data comprising Bulk Tank Somatic Cell Count (BTSCC), Bactoscan count (BS) and the reported clinical mastitis case rate were recorded. Bulk-tank milk samples from each farm in January were submitted for bacteriological culture. Farms were ranked by BTSCC, BS and mastitis incidence with the hygiene score of the top quartile of herds compared to the bottom using a Mann-Whitney test. Regression analysis was conducted of BTSCC relationship with median herd hygiene score for organic and conventional farms.

## Results

Hygiene score assessment was shown to be repeatable, as indicated by good agreement using weighted Kappa (K(W)). Overall, GLMM analysis showed that cow hygiene score increased (cows became more dirty) between August and January ( $P < 0.001$ ), which corresponded to cows being housed in winter. The POLR analysis showed that when all cows were at grass, dry cows were more likely to be in a cleaner score category compared to lactating cows ( $P < 0.001$ ). When housed and when cows were separated by yield group, higher yielding cow groups were less likely to be in a cleaner score category compared to when all lactating cows were grouped together ( $P < 0.001$ ). Cows housed in straw yards were less likely to be in a cleaner score category compared to cows in cubicles ( $P < 0.001$ ). However, organically managed cows in straw yards were more likely to be cleaner than conventional cows in straw yards ( $P < 0.05$ ). Overall, when housed, organically managed cows were more likely to be in a cleaner score category compared to conventional cows ( $P < 0.001$ ). The quartile of herds with the lowest cell count tended to a lower (cleaner) median cow hygiene score ( $P = 0.06$ ). Hygiene score and BTSCC association differed between organic and conventional farms, where on organic farms  $R^2 = 0.38$  ( $P = 0.02$ ) and on conventional  $R^2 = 0.06$  ( $P = 0.38$ ). There was no significant association between hygiene score and BS count or mastitis incidence. No major mastitis pathogens were cultured from the cleanest quartile of herds, but major pathogens were cultured from the three herds in the dirtiest quartile.

## Discussion

Organic cows were more likely to be cleaner when housed, which has implications on animal health and welfare. Hygiene score is not merely a cosmetic issue and is associated with BTSCC and therefore, sub-clinical mastitis. Thus, organic farms, which use fewer antimicrobials and no blanket dry cow therapy, should emphasise clean cow management as part of sub-clinical mastitis prevention.

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