Seasonal variation in milk production and culling in California dairy herds

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Introduction

Heat stress influences production and health in dairy herds. The effectiveness of different cooling strategies could potentially be assessed by the degree of seasonal variability on production and health within a herd. The first step to develop an assessment tool is to understand the regional seasonal variation in production and health. The aim of this study was to evaluate the seasonal variation on milk production, peak milk, and early culling in California Holstein herds.

Materials and Methods

Dairy Herd Improvement Association records from 2009 to 2011 were obtained from AgriTech Analytics, Visalia, CA. The data set included Holstein herds (2009, n= 263; 2010, 265; and 2011, 251) that tested at least 10 out of 12 months per year and had an average of ≥ 500 cows. For each herd, data were obtained monthly for peak milk, milk production, and culling at 31 DIM. Data were analyzed with SAS version 9.3. Proc Means and Proc Univariate were used for descriptive statistics. Proc GLM was used to evaluate the effect of year and month on milk production, peak milk, and early culling.

Results

The month with the lowest monthly milk production was found to vary across dairies and was more frequently observed in September, October, or November (59.7% dairies in 2009, 48.3% in 2010, and 50.6% in 2011); whereas, either April, May, or June was the month with the highest milk production (51.3% dairies in 2009, 43.0% in 2010 and 56.6% in 2011). Overall, milk production per cow was lower during September through November (71.9 lb [32.7 kg]; $P < 0.01$) and higher during April through June (75.7 lb [34.4 kg]). Mean milk production within a herd declined from April through June to September through November by 94.8% (25th quartile, 92.2%; 75th quartile, 97.7%). However, 11.5% of the dairy herds showed an opposite trend with an increase in milk production per cow from April through June to September through November (mean increase, 1.9%; 25th quartile, 0.8%; 75th quartile, 4.2%).

In 2009 the highest monthly peak milk was more frequently observed in April, May, or June (60.7% of dairies), but during 2010 and 2011 the highest monthly peak milk was more frequently observed in May, June, or July (43.5% and 49.8% of dairies, respectively). The lowest peak milk was more frequently observed in November, December, or January (63.1% in 2009) or December, January, or February (56.0% and 65.0% of dairies in 2010 and 2011, respectively). Peak milk averaged 93.9 lb (42.7 kg) of milk per cow. Peak milk was significantly higher during May and June (95.1 lb (43.2 kg) of milk per cow) than during January and December (93.1 lb (42.3 kg) of milk per cow). Peak milk was significantly lower in 2010 (93.2 lb (42.4 kg) of milk per cow), compared with that than 2009 and 2011 (94.3 lb (42.9 kg) of milk per cow). No year by season interaction was found. Mean peak milk declined from May through June to December through January by 97.9% (25th quartile, 96.6%; 75th quartile, 99.3%). However, 15.1% of the dairy herds showed an opposite trend with an increase in milk production per cow from May through June to December through January (mean, 0.09%; 25th quartile, 0.03%; 75th quartile, 1.9%).

The percentage of lactating cows freshening by month was significantly ($P < 0.01$), higher during January and September (9.7%) and lower during May (7.0%). Overall, each month, a total 5.1% of cows were culled from herds before 31 DIM. The percentage of cows leaving the herd before 31 DIM was varied by month ($P < 0.01$). Two peaks of early culling were observed each year during August and September (5.7%) and during February and March (6.0%). However, no effect of year or year by month interaction was detected.

Significance

In California dairy herds, we observed that lowest monthly milk production per cow happened from September through November and the lowest monthly peak milk happened from December through January. These findings suggest that the negative impact of heat stress may have a carryover effect beyond the summer season. Cows undergoing the dry period during the heat of summer, may be the group most susceptible to having poor production performance associated with seasonality. Further evaluation of the impact of seasonality on transition cow performance should be conducted.