

Assessment of Reproductive Outcomes in United States Holstein Dairies by Geographic Region

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Introduction

Herd size is frequently associated with differences in reproductive management strategies such as the use of fixed-time AI (TAI) and outcomes such as conception rate (CR), pregnancy risk (PR), and stillborn and abortion percentages. Although reproductive outcomes may also differ by geographic region, they may be used as benchmarks to assess reproductive management success within a dairy. In this study, reproductive outcomes were evaluated to determine overall CR, PR, stillborn, and abortion percentages and to establish benchmarks for the most effective 20% of operations.

Materials and Methods

Data was analyzed from 85 Holstein dairies in four regions of the US. Records of 231,288 cows and 649,495 matings were evaluated between August 2008 and August 2009 from dairies located in Region 1 (CA, ID, WA; n = 22 herds), Region 2 (KS, NM, TX; n = 15 herds), Region 3 (IL, MN, SD, WI; n = 35 herds), and Region 4 (IN, MI, NC, NY, OH, PA; n = 13 herds). Analyses were conducted with PROC GLM to determine reproductive responses using herd as the experimental unit. Herd size ranged from 258 to 15,866 cows.

Results

Mean herd size was greater ($P < 0.01$) for Region 1 ($5,809 \pm 522$) than Regions 2 ($2,569 \pm 632$), 3 ($1,240 \pm 414$), and 4 ($1,704 \pm 678$). For all inseminations, the overall percentage of cows inseminated after estrus or ovulation synchronization with a fixed-time AI (TAI) protocol was 43.4%, and was greater ($P < 0.01$) for Region 3 (63%) than Regions 4 (46%), 1 (24%), and 2 (18%). The overall percentage of cows receiving an insemination after an observed estrus was 56.4%, and was greater for Regions 1 (76%) and 2 (82%), compared to Regions 4 (54%) and 3 (37%). Overall CR to first service TAI was 30.5% and

was greater ($P < 0.01$) for Region 3 (33.6%) than Regions 1 (28.6%) and 2 (23.9%), whereas Region 4 (30.8%) was intermediate. Similarly, CR for cows inseminated after observed estrus was 34.9% and was greater ($P < 0.05$) for Region 3 (37.2%) than Regions 1 (33.6%), 2 (33.1%), and 4 (33.1%). Whole herd 21-day PR (17.8%) and AI 21-day PR (18.5%) were similar among regions. The percentage of cows culled by 30 days (6.1%) and 60 days (8.7%) of lactation was similar among regions. The percentage of stillborn calves was greater ($P < 0.01$) for Region 3 (8.1%) than Regions 2 (5.7%) and 1 (6.0%), whereas Region 4 (6.8%) was intermediate. However, stillbirths were similar among regions when calves were male (9.1%), but when calves were female stillbirths were greater ($P < 0.01$) for Region 3 (7.3%) than Region 4 (5.6%) and lowest for Region 1 (3.1%) and 2 (3.9%). In addition, the percentage of abortions reported per year was greater ($P < 0.05$) for Regions 1 (15.2%) and 4 (15.0%) than Regions 2 (11.1%) and 3 (13.0%). The upper 20th percentile of all herds had a CR to first service TAI of greater than 38%, a CR after observed estrus of greater than 39%, a whole herd 21-day PR of greater than 20%, an AI 21-day PR of greater than 20%, a lower percentage of cows culled at 30 days and 60 days (4 and 6%, respectively), a lower overall percentage of stillborn calves (6%), and a lower percentage of abortions per year (10%).

Significance

Regional differences in reproduction exist in US dairies, specifically in the percentage of cows that are inseminated at TAI and following detection of estrus. In addition, reproduction outcomes vary among region in terms of multiple outcomes, which may be attributed to protocol compliance, heat detection efficiency, differences in herd size, and employee training. Nevertheless, the upper 20th percentile of dairy herds in this study achieved CR exceeding 38%, 21-day PR exceeding 20%, stillbirth rates less than 6.0%, and abortions per year of less than 9.5%.