

# Evaluation of reproductive performance in Alberta dairy herds using in-line milk progesterone analysis

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An in-line milk analysis system (IMAS) offers a unique approach to assess postpartum reproductive status at a whole-herd level by automatically and frequently analyzing milk progesterone (mP4) to determine ovarian activity based on mP4 levels (high vs. low; 5ng/mL threshold). Using IMAS, this study aimed to evaluate the variability in: 1) days in milk (DIM) to first ovulation (FOV; indicated by two consecutive high mP4); 2) length of first estrous cycle (FEC; measured by interval between two successive ovulations); 3) proportion of pregnancy per estrus (P/E); 4) proportion of pregnancy loss per pregnancy (PL/P); and 5) calving interval (CI) in 4 Alberta herds. Records of mP4 (n=173,480) starting ~20 DIM until ~55 d post-AI were assessed in 2,579 postpartum periods from 2014 to 2016. Estrus events (i.e. opportunity to AI) were presumed after a decline in mP4 levels (high to low). Pregnancy was presumed based on high mP4 levels from ovulation post-AI until ~35 d post-AI; pregnancy loss was presumed when a decline in mP4 occurred between ~35 and ~55 d post-AI. Differences among farm, parity, calving season (cold, warm or moderate) and milk yield were tested and significant differences ( $P \leq 0.05$ ) reported. Overall, the proportions of cows achieving FOV by 28, 42 and 56 DIM were 28, 59 and 76%, respectively. Farm 2 had more (31%) FOV occurring  $\leq 28$  DIM than Farms 1 (27%) and 3 (21%). Farm 3 had less (65%) FOV occurring  $\leq 56$  DIM than Farms 1 (79%), 2 (76%) and 4 (77%). Multiparous cows or cows calving in cold season were 30% less likely to have FOV by 28 or 56 DIM than primiparous cows or cows calving in other seasons. Overall proportion of short (<16 d), normal (16-24 d) and long (>24 d) FEC were 8, 39 and 53%. Farm 1 had more short FEC than farm 2 (9 vs 6%) and less normal FEC than farm 3 (35 vs 50%). Primiparous cows had more short FEC than multiparous cows (12 vs 5%). Cows achieving FOV by 28 DIM had more long FEC (62%) than cows achieving FOV later than 42 DIM (<49%). The P/E was greater in Farms 1 (1087/2844; 38%) and 4 (263/764; 34%) than in Farms 2 (1004/4501; 22%) and 3 (265/953; 28%). The PL/P was greater in Farm 1 (249/1087; 23%) than in Farms 2 (164/1004; 16%), 3 (36/265; 14%) or 4 (39/263; 15%). Overall CI was 401 d (311-590), and was shorter in Farm 1 (386 d) than in Farms 2 (395 d), 3 (403 d) and 4 (410 d).

**Implications:** There was significant variability on reproductive cyclicity and performance parameters among farms. The high (>50%) prevalence of first estrous cycle longer than 24 d may either indicate an increased prevalence of “abnormal” cycles or an increase in the length of “normal” estrous cycles of the modern Holstein cow.