

Milk Progesterone Profiles Before and After AI and Their Association with Pregnancy and Pregnancy Loss in Alberta Dairy Farms

T.C. Bruinje¹, M. Colazo², M. Gobikrushanth¹, D.J. Ambrose^{1,2}

¹Department of AFNS, University of Alberta; ²Livestock Research & Extension Branch, Alberta Agriculture and Forestry, Edmonton, AB, Canada T6H 5T6

E-mail: tcbruinje@ualberta.ca

The assessment of reproductive function through in-line milk progesterone (mP4) profiles is a new opportunity to evaluate characteristics of ovarian activity associated with fertility. No such report currently exists for North American herds. The objectives were to evaluate if postpartum ovarian activity before first AI and mP4 levels around time of AI are associated with fertility in primiparous and multiparous cows. In-line mP4 records were assessed from two dairies in Alberta using the Herd Navigator system (DeLaval Inc). Days in milk (DIM) to first ovulation (FOV) and presence of abnormal cycles (short/long) from ~20 DIM until first AI were defined based on mP4 levels (high vs. low; 5ng/mL threshold) in 785 cows. Levels of mP4 from ~7d before to ~14d after 605 AI were also evaluated, and outcomes of AI determined based on mP4 levels until ~55d after AI to define pregnancy (PREG) and pregnancy loss (P-Loss). Effects of FOV and presence of abnormal cycles were tested using logistic regressions, while mP4 levels around AI were compared using mixed-effects ANOVA. Only significant differences ($P \leq 0.05$) are presented. Fewer primiparous cows had FOV by 28 DIM than multiparous cows (20 vs 30%). Primiparous cows having early FOV (≤ 28 DIM) had higher PREG per AI than those with later FOV (47 vs 32%), while multiparous cows with delayed FOV (> 56 DIM) had lower PREG per AI (11 vs 29%) and higher P-Loss (62 vs 35%) than those with earlier FOV. The absence of abnormal cycles increased PREG per AI (40 vs 30%) and reduced P-Loss (11 vs 29%) in primiparous cows. Levels of mP4 were greater in primiparous than in multiparous cows from 5 to ~17d after AI. Primiparous cows that suffered P-Loss had higher mP4 at d5 after AI than those PREG (5.7 vs 4.4ng/mL), while multiparous cows that suffered P-Loss had higher mP4 2d before AI than those PREG (3.5 vs 3.2ng/mL). Beyond d10 after AI, PREG cows had higher mP4 levels than open cows. **Take Home Messages:** An early first ovulation highly benefited pregnancy per AI, while a late first ovulation and the presence of abnormal cycles reduced pregnancy per AI and increased pregnancy loss. Greater milk P4 levels near time of AI and lesser milk P4 beyond d10 were negatively associated with fertility. Using in-line milk P4 data, we determined significant effects of ovarian activity and milk P4 levels on parity and fertility. A wider use of this technology in future research will improve our understanding of the factors affecting reproductive physiology of the modern dairy cow, facilitating informed decision making to enhance fertility in dairy herds.