Monitoring in-line milk progesterone profiles to benchmark ovarian dysfunction associated with reduced fertility in Holstein herds

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Infertility in high-producing dairy cows could be linked to altered ovarian function. Our objectives were to characterize and evaluate parameters of ovarian activity associated with reduced fertility in Holstein cows based on milk progesterone concentrations (P4c) before and after artificial insemination (AI). A total of 4,674 AI events and 158,961 milk P4c records, obtained through an in-line milk analysis system (Herd Navigator, DeLaval, Tumba, Sweden) from 2,029 lactations of 1,538 Holstein cows in 4 herds, were evaluated. Milk P4c (ng/mL) were measured every 2 d from 23 DIM until pregnancy. Variations in milk P4c were used to define ovarian activity, such as onset of luteal phase (increase in P4c from < 5 to ≥ 5 ng/mL), luteal phase length (period, in days, of P4c ≥ 5 ng/mL until a decline to < 5 ng/mL), cessation of luteal phase (decline from ≥ 5 to < 5ng/mL, referred as "P4c-decline"), and pregnancy (AI followed by an onset of luteal phase that remained uninterrupted until at least 50 d post-AI). Overall pregnancy per AI (P/AI) was 25.1%. Ovarian activity parameters associated with reduced probability of P/AI (represented as % decreased in P/AI and its prevalence) were: luteal phase preceding AI longer than 14 d (6% decrease in P/AI, 31% prevalent), highest P4c in the luteal phase preceding AI < 24.7 ng/mL (4% decrease in P/AI, 45% prevalent), nadir P4c preceding AI > 0.5 ng/mL (5% decrease in P/AI, 43% prevalent), and interval between P4c-decline and AI greater than 39 h (10% decrease in P/AI, 71% prevalent). In addition, P/AI was reduced: if the interval between AI and onset of subsequent luteal phase was shorter than 6 d (8% decrease in P/AI, 17% prevalent) or longer than 12 d (11% decrease in P/AI, 16% prevalence); if P4c at 4 d post-AI was < 0.7 ng/mL (11% decrease in P/AI, 25% prevalent) or > 3.4 ng/mL (7% decrease in P/AI, 25% prevalent); if P4c at 10 d post-AI was ≤ 11.8 ng/mL (10% decrease in P/AI, 25% prevalent); and if P4c at 14 d post-AI was ≤ 22.7 ng/mL (8% decrease in P/AI, 51% prevalent). Take Home Messages: Monitoring postpartum milk P4c profiles can be a valuable approach to identify abnormal ovarian function. The luteal activity parameters associated with reduced probability of P/AI established in the present study could be used to benchmark ovarian dysfunction and develop recommendations to improve reproductive performance in herds monitoring in-line milk P4c profiles.