

## The effect of high or low concentration of progesterone during diestrus and its association with intensity of oestrus in lactating Holstein cattle

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The objective of this study was to determine the effect of different concentrations of progesterone (P4) during the oestrus cycle on the intensity of oestrous expression detected by an automated activity monitor (AAM). All cows were enrolled onto a presynchronization protocol, starting on day -27 relative to the final estrus, composed of the administration of GnRH and a P4 insert, 7 d later an injection of PGF2 $\alpha$  and insert removal, and a second injection of GnRH 48h later. Cows were then submitted to the same hormonal protocol as the presynchronization program starting on d 7 of the estrous cycle and received an injection of estradiol cypionate (E.C.P) on -2 d of the study. Cows in the high P4 (HP; n = 61) treatment received no additional treatment. Cows in the low P4 (LP; n = 64) treatment received extra PGF2 $\alpha$  injections on day -15, -14.5, and 14 and again on day -10, -9, -8.5, and -3 of the protocol. Blood samples were harvested to quantify the concentration of P4 throughout the study. Individual activity was monitored continuously by a leg mounted AAM. Concentration of P4 was greater for HP cows on day -8 and -3 of the study, as expected. At the time of the estrus alert, cows on the HP treatment had lower P4 concentration compared with cows on the LP (0.78  $\pm$  0.14 ng/mL vs. 1.36  $\pm$  0.11 ng/mL, respectively). The proportion of cows that did not show oestrus was greater for HP than for LP (18.2 % vs. 5.1%), however, cows in the HP treatment had greater relative increase in activity compared with cows on the LP treatment (398.5  $\pm$  21.1 RI vs. 312.4  $\pm$  19.8 RI, respectively).

**Take home message:** There was no difference in the duration of oestrus. In conclusion, cows enrolled the HP treatment had fewer cows expressing oestrus, however they had greater concentration of P4 during diestrus and had greater relative increase at oestrus compared with cows that were enrolled in the LP treatment.

## The effect of high or low concentration of progesterone during diestrus and its association with the LH surge and PGF2 $\alpha$ metabolite in lactating Holstein cattle

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The objective of this study was to determine the effect of progesterone concentration during the oestrus cycle on circulating LH and PGFM. Cows were enrolled into a presynchronization protocol, starting on day -27, composed of the administration of GnRH and a P4 insert, 7 d later an injection of PGF2 $\alpha$  and insert removal, and a second injection of GnRH 48h later. All cows were then resubmitted to the identical presynchronization program again, starting on d 7 of the oestrous cycle and received an injection of estradiol cypionate (E.C.P) on -2 d. Cows in the high P4 (HP; n = 8) treatment received no additional treatment. Cows in the low P4 (LP; n = 9) treatment received extra PGF2 $\alpha$  injections on days -15, -14.5, -14, -10, -9, -8.5, and -3. Blood samples were collected, to quantify the peak LH concentration after E.C.P. administration, every 2 hours until ovulation. Ovulation was confirmed by transrectal ultrasonography. An estradiol/oxytocin challenge for PGFM was performed on day 16 of the treatment. E.C.P (0.5 mL) was administered 4 h before the intravenous treatment of oxytocin (5 mL). Blood samples were collected at -15, 0, 15, 30, 45, 60, 90, 120, and 180 min relative to the oxytocin injection. Concentration of LH tended to be lower for HP than LP cows (0.49 vs. 0.58 ng/mL). Duration from E.C.P. administration to peak LH was longer for cows in the HP treatment compared with the LP treatment (37.3  $\pm$  6.3 h vs. 28.3  $\pm$  4.8 h). The duration of the LH peak was greater in the LP treatment compared with the HP treatment (8.7  $\pm$  1.0 h vs. 6.3  $\pm$  1.6 h). The duration from peak LH to ovulation was shorter in the LP treatment compared with the HP treatment (26.4  $\pm$  2.3 h vs. 35.1  $\pm$  5.7 h). Concentrations of PGFM were greater for the LP treatment than the HP treatment (107.8 pg/mL vs 92.5 pg/mL).

**Take home message:** Cows that were exposed to lower concentrations of P4 during diestrus tended to have greater LH concentrations and greater circulating concentrations of PGFM following an oxytocin challenge in the subsequent oestrous cycle.