

Prevalence, Risk Factors and Treatment of Postpartum Anestrus in Dairy Cattle

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Introduction

Reproduction remains a significant limiting factor to the achievement of economic goals on dairy farms. Dairy producers are making increasing use of management aids, such as estrus detection devices and estrus or ovulation control programs, to mitigate the impact of poor heat detection. While such management aids are useful, their success is dependent on the rate that animals return to a predictable estrus cycle. The objectives were: 1) to determine the prevalence of anestrus in Ontario dairy herds, 2) to evaluate herd and cow level risk factors for anestrus and 3) to investigate the impact of a progesterone releasing intravaginal device (PRID) on days to first service, first service conception risk and days from calving to conception in animals at risk of anestrus.

Materials and Methods

Two field studies were conducted. In each study, animals were assigned a body condition score (BCS) prior to calving and at 60 days-in-milk (DIM). Milk β -hydroxybutyrate was determined (Keto-Test[®]) once in each of the first two weeks after calving. Periparturient disease information was recorded using on-farm records and Dairy Herd Improvement Association (DHIA) records. To determine the prevalence and risk factors for anestrus, a large-scale observational study was conducted in 18 herds from across southern Ontario, Canada from February 2004 to March 2005. Anestrus was defined as progesterone < 1ng/ml in two defatted milk samples collected at 46 (\pm 7) and 60 (\pm 7) DIM. Preliminary data are available from 550 cattle in 18 herds from February through October 2004, and were analyzed with contingency tables and logistic regression. For the purpose of this preliminary analysis, the significance level was set at a 10% level. In order to fulfill the final objective, a large-scale clinical trial was conducted in four herds. Automated estrus detection (pedometry) was the sole method of estrus detection and selection of animals for insemination in all four herds. Animals that failed to show increased pedometry readings by 60 DIM were enrolled using a double-blind assignment to treatment with a progesterone releasing intravaginal device (PRID; n=214) or a placebo intrav-

aginal device (PID; n=190) for seven days. At device removal all animals received 500 mg cloprostenol. Insemination was based upon estrus detection by an increase in pedometry activity.

Results

Overall, the prevalence of anestrus was 24.4% (95% confidence interval = 20.8 to 27.9%). The estimated herd specific prevalence varied from 9 to 56%. The prevalence of anestrus was not different among parities (27, 28 and 23% in parity 1, 2 and \geq 3, respectively). Anestrus was 1.7 times more likely in animals calving in March through May than in animals calving in June through August. In a representative subset of 321 animals, milk β -hydroxybutyrate (BHBA) was measured once in each of the first two weeks after calving. Among these animals, 33% had subclinical ketosis (\geq 100 mmol/ml BHBA) in the first week (range among herds, 6 to 80%) and 28% (range, 8 to 52%) in week 2 of lactation. Cattle with ketosis in week 1 were 1.4 times more likely ($P = 0.06$) than non-ketotic animals to be classified as anestrus, but ketosis in the second week of lactation was not associated with anestrus. Accounting for season, parity and ketosis in week 1, anestrus tended to be less likely in animals with first DHI test projected 305ME \geq 22,000 lb (10,000 kg) than in animals projected to produce < 22,000 lb (odds ratio = 0.65, 95% CI 0.4 – 1.1, $P = 0.13$). Time to first insemination was not significantly different between cycling and non-cycling animals (mean \pm SD, 73 \pm 20 versus 78 \pm 23 DIM); approximately half the cows in the study received timed AI for first insemination. The probability of pregnancy at first service was 30% and 20% in cyclic and anestrus cattle, respectively ($P = 0.04$). In the separate clinical trial, animals receiving the PRID were 2.54 times more likely to display estrus within five days of device removal ($P < 0.001$). A 12-day reduction in days from device insertion to insemination was observed in the PRID treated animals (hazard ratio [HR] = 1.43; $P < 0.001$). First service conception risk was not significantly different between progesterone and placebo treated animals (27.8 vs. 28%, respectively). However, pregnancy rate was increased in the progesterone treated animals: median time from calving to pregnancy was 135 and 154 days for PRID and controls, respectively (HR 1.32; $P = 0.012$).

Significance

The prevalence of anestrus varies considerably among dairy herds and has a negative effect on the probability of pregnancy at first insemination. Among ani-

mals that had not displayed estrus before enrollment, PRID treatment shortened time to pregnancy beyond the improvement in time to first insemination.