

Results

Through a partnership with two private practices (Perry Veterinary Clinic and Countryside Veterinary Clinic) and a large dairy producer organization (Northeast Dairy Producers Association), six selected participants from a pool of 28 applicants completed the program in its initial year. The USDA Higher Education Challenge program provided funding. This year's participants scored the program 4.66/5, and said they "gained mentors who will help to shape their careers". Details of the research project were presented at this year's National

Mastitis Council meeting; the participants made substantive contributions.

Significance

Our goal to attract and train highly skilled professionals in the areas of production animal medicine and veterinary public health is underway. This program may be a model for other commodity groups other than dairy, such as beef production. Further experience with the program should bolster these efforts.

Relationship Between Pre-fresh NEFAs, Fresh Butterfat Percentage, Progesterone Levels Following Pre-Synch and Pregnancy Rates

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Introduction

As herd size and milk production increase on modern dairies, it seems to be at the expense of fertility, increasing days open, declining pregnancy rates and rising cost associated with each pregnancy. To determine which service was the best time to use more expensive semen, a large commercial dairy in central Michigan investigated progesterone levels in cows following a Pre-synch protocol. This was followed by a prospective study, beginning with cows in the dry period, with the objective of relating pre-breeding progesterone levels to risk factors in the transition period.

Materials and Methods

PART 1: In April 2004, blood was drawn for progesterone measurements from 50 primiparous cows and 50 multiparous cows. Blood was drawn directly before the GnRH was given to start Ov-Synch, which was 11 days from the second prostaglandin injection of a Pre-synch program (two injections of prostaglandin two weeks apart). Serum was sent to Michigan State University Animal Health Diagnostic Laboratory for serum progesterone levels. Calving, health, breeding and production data was collected from the farm's Dairy Comp 305 program. Dystocias are classified on a 1 to 5 scale, with 1

being unassisted and 5 being a C-section. Cows are tested at 10-16 DIM for milk components and SCC. The farm also does random NEFA testing on cows less than three weeks before calving, and approximately 40% of the cows in the study had undergone NEFA testing. The data proved to be interesting and prompted a second study to further investigate the relationships between transition dry cow NEFAs and pre-breeding progesterone levels. PART 2: In September 2004, a prospective study was started using 75 multiparous cows in the transition lot (15 cows were randomly selected every other week). At the time of enrollment, a lameness score, BCS, ultrasound back-fat measurement and NEFA were collected. NEFAs and back-fat measurements were taken on a weekly basis during the pre-fresh and post-fresh period until cows were approximately 30 DIM. Cows were started on Pre-synch according to the existing farm protocol. At 52-58 DIM, on the day they were scheduled to start Ov-Synch, a lameness score, BCS, back-fat measurement and blood for serum progesterone were collected. Cows continued in the breeding program according to the farm protocol. Calving, health, breeding and production data were collected from the farm's Dairy Comp 305 program. (Breeding outcomes are not yet available for Part 2). Data from both studies was analyzed using Excel and SAS to perform T-tests, ANOVA, Chi Square, and Logistic regression.

Results

Progesterone levels ranged from 0 to 7.55 ng/ml on 156 samples. Due to the Pre-Synch program, about 90% of the cows should have had a CL and high progesterone, if all cows were cycling normally. Research suggests that 1 ng/ml is a physiological level, and therefore that level was used as a cutoff to classify cows as "abnormal" (low) or "normal". A large percentage (41%) of cows were in the abnormal range, and 28% had zero progesterone. Breeding results for the cows in Part 1 showed 2.4 services per pregnancy for the normal cows and 3.1 services for the abnormal cows ($p < 0.10$). On a Kaplan-Meier survival curve for pregnancy, the abnormal group had a lower pregnancy rate compared with the normal cows, until 200 DIM. Cows with abnormal progesterone tended to be problem breeders, and therefore risks for low progesterone were evaluated. No differences were found between abnormal and normal cows for previous 305 ME, 305 ME on the first three tests, days open in previous lactation, days dry in previous lactation, lactation number (age), body condition score during transition, lameness score or fresh cow diseases (ketosis, metritis or retained placenta, LDA, or mastitis < 30 DIM). However, cows with abnormal progesterone had higher NEFAs (0.162 mmol/L) throughout the transition period than normal cows (0.133 mmol/L, $p < 0.05$). Cows with abnormal progesterone also tended to have harder dystocias at calving. Abnormal cows had 53% hard dystocias (score > 3), and normal cows had only 37% hard dystocias ($p < 0.05$). Cows with abnormal progesterone also had higher butterfat at 10-16 DIM compared to normal cows, 4.35% vs. 3.89%, respectively ($p < 0.05$). There was a strong linear relationship between the butterfat at 10-16 DIM and the probability of hav-

ing an abnormal progesterone at 52-58 DIM. A large percentage (93%) of cows with abnormal progesterone did not show a heat after Pre-synch, while only 50% of normal cows did not show a heat ($p < 0.01$).

Significance

Clearly, this is an important issue because there were a large percentage of cows with abnormal progesterone levels, and these cows failed to show heats and had more services per pregnancy than normal cows. For a large dairy, this difference translates to a huge cost for additional Ov-synch injections, semen, and labor, as well as the cost associated with longer days open and longer calving intervals. In order to correct low progesterone levels, risk factors must be identified and evaluated. From this data, it appears that risk factors for abnormal progesterone are associated with energy balance in the transition period, and cows show elevated NEFAs. These cows tend to have dystocias and are in negative energy balance as they start their lactation. Their butterfat at 10-16 DIM is elevated, as they use body stores of fat for energy and milk. Ultimately, the goal should be to solve the transition problem so that fewer cows are in negative energy balance, and therefore fewer cows have abnormal progesterone levels at breeding. However, fresh-cow butterfat is an easy way for farms to identify these problem cows before the breeding period and reduce costs associated with synchronization protocols, semen, and labor. Ongoing research is examining the possible management strategies (i.e. wait to start Pre-synch and increase VWP, CIDR implant, etc.) to deal with these cows with abnormal progesterone.