above the normal rate. We had a 49% conception rate on first-service following use of prostaglandin as compared to 46% herd average on first-service.

When we consider that a percentage of the cows receiving prostaglandin were previously cystic cows, cows behind in breeding perhaps due to poor heat signs, and cows that were previously bred and then found open on palpation, we were very pleased with the results.

Summary

The use of prostaglandin in this now 1600-cow herd has been proven to be cost-effective, and gave very satisfactory results in this field study. Selection of recipients for prostaglandin injection is determined by rectal palpation by the veterinarian during herd checks, and is now a routine part of the herd health and reproduction program.

Trouble-Shooting Reproductive Problems Through Integrated Reproductive Management

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Summary

This progress report describes the Pennsylvania-Vermont reproductive management project. This integrated project utilized a task force of professional and service personnel and applied technology to evaluate herd status, diagnose deficiencies and problem areas and recommend corrective action in an attempt to improve reproductive performance. Sixteen herds in each state cooperated in this project. Herds were intensively evaluated for reproductive, health and nutritional status. Analysis of herd reproductive status, disease testing, blood and metabolic profiling, forage analysis, computer ration evaluation and feed programming, semen evaluation, and AI technique evaluation were the major tools used to identify problem areas. Reproductive goals were established for each herd and formal reports of herd status and recommendations were sent to each dairyman and the respective county agent, AI technician and veterinarian. Numerous reproductive management, health and nutritional deficiencies have been noted. Progress is determined by comparing herd reproductive status at the beginning of the project with similar data obtained at nine and eighteen months. The eighteen-month summary indicated improvement in several areas: a reduction in days to first service, increase in the percentage of cows first bred by 90 days, a reduction in the estimated calving interval, a decrease in services/conception and a decrease in percent reproductive culls. This project revealed a number of potential problem areas to be checked and tests to be performed when trouble-shooting reproductive problem herds in the future. This report summarizes the findings of the Pennsylvania portion of this study.

Introduction

The problem of poor herd reproductive performance is often complex involving management, nutritional and health factors. Although poor heat detection is widely accepted as the primary problem in herds with low reproductive performance, other important factors need to be considered more thoroughly under farm conditions. New developments in blood profiling, disease testing, ration evaluation, feed programming and evaluation of artificial insemination technique make it possible to more effectively assist dairymen in improving reproductive management. Furthermore, with the expertise in various disciplines related to dairy production available from both research and extension, it was felt that an integrated effort would be more effective in problem solving.

The objective of this project is to develop and implement a coordinated approach at the farm level to improve reproductive efficiency by 1) evaluating and monitoring herd reproductive and health status and feeding management, 2) recommending effective management practices, and 3) employing new technology and practices. This project was conducted jointly with the University of Vermont and funded by USDA through a new national program entitled "Integrated Reproductive Management."

Procedures

Sixteen problem herds (calving intervals in excess of 13.3 months) in each state were selected to participate in this project for eighteen months. Each herd is DHIA tested,

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utilizes AI extensively and maintains a farm accounting system. Herds were visited every 3 months for the first year. During these visits, 21 cows were bled and scored for body condition. Herds were revisited between each of these 3-month visits and every 2 months after the last bleeding until the end of the project. Reproductive information, herd health, financial and feeding management information plus feed samples were obtained during each visit. The effectiveness of this project will be determined by comparing reproductive and health data obtained at the beginning of the project (reproductive performance for the previous 12 months) with the same parameters calculated at 9 and 18 months into the project.

Reproductive Evaluation and Procedures

A reproductive profile was summarized for each herd. Components of this profile include actual calving interval, estimated calving interval, days open, first service conception rate, percentage of cows open over 120 days and greater than 150 days, services per conception for all cows bred and pregnant cows only and the percent reproductive culls. Management practices involving heat detection, semen handling and insemination technique, timing of service, record keeping and calving care were evaluated for each farm. Control semen of known seminal quality was placed in farm semen tanks at the beginning of the project and retrieved and evaluated at 9 and 18 month. This aided in detecting problems in semen tank management. Insemination technique of cooperators who are owner-inseminators was evaluated using radiographic techniques.

Health Aspects

Every nine months the incidence of abortion, uterine infection and retained placenta was determined. The vaccination program to include type and date of vaccination was recorded for each herd. Aliquots of serum from each of the 21 cows from each herd were submitted quarterly for disease testing. Disease monitored include IBR, BVD, PI_3, five serovars of Leptospirosis, Brucellosis, Haemophilus somnus and Chlamydia. Serology results and vaccination data were compared to determine if titer changes were caused by vaccination or an active infection.

Nutrition and Feeding Management

Serum samples from the 21 cows (7 early lactation, 7 mid-lactation, and 7 dry cows) obtained quarterly were analyzed to obtain a metabolic profile (PVC, Hb, RBC, WBC, Ca, P, K, Mg, Na, BUN, tot. protein, Alb., Glob.). In addition to the standard metabolic profile tests, 12 samples per herd were assayed for selenium status, glutathione peroxidase, vitamin A, tocopherol and carotene. Based upon results of these tests, the initial ration evaluation and forage testing, a feed program was developed for the milking herd and dry cows. Such programs were updated as required.

Recommendations and Follow-up

Following the first herd visit and blood sampling, the reproductive, health and nutritional data were compiled for each herd. Current herd status, deficiencies, recommendations and goals were established on an individual herd basis and sent to each dairyman. After each blood sampling, all results and interpretations were returned to the dairyman and his veterinarian. Furthermore, a nine-month progress report for each herd was sent to the dairyman and his veterinarian, AI technician and county agent. A reproductive economic survey form was developed to obtain financial data relative to reproductive performance. This information will be used to determine cost-benefit ratio of improved herd reproductive efficiency.

Results and Discussion

Certain reproductive management, health and feeding problems were revealed during the initial farm survey and from blood testing. The following management problems were apparent on seven or more farms; ineffective heat detection, excessive days to first service, poor first service conception rate, inadequate reproductive health records, high culling rate for reproduction and unsanitary or crowded calving areas. Several health conditions appear to be adversely affecting reproductive performance. These conditions and the number of herds affected are: retained placenta (8), metritis or vaginitis (12), cystic ovaries (3), anestrus (4), abortions (3), feet and leg problems (2), inadequate vaccination program (4), BVD (6), and leptospirosis (3). Once the serology results are complete from all four blood samplings, a more accurate appraisal of the disease situation can be made. The following nutritional problems were evident on several farms: lack of protein intake, low forage high concentrate intakes, inadequate trace mineral and vitamin supplementation, excessive phosphorus and inconsistent selenium supplementation, and improper mixing of concentrates.

The 9-month and 18-month herd reproductive summary for all herds indicated that progress was made in certain areas. Most notably there has been a reduction in average days to first service (95 to 84 days) and an increase in percentage of cows first bred by 90 days postpartum (58% to 66%). First service conception rate increased from 32% to 45%. There was also a reduction in estimated calving interval from 13.7 to 13.4 months during the 18 months. Significant progress has been made on other categories on an individual herd basis. There was no significant change in quality of semen samples that were recovered from farm tanks after 18 months storage. An experimental radiographic procedure for evaluating insemination technique was developed. Errors of technique were identified for several of the herdsman/inseminators.

A final evaluation of herd reproductive parameters will be conducted at 24 months after initiation of the study. It appears that this coordinated, multi-faceted approach is effective in identifying and solving specific herd problems and improving reproductive efficiency.