Response of Reproductive Control Program to Computer Enhancement

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Summary

The effect of adding computer technology to an existing reproductive herd health program was studied. The data from twenty dairy herds already on reproductive program was entered onto a computer program designed to prepare action lists and to produce reports measuring reproductive performance. These reports were used to encourage, educate and critique dairy management. Measurements of seven reproductive parameters during a base period were compared with measurements 9 and 15 months later to determine if computer enhancement provided a useful tool for increasing breeding efficiency. Days from calving to conception were reduced from 111 to 101. Other parameters were uneffected.

Introduction

The beneficial effect of regular reproductive herd health programs has been well documented. These programs became popular during the 1960's (8) and have led to improved performance in dairy producing countries throughout the world. (1, 12) More recently integrated reproductive management programs have incorporated nutrition, disease status monitoring and artificial insemination technique evaluation. (11)

Within the past 5 years microcomputers have become available to the practicing veterinarian. Dairy management programs (2, 7, 10) have been written for practice based computers that allow selection of cows for examination, monitoring of reproductive efficiency, and diagnosis of failures of herd reproductive efficiency. (4, 5)

These systems have reduced the dependency of centrally located mainframe computers. (3) The resultant reduction in cost of computer time-sharing and telephone line rental and the decrease in efficiency of regular postal service have encouraged the use of microcomputers by local practicing veterinarians. Futhermore, the assumption of responsibility for these monitoring systems by the attending veterinarian has shifted the role of advisor from the often impersonal central bureau to the more accessible local practitioner.

The response, however, of herd reproductive management to computer-enhancement (C-E) in existing reproductive herd health programs has not been well documented.

A study was conducted to determine if adding computer technology to an existing reproductive program would effect a change in common parameters of reproductive efficiency.

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Materials and Methods

Study Herds and Their Management

Twenty dairy herds were selected on the basis of having been on a regularly scheduled reproductive health program for a period of at least one year, used artificial insemination for at least 90% of services, were full time dairymen (were not employed off the farm) and had been on a computer enhanced program long enough to accumulate a 15 month period of records. All herds meeting these criteria were included in the study.

During the control period these 20 herds were visited monthly. The dairymen selected cows for reproductive examination based on the following guidelines: all cows not previously diagnosed pregnant except cows in early lactation that had been bred less than 30 days. Treatments were administered during these visits using accepted practices. (9) As each herd, already on an existing regular fertility control program, was brought on to the computer enhanced program each individual cow record was entered into the computer program (see below) back to the date of her last parturition.

Study Protocol

During the test period these 20 herds were also visited monthly. Prior to each visit an information sheet was prepared by the dairyman and submitted by mail to the veterinary office. Data included date, location, difficulty, and associated disease of calving; estrus dates; service date, sire code and inseminator; date of and reason for culling; and dry-off date.

This information was entered into the Dairy Herd Management Program (DHMP Program, Dairy Management Associates, 450 West 21st Street Suite C, Merced, California 95340, USA) running on a 10 MB hard disc portable computer (Kaypro 10, Kaypro Corporation,

Solana Beach, California, USA).

A vet-check list was then computer prepared that selected cows for examination by the attending veterinarian based on the following criteria: Three days or more postpartum; a history of calving problems; 30 days since last exam without a recorded estrus or more than 23 days since last recorded estrus; more than 60 days post-partum without a breeding; 3 estrus periods within 30 days, 35 days post breeding; 100 days post-partum without a pregnancy diagnosis or estrus; breeding or observed abortion after a pregnancy diagnosis. In short, after an initial post partum exam only cows that failed to perform optimally were selected for examination until they were called up for a pregnancy diagnosis after 15 days.

The "lock-up" list was mailed if time permitted or telephoned prior to the farm visit.

Cows were rectally examined, treatments were administered as during the control period and findings recorded in simple code form on the vet-check list. This information was batch entered into the program.

Each month immediately after the reproductive examination visit a DHMP generated reproductive summary was produced covering a "rolling quarter." (Each month the most current month was included and the least current excluded.) This report measures the reproductive performance of any population of cows for any period of time using 28 measurements of reproductive efficiency with goals that are agreed upon by the dairy management listed for each of these parameters. The attending veterinarian reviewed the information making hand written notes of encouragement, praise, constructive criticism, ideas for further diagnosis or steps to improve reproductive performance. If actual performance parameters fell well outside the goals further diagnostic reports were run such as conception rates for bulls and technicians, age specific abortion rates, right horn vs. left horn pregnancy ratio, etc. Routine reports were returned by mail, less routine matters were conveyed to the owner via telephone.

Data Management

Seven of these parameters were chosen as being most likely to be indicators of changing manager motivation and/or competence.

These seven indicators were: Percent recorded in estrus by 60 days post-partum, average interestral interval, first service conception rate, services per conception for all cows, percent bred AI by 90 days post-partum, days from calving to conception and herd reproductive survey (HRS) index. HRS index = $100 - (x/y \times 1.75)$ where x = total cow days open over 100 days post-partum and y = number of cows in herd. (6)

A 3 month retrospective summary done as soon as a dairy was started on C-E was averaged with a 3 month retrospective study performed 3 months later. This 6 month period became the control period. A 3 month retrospective done at 6 months and at 9 months after computer enhancement were averaged to form a first test period. Likewise, a 3 month retrospective summary at 12 months and at 15 months form a second test period. The first and second test period were each compared to the control period using the paired t-test.

Results

Of the seven parameters of reproductive performance measured (Table I) only two showed significant change. Days open were reduced from 111.8 to 101 (P .05) and HRS index increased from 57.4 to 64.5 (P=.1) during the first 6 months after the base period.

Discussion

A decision by the practicing veterinarian to computer enhance his/her reproductive control program is one that should not be taken lightly. (13) It requires a moderate commitment of capital and an enormous commitment of time that may not result in sufficient compensation to be attractive.

The results (Table I) seem to illustrate that dairy management may not respond to C-E as we might hope. Improvements cannot be expected in all reproductive parameters probably because some are measuring efficiencies that are a result of very complex interrelationships of nutrition, sanitation, technique, health, production, etc. The following are speculations regarding the response of the seven chosen parameters.

The first, percent recorded in estrus by 60 days, is an indication of increased interest in recording those estrus coming early in the lactation, that are so vital in "tracking" later estrus. Early estrus is also an indication of adequate early lactational energy intake. That there was no response, is evidence that it will require more than C-E to improve early estrus recording and post-partum nutrition.

TABLE 1. Means (±SD) of Reproductive Parameters for the Base 6 Months and at 9 and 15 Months. 1

	Base		9 mo.		15 mo.	
Parameter	$\bar{x}$	**SD**	$\bar{x}$	**SD**	$\bar{x}$	**SD**
% Estrus by 60 d	45.2	15.9	48.3	13.4	46.2	11.3
Avg. Interestral Interval	33.2	5.5	33.1	4.5	33.9	5.1
1st Service Conception Rate	49.2	15.7	49.6	7.8	48.9	12.4
Services/conception (all cows) 2	2.2	.6	2.1	.1	2.2	.5
% Bred by 90 d	72.1	14.5	70.1	15.5	63.4	16.7
Days from calving to conception	111.8	17.1	101.0	13.6*	109.1	18.9
HRS Index 3	57.4	16.5	64.5	14.2+	58.4	14.4

1 Data at 9 mo. and 15 mo. were compared with the base year.
2 Total number of services during period per number of pregnant cows during the period.
3 HRS = 100 - (Total open cows days over 100/total cows × 1.75)
* $P<.05$ compared to base
\+ $P=0.1$ compared to base

The second, average interestral interval, is used as a measurement of the number of estrus and/or services recorded. Failure to see a reduction is, like the above parameter, evidence that C-E is insufficient motivation to record more estrus. This is not surprising for even though there is a relationship between efficiency of estrus detection and efficiency of conception the average dairyman does not perceive this relationship but looks upon it as unnecessary record keeping.

The third, first service conception rate, may reflect management attention to the detail of post-partum reproductive health and heat detection accuracy. Here again C-E did not seem to play a role in influencing this important parameter.

The fourth, services per conception (all cows), should be an indicator of attention to detail in all phases of the reproductive endeavor but was unchanged over the two test periods. Nutrition, accuracy of heat detection, AI technique, cow health are all factors that contribute to fertility. It is probably too much to expect that adding computer technology would result in a significant change when so many and varying facets contribute to conception rate.

The fifth, percent bred 1st service by 90 days, is expected to be a measure of management's motivation to "move ahead" with the reproductive program. To see a decrease is indeed a disappointment. This may have been influenced by a few herds in the study in which conception rates improved so much that they were advised to delay first service, particularly in first lactation cows.

The sixth, days from calving to conception, had a significant decrease. The 10 day decrease from an already satisfactory 111 demonstrates two things: The standard reproductive program was very effective and that adding C-E may be a cost effective tool for reducing days open even further. Each day open over 90 is thought to cost the dairy $2.50. If true, then reducing days open by 10 will yield a savings of $25.00 per animal. If C-E costs $5.00 per cow per year, there is a cost benefit ration of 1:5. The failure of this effect to persist may indicate that C-E is a novelty that "wears off."

The last measurement, HRS index, is really the best indication of current reproductive status because it measures only non-pregnant cows. Unlike calving interval it is very sensitive over the short term. It is used in these twenty herds as an indicator of when it is appropriate to make an extra effort. HRS cannot exceed 100 but can decrease presumably to infinity. A practical goal is 60. In this study the average HRS index was near this goal in all 3 periods, more evidence that reproductive programs are effective.

The "vet-check" list produced by DHMP carries the days-in-milk for each cow called up for examination. Surprised upon seeing the actual number of days-in-milk, the manager and veterinarian are often prompted to use prostaglandin to promote estrus. This may be a way in which C-E is effective in decreasing days open and increasing HRS.

Conclusion

C-E is a tool for motivation and management both of the attending veterinarian and dairy manager. Although insufficient to effect a change in many parameters of reproductive efficiency a 10 day decrease in calving to conception and increase in HRS index was associated with commencement of computer enhancement. Whether these improvements justify the cost is a matter of one's practice philosophy.

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