

An Economic Comparison of Two Estrus Synchronization Programs For Dairy Heifers

Juan Jesus Mora, D.V.M. and

Lawrence E. Heider, D.V.M.

Department of Veterinary Preventive Medicine

College of Veterinary Medicine

and

Harry L. Barr, P.L.D.

Department of Dairy Science

The Ohio State University

Columbus, Ohio 43210

Summary

Two groups of 22 cycling nulliparous dairy heifers were used in this study to compare the reproductive performance and cost of the following two synchronization programs: a conventional synchronization program (single P conventional synchronization program (single PGF₂-α injection) and synchronization program (single PGF₂-α injection) plus estrus detection. The reproductive performance parameters analyzed were: days that elapsed from the first service to conception, services per conception and pregnancy rate. The mean difference in days that elapsed from first service to conception was 11 days in favor of the conventional synchronization program; mean services per conception were 1.68 and 2.22 respectively; and the percent of heifers conceiving was 86.4% and 81.8% respectively. None of these differences was significant (P>0.41, P>0.15, P>0.66). The economics of both synchronization programs were evaluated using the following expense factors: estrus detection cost, labor cost, semen cost, drug cost, veterinary service cost, and days lost cost. Total costs for the conventional synchronization program and for the synchronization plus estrus detection were \$2,092.08 and \$2,514.57. The costs of the programs on a per heifer basis were \$95.09 and \$114.03, which gave a mean difference of \$19.20 in favor of the conventional synchronization program. Statistical analysis of this difference showed no significance (P>0.43). This study demonstrated that use of the conventional synchronization program and regular pregnancy diagnosis can effectively replace labor needed for estrus detection. This method allows a dairyman to replace estrus detection with regular management practices and utilize artificial insemination which is a desired benefit.

Introduction

Major goals in any estrus synchronization (ES) program are to get a high proportion of dairy heifers bred artificially to proven sires with histories of easy calving (AI) in a practical, economical way.

Loss in production has been estimated to be \$109.00 for each dairy heifer not produced as a result of AI¹.

The efficacy of ES with prosta glandin F₂-α PGF₂-α is well established^{6,9}. Field trials with PGF₂-α have shown that levels of conception comparable to those achieved in the experimental herds under AI programs are possible^{5,7}. Nevertheless, limited research has been conducted to determine the economics of the different synchronization programs.

The objective of this study was to evaluate whether there were differences between two ES programs using PGF₂-α in regard to reproductive performance parameters and costs. The programs were a conventional synchronization (single injection) and a synchronization program (single injection) plus estrus detection.

Materials and Methods

Two groups of 22 cycling nulliparous dairy heifers were used in this study. The conventional synchronization program (group I) consisted of 19 Holstein heifers, 2 Ayrshires, and 1 Guernsey. The synchronization plus observation program (Group II) consisted of 20 Holstein Heifers, 1 Ayrshire, and 1 Guernsey. These animals were selected from two larger groups of replacement heifers on the basis of a breeding soundness examination and body weight. The heifers were assigned to groups based on age and stage of

estrus cycle. Heifers were pastured on grass lots. Restraint and breeding facilities were adjacent. The study was executed from July to December, 1980.

On the day of initiation of the study luteal status was determined by rectal examination in both groups. Twenty-eight heifers (14 in each group) which had a corpus luteum (CL) estimated to be between 5 and 16 days of development received one 25 mg injection of PGF₂-α, IM. Artificial insemination was performed at 80 hours after injection. Eleven days later the other 16 heifers (8 in each group) were injected with 25 mg of PGF₂-α, IM. These were inseminated 80 hours later. After all heifers were inseminated once, each experimental group was treated differently. All 22 heifers in group I were examined rectally to identify open heifers 35 days after insemination. Open heifers received a second PGF₂-α after injection if a CL was present, and AI was performed 80 hours later. For open heifers without a functional CL, a dose of PFG₂-α was left with the herdsman to be administered 11 days later. This scheme was repeated every 38-39 days until the end of the project. For group II, observations of 15 minutes duration were made twice daily (AM-PM) to detect estrus. All heifers were bred 12 hours after first observation of signs of standing estrus. Pregnancy examinations were conducted biweekly on all animals that had been bred 35 days or longer for the purpose of recording experimental data only. (This examination cost was not included in the economic analysis.) Observation and insemination of those in estrus were conducted until the end of the project.

Results

The reproductive performance parameters evaluated were days that elapsed from first service to conception, services per conception, and pregnancy rate. The days that elapsed from the first breeding to conception were analyzed by a paired t-test. The mean days for group I was 42.27 days and for group II 54.22 days. The difference of the mean was 11 days in favor of group I. It was not statistically significant ($P>0.41$). The mean services per conception were 1.68 and 2.22 for each group respectively. The statistical test used was an analysis of variance. There was no significant difference between these means ($P>0.15$). The pregnancy rate was analyzed by a test for equality of proportion⁸. The percent of heifers which conceived in group I was 86.26% and 81.81% for group II. These proportions were not significantly different ($P>0.66$).

The cost factors taken into consideration for group I were, total drug cost (\$143.50), value of labor for injection and for AI by appointment (\$218.64), semen cost (\$205.00), and cost of veterinary examinations (\$130.00). These examinations included initial palpation to determine estrus cycle status, breeding soundness and rectal palpations to diagnose pregnancy and to determine stage of estrus cycle in open heifers. The cost factors for group II were, total drug cost (\$77.00); value of labor for injection, AI by appointment, and sorting, restraining and inseminating

heifers in standing estrus (\$175.32); labor used for estrus detection (\$174.00); semen cost (\$225.00); and cost of veterinary examination (\$44.00). The only examination was the initial palpation to determine breeding soundness and estrus cycle status. A \$1.50 value was calculated per day lost. The value of days lost in group I was \$1395.00 and in group II \$1789.50. The total cost per program was \$2092.14 and \$2514.85 for group I and group II respectively (Table 1). In order to analyze the significance of program cost differences, expenses were allocated on a per heifer basis in each program and were analyzed by a paired t-test. The mean cost per heifer for group I and group II were \$96.09 and \$114.29 respectively. The difference of the means was \$19.20 in favor of group I. It was not statistically significant ($P>0.43$).

TABLE 1 Comparative Summary of Cost per Program.

Items	Conventional Synchronization Program	Synchronization Plus Observation Program
Estrus Detection Cost	—	\$ 174.00
Labor Cost	\$ 218.64	\$ 175.32
Semen Cost	\$ 205.00	\$ 255.00
Drug Cost	\$ 143.50	\$ 77.00
Veterinary Service Cost	\$ 130.00	\$ 44.00
Days Lost Cost*	\$1,395.00	\$1,789.50
Total Cost	\$2,092.14	\$2,514.85
Cost per Heifer	\$ 95.09	\$ 114.31
Reduced Cost per Heifer as Compared to Synchronization Plus Observation Program	\$ 19.22	\$ —

*Daily cost of maintaining an open heifer in a herd — \$1.50 (Porterfield, R. — Department of Dairy Science, The Ohio State University).

Discussion

The results demonstrated that there was no significant difference between conventional synchronization and synchronization plus estrus detection program.

The most important reproductive performance parameter is days elapsed from first service to conception because the cost of this parameter was the greatest expense in both groups. Reducing days lost from first breeding to conception will ensure that replacement heifers will calve early which has a positive effect on pounds of milk per day of cow life^{2,4}.

Although the mean values for services per conception in both synchronization programs were not significantly different, they were within acceptable values and similar to those obtained in dairy herds under routine reproductive health programs³.

The results of this trial suggest that dairymen can choose either synchronization program in order to get heifers sired by AI without affecting the reproductive performance of the herd or increasing its cost. The pregnancy rate of 86.36% and 81.81% obtained in both breeding programs over a period of

about four months support this concept. It is well known that dairymen have been reluctant to use AI in their replacement heifers. Several reasons have been mentioned. The most important ones are: the difficulty in detecting estrus in heifers, poor handling facilities, and unreliable or costly labor. Reliability of labor for estrus detection represents a very critical factor in any AI program, even more so in heifers due to the fact that some of these animals have short estrus periods¹⁰. The personnel in charge of estrus detection must know the subtle signs of estrus and should keep good records which will ensure proper timing of insemination. As a result of the outcome of this field trial the conventional synchronization program demonstrated a valid alternative for the dairyman.

Use of the conventional synchronization program and regular pregnancy diagnosis can effectively replace the labor needed for estrus detection. This method allows a dairyman to replace estrus detection with regular management practices and use AI which is a desired benefit.

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Clinical synopsis:

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