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Estrus detection, first service conception, and embryonic death in beef heifers synchronized with MGA and prostaglandin

Abstract

In April, 1996, 1501 yearling crossbred heifers located on seven different ranches were estrus-synchronized and artificially inseminated (AI) 12 hours after they were detected in estrus. Herd size ranged from 82 to 439 head. Of the 1501 heifers, 86.1% were detected in estrus. First service conception rates of those 1292 heifers averaged 58.4% (40.3 to 68.8%). In three herds, ultrasonography was used to diagnose 525 heifers as pregnant at 30 days after AI. At 60 to 90 days after the breeding season, palpation of the uterus confirmed that embryonic death had occurred in 4.2% (4.0 to 4.8%). First service conception rates varied widely among ranches. The variation might have been due to factors such as climate, average daily gain, body condition, AI technician, and AI sire. A small percentage of embryos died after the 30-day ultrasound exam regardless of the ranch or management system.

Keywords

Cattlemen's Day, 1997; Kansas Agricultural Experiment Station contribution; no. 97-309-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 783; Beef; Artificial insemination; Synchronization; Ultrasound; Conception; Embryonic death

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**ESTRUS DETECTION, FIRST SERVICE CONCEPTION,
AND EMBRYONIC DEATH IN BEEF HEIFERS
SYNCHRONIZED WITH MGA AND PROSTAGLANDIN ¹**

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Summary

In April, 1996, 1501 yearling crossbred heifers located on seven different ranches were estrus-synchronized and artificially inseminated (AI) 12 hours after they were detected in estrus. Herd size ranged from 82 to 439 head. Of the 1501 heifers, 86.1% were detected in estrus. First service conception rates of those 1292 heifers averaged 58.4% (40.3 to 68.8%). In three herds, ultrasonography was used to diagnose 525 heifers as pregnant at 30 days after AI. At 60 to 90 days after the breeding season, palpation of the uterus confirmed that embryonic death had occurred in 4.2% (4.0 to 4.8%). First service conception rates varied widely among ranches. The variation might have been due to factors such as climate, average daily gain, body condition, AI technician, and AI sire. A small percentage of embryos died after the 30-day ultrasound exam regardless of the ranch or management system.

(Key Words: Artificial Insemination, Synchronization, Ultrasound, Conception, Embryonic Death.)

Introduction

Proper management of replacement heifers is critical to their future production and longevity. Many producers utilize estrus-synchronization systems and AI to increase the proportion of replacement heifers that conceive earlier in the breeding season. Consequently, these

females produce their first calf early in the calving season and tend to continue to calve earlier throughout their productive life.

Fetal aging by rectal palpation, subsequent estrus activity, or calving dates are used to determine whether the calf was sired by an AI or cleanup bull. Although these methods are useful, they very often produce inaccurate conception or pregnancy rates.

Ultrasonography can be used to determine the presence of a viable embryo as early as 28 days of pregnancy. In addition, ultrasonography can be used for ovarian and uterine scans and fetal sexing. This technology also can be used to accurately determine conception and pregnancy rates and evaluate the viability of estrus synchronization and AI protocols. Our objectives were to determine the difference in first service conception rates among ranches using a common estrus-synchronization protocol and to estimate the incidence of embryonic death after a viable embryo had been detected at 30 days of pregnancy.

Experimental Procedures

In April, 1996, 1501 yearling crossbred heifers from seven ranches in Kansas and Missouri were synchronized using a common estrus synchronization and AI program. Herd size ranged from 82 to 439 and averaged 214 head. Estrus was synchronized by feeding MGA (.5 mg per head per day for 14 days) and then

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giving a prostaglandin $F_{2\alpha}$ injection 17 days after MGA withdrawal. Heifers were observed for signs of estrus and inseminated artificially by an experienced technician 12 to 16 hours after the first detected standing heat. At 29 to 33 days after AI, ultrasonography was used to establish the presence of a viable embryo and to determine first service conception rates. Incidence of subsequent embryonic death was monitored in three herds. At 60 to 90 days after the end of the breeding season, pregnancy was reconfirmed by uterine palpation in the 525 heifers that were earlier diagnosed pregnant to AI by ultrasonography.

Results and Discussion

Table 1 shows the variability in detection of estrus and first service conception rates among ranches. Of the 1501 heifers initially synchronized, 1292 (86.1%) were detected in estrus within 72 hours and had first service conception rates of 40.3 to 68.8%, with an average of 58.4%. The remaining 209 heifers received a fixed-time AI and/or were exposed to cleanup bulls. A primary goal of

an estrus-synchronization system is to maximize the number of replacement heifers bred to proven AI sires within the first few days of the breeding season. Thus, calves are born earlier and have the potential for greater growth and heavier weaning weights.

The variability in first service conception rate among ranches could have been a result of such factors as average daily gain, body condition score, climate, AI technician, and AI sire.

Embryonic death was measured in three herds (A, D, G; Table 1). Of the 525 heifers diagnosed pregnant at 29 to 33 days after insemination, 4.2% (4.0 to 4.8%) of the heifers did not have viable embryos at palpation. Most reports suggest a 5 to 25% embryonic loss between 30 and 60 days after insemination. Therefore, our observations support the notion that, regardless of the management system, a small percentage of embryos die. Ultrasonography can monitor the success of a breeding program and can accurately determine first service conception rates and embryonic death. This technology can enhance the ability of cow-calf producers to make decisions that impact profitability and efficiency of their operation.

Table 1. Estrus Detection, First-Service Conception, and Embryonic Death of Beef Heifers Synchronized with MGA and Prostaglandin

Item	Ranch						
	A	B	C	D	E	F	G
No. of heifers	414	175	121	439	82	101	169
No. detected in estrus (%)	339 (81.9)	151 (86.3)	85 (70.2)	404 (92.0)	62 (75.6)	93 (92.1)	158 (93.5)
% first service conception	44.0	60.9	57.6	67.1	40.3	68.8	66.5
No. of embryo deaths ^a (%)	6 (4.0)	-	-	11 (4.1)	-	-	5 (4.8)

^aViable embryos at 30 days of pregnancy that died thereafter.