

ESTRUS SYNCHRONIZATION AND CALVING EASE AMONG FIRST CALF HEIFERS

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Managing heifer replacements so they will calve as two year olds with a minimum of difficulty has been, and continues to be, a problem for many cow-calf producers. In beef cattle production, selection pressure is placed on maximum performance, which tends to increase birth weight. Birth weight has been shown in several detailed studies to be highly correlated with difficult births. Conformation, while important, hasn't been as highly correlated with calving difficulty as has birth weight. The first calf heifer is a special problem indeed, because, although she is still growing, the economics of beef production give producers no alternative but to strive for maximum production. While selection for maximum performance is often associated with heavier birth weights, individual sires have been identified that sire calves with light birth weights and possess above average pre and post-weaning performance. Easiest access to these type sires is through artificial insemination.

Artificial insemination has not been widely used in beef herds for many reasons, but a few of the major ones are: special training and handling facilities are required, extra handling of cows and heifers is necessary, time for heat detection and insemination is often limited, and pounds of calf lost among females that don't conceive is costly. The advent of estrus synchronization has changed some of the previously accepted disadvantages. Most notably labor is not eliminated, but is substantially reduced and within the time frame of a conventional 21-day A.I. breeding period, synchronized females will show two heat cycles.

In this heifer breeding management study we have combined some well established management techniques with the advanced technology of estrus synchronization. In executing the study we've incorporated the following:

1. Heifers have been sorted into groups according to weaning weight and fed to weigh 700 pounds by the start of the breeding season.
2. All heifers were inseminated once artificially.
3. A.I. sires were selected on progeny test data for calving ease and pre and post-weaning gain.
4. Heifers were synchronized with Lutalyse^(R) using either a single or double injection method.
5. Texas Longhorn bulls were used for clean-up breeding to insure calving ease.
6. A short 45-day breeding season was used.

Primary objectives as they relate to the design of this study are to evaluate two methods of synchronization with Lutalyse^(R) to determine whether or not calving difficulty can be minimized through the use of progeny tested sires while cleaning up with the Longhorn breed, and to evaluate the overall efficiency and effectiveness of the heifer management system being suggested.

In order for estrus synchronization to be successful, beef females must be sexually mature and cycling properly. In 1979, KaMar heat detection devices and rectal palpation were used to identify those heifers that were cycling. This method was found to be totally unacceptable and a waste of time and money. In all other years of the study epididectomized sterile bulls with marking harnesses have been used to measure pre-breeding estrus activity. All animals that were wintered, with limited exceptions, were used in the breeding studies and were not eliminated until identified as open after being pregnancy tested.

Two breeding groups are being used in this study to evaluate two different management methods for using the estrus synchronizing compound, Lutalyse. A single injection of Lutalyse is being compared with the recommended double injection.

Group One was synchronized using the single injection method. With this method, heifers are inseminated conventionally during the first five days of the breeding season. On the sixth day at 8:00 A.M. all heifers not inseminated during the first five days of breeding are given 25 mg Lutalyse. After the Lutalyse is administered, A.I. breeding is continued until 80 hours has elapsed. At that time all remaining undetected heifers were inseminated as a group. Following the group insemination and a five-day waiting period, the heifers were exposed to a Longhorn clean-up bull equipped with a chin-ball marker. Group Two was synchronized with the double injection method. Using this method, two injections of Lutalyse separated by eleven days are used. None of the heifers were inseminated during the eleven day period between injections. Our abbreviated description of how each group was synchronized is shown in Table 1.

Table 1. Design for Estrus Synchronization

Single Injection Method:		
Day of Breeding Season:		
1		
2		
Period I	3	Inseminate normally 1 st five days of breeding season.
	4	
	5	
	6	8 A.M. administer 25 mg. Lutalyse to all heifers not inseminated during Period I.
Period II	7	Continue breeding normally until 80 hrs. post-injection time.
	8	
	9	At 4 P.M. (80 hrs. after the Lutalyse injection) all heifers not inseminated during Periods I and II were inseminated as a group without regard to standing heat.
Double Injection Method:		
Day of Breeding Season:		
11 days before start of breeding season		Administer 25 mg Lutalyse.
1		The 2 nd injection of Lutalyse is given at 8 A.M. on the 11 th day, which is the start of the breeding season.
2		Inseminate normally all heifers found in standing heat until 80 hrs. post-injection time.
3		
4		At 4 P.M. (80 hrs. after the 2 nd injection of Lutalyse) all heifers not inseminated during the 80 hr. period are inseminated as a group without regard to standing heat.

The heifers were placed with a Longhorn clean-up bull after a five day waiting period.

Semen from an Angus sire, Shoshone Monitor 17An50, was purchased from Minnesota Valley Breeders Assn. in 1979, and in 1980 and 1981 semen from an Angus bull, Kadence Shoshone 7An47, was purchased from Select Sires, Plain City, Ohio. In 1982, Angus semen was purchased from American Breeder Service. Sires used were Stardust Expansion 17An1337, Northern Prospector 29An1329 and Prairie Lane Rito 29An1343.

Accumulated breeding results, calving difficulty, birth weights, actual and adjusted weaning weights and economic analysis are given in Tables 2, 3, 4 and 5.

Summary:

1. Four years of synchronization and calving data, and three years of weaning data have been summarized in this progress report.
2. Synchronized estrus conception rates have been variable. In the double injection group a four year average conception rate of 51% was recorded and ranged from a low of 19% to a high of 62%, and using the single injection method resulted in 42% of the heifers conceiving with yearly variations ranging from a low of 5% to a high of 74%. In years when extremely low conceptions were experienced, only a small number of heifers had cycled before the start of the breeding season; demonstrating the need to have heifers sexually mature before engaging in a synchronization program with heifers using prostaglandin synchronizing compounds.
3. Economically, it was substantially less expensive to use the single injection method but required three additional days of labor. The single injection group cost for semen and Lutalyse per heifer conceiving was \$26.33 as compared to \$34.34 in the double injection group.
4. Each management method is being evaluated to determine which will return the most net dollars from sale of weaned calves. Economic analysis to date favors the single injection method by a small margin in spite of it being the group recording the lowest four year synchronized estrus conception rate. Most of the difference is due to the added cost of Lutalyse under the double injection regime.
5. A major objective in this study was to reduce calving difficulty and still have satisfactory performance from the calves. Performance was about as expected from any group of young unproven heifers. Calving difficulty, however, was not minimized with the progeny tested bull used in this study. Forty percent of the Angus sired calves required assistance whereas only 2.8% of the Longhorn calves were assisted. Angus bull calves weighing seventy pounds or more were the source of difficulty in a ratio of 2:1 when compared to the Angus heifers. Longhorn sired calves were excellent for calving ease; however, pounds of beef are significantly reduced.

Table 2. Double Injection Method of Synchronization among First Calf Heifers

Breeding/Calving Year	Double Injection				4-Yr. Total
	1979-80	1980-81	1981-82	1982-83	
No. head	21	24	18	29	92
No. in heat before breeding	7	21	18		
No. in heat + insemination before 80 hrs.	4	18	14	18	54 (58.7%)
No. not showing heat but inseminated at 80 hrs.	17	6	4	11	38 (41.3%)
No. open	1	3	1	5	10 (10.8%)
Conception rate for synchronization estrus	4 (19%)	14 (58%)	11 (61%)	18 (62%)	47 (51%)
Economics:					
Semen + Lutalyse expense ^{1/} , \$	336	432	324	522 =	1614
No. Conceiving to Synchronization	4	14	11	18 =	47
4-Year Avg. Cost/Heifer Conceiving					
\$34.34					

^{1/} Average Lutalyse cost was \$5.00/injection; semen averaged \$7.50/head.

Table 3. Single Injection Method of Synchronization among First Calf Heifers

Breeding/Calving Year	Single Injection				4-Yr. Total
	1979-80	1980-81	1981-82	1982-83	
No. head	20	24	19	29	92
No. in heat before breeding	3	21	19		
No. Inseminated 1 st 5 days of Breeding	5	9	5	7	26 (28.2%)
No. in heat + insemination before 80 hours	0	9	10	8	27 (29.3%)
No. not showing heat but inseminated at 80 hours	16	6	4	14	40 (43.5%)
No. open	1	8	0	1	10 (10.8%)
Conception rate for synchronization estrus	1 (5%)	11 (46%)		14 (74%)	39 (42%)
Economics:					
Semen + Lutalyse expense ^{1/} , \$	200	267	222	338 =	1027
No. Conceiving to Synchronization	1	11	14	13 =	39
4-Yr. Avg. Cost/Heifer Conceiving					
\$26.33					

^{1/} Average Lutalyse cost was \$5.00/Heifer for 66 head not cycling during first 5 days of breeding; semen averaged \$7.50 per head.

Table 4. Calving Difficulty and Birth Weights among First Calf Heifers

Management Method Calendar Year	Single Injection					Double Injection				
	1979- 80	1980- 81	1981- 82	1982- 83	4-Yr. Total	1979- 80	1980- 81	1981- 82	1982- 83	4-Yr. Total
No. Calving	19	16	18 ^{1/}	27	80	20	21	17	24	82
No. Unassisted	18	16	10	17	61	17	21	9	15	62
Calving Difficulty^{2/}:										
A.I. Angus:										
Shoshone Monitor- (17An50)	1/1	--	--	--	1	4/2	--	--	--	2
Kadence Shoshone- (7An47)	--	11/0	13/8	--	8	--	14/6	11/7	--	7
Stardust Expansion- (17An1337)	--	--	--	6/5	5	--	--	--	6/5	5
Northern Prospector (29An1329)	--	--	--	4/4	4	--	--	--	11/4	4
Prairie Lane Rito (29An1343)	--	--	--	3/0	0	--	--	--	1/0	0
Angus Clean-up Bull (A-94)	2/0	--	--	--	0	5/1	--	--	--	1
Longhorn Clean-up Bull	16/0	5/0	5/0	14/1	1	11/0	7/0	6/1	6/0	1
Percent Calving Difficulty	Angus Sired $\frac{18}{40} = 45\%$					All Angus $\frac{19}{52} = 36.5\%$				
	Longhorn $\frac{1}{40} = 2.5\%$					Longhorn $\frac{1}{30} = 3.3\%$				
Birth Weight Summary:										
4- Year Avg.	Bulls			Heifers		Bulls			Heifers	
A.I. Angus:										
Shoshone Monitor	72			--		85			72	
Kadence Shoshone	72			68.5		71.3			69.5	
Stardust Expansion	75			71		75			75	
Northern Prospector	69			71		71			63	
Prairie Lane Rito	66			64		--			70	
Angus Clean-up Bull	73			--		67			70	
Longhorn Clean-up Bull	61			55		61			57	

^{1/} One heifer died.^{2/} First number indicates number of calves sired/second number indicates calving without difficulty.

Table 5. Three Year Actual and Adjusted Weaning Weights, and Partial Economic Analysis When Comparing Two Synchronization Methods^{1/}

Management Method	Single Injection				Double Injection			
	Bulls		Heifers		Bulls		Heifers	
	Actual	Adj.	Actual	Adj.	Actual	Adj.	Actual	Adj.
Angus Calves:								
No. Head	10		12		17		11	
Total Wt., lbs.	4524	4916	5323	5977	6951	7599	5019	5868
Avg. Wt., lbs.	452.4	491.6	443.5	498.1	408.9	477	456.3	533.5
Longhorn Calves:								
No. Head	13		13		11		10	
Total Wt., lbs.	4632	5411	4580	6084	4051	4646	3188	3814
Avg. Wt., lbs.	356.3	416.2	352.3	468	368.3	422.4	318.8	381.4
Economics:								
Angus Bulls @ 65¢, \$			2,940.60				4,518.15	
Angus Heifers @ 57¢, \$			3,034.11				2,860.83	
Longhorn Bulls @ 58¢, \$			2,686.56				2,349.58	
Longhorn Heifers @ 55¢, \$			<u>2,519.00</u>				<u>1,753.40</u>	
Gross Return, \$			11,180.27				11,481.96	
Deduction for Semen + Lutalyse, \$			<u>-1,027.00</u>				<u>-1,641.00</u>	
Net Return, \$			10,153.27				9,867.96	
Difference Favoring Single Injection, \$			285.31					

^{1/} Heifer weights are adjusted to bull basis.