

LUPROSTIOL FOR THE INDUCTION OF ABORTION IN FEEDLOT HEIFERS

By

J.L. Nelson, D.G. Landblom,
D.A. Redmer and T.J. Newby

Proper management of pregnant heifers is a major challenge to feedlot owner-operators. If the pregnancy is not terminated early in the feeding period, one of two things must happen. The heifer will either calve in the feedlot, or carry a sizeable fetus to the packer. Either way the losses are substantial and may exceed \$90-\$100 per heifer.

A trial was conducted in the late fall and winter of 1986-87 to determine the effectiveness of Luprostiol^R for induction of abortion in feedlot heifers. This was a cooperative study involving the Dickinson Experiment Station and Norden Laboratories, Inc., Lincoln, Nebraska. Dr. T.J. Newby was the monitor and key contact person for the Norden Laboratory.

According to Dr. Newby, Luprostiol^R is a new, highly effective and almost side effect free luteolytic analog of prostaglandin F2 alpha. It has been formulated as an injectable solution of 7.5 mg/ml in propylene glycol. Luprostiol^R has been available to European veterinarians for several years. Information from pharmacokinetic studies with radiolabelled luprostiol indicates luprostiol is quickly eliminated, in a manner similar to other prostaglandin analogs.

European dose response and efficacy studies using dairy cows and heifers indicated that a 2 ml dose (15 mg) of luprostiol is highly effective and safe for estrous cycle control and abortion, as well as for the treatment of anestrous (silent heat cycles). Dose up to 100 times the recommended dose were tolerated with only transient side effects.

PROCEDURE

In October, 1986, fifty yearling heifers of mixed breeding, mostly Hereford X Angus or straight Hereford, believed to be approximately 150 days pregnant were purchased from a local livestock auction market over a period of several weeks.

On November 17, 1986, the heifers were individually identified with ear tags, weighed and palpated rectally to determine pregnancy status and approximate age of fetus. Forty-nine of the fifty heifers were found to be pregnant. The heifers were then paired according to weight and estimated age of fetus. One heifer from each pair was then assigned at random to a control or treatment group. Control heifers received a 2 ml dose of fenprostalene (Bovilene^R) by subcutaneous injection while those in the treatment group were injected with 2 ml of Luprostiol^R. Bovilene^R is an analogue of the naturally occurring prostaglandin F2 alpha. The dosage as an abortifacient is a single subcutaneous dose of 2 ml (1 mg) per injection.

Blood samples were taken at 0, 48, 96 hours post injection. These samples were cooled, centrifuged and the serum sent to the Animal Science Department, North Dakota State University for progesterone assay.

The heifers were held in four lots with 12 to 13 heifers per lot, where they had access to automatic waterers and were fed a ration composed of chopped hay and corn silage. They were observed daily for signs of apparent abortions, treatment caused side effects and general health. On a weekly schedule, they were palpated by a licensed veterinarian. Those found to have aborted were then transferred to holding pens where they were held for a minimum of sixty days post treatment. Following the required holding period, the heifers were sold at auction.

Heifers that did not respond to the initial treatment on November 17, 1986 were given a second injection on December 8, 1986 and again monitored by blood sampling, observation and rectal palpation for three weeks. Heifers not responding to the second treatment were held for the required sixty days and then sold.

Results of the abortion treatments are shown in Tables 1 and 2. Blood progesterone assays are tabulated in Tables 3 and 4.

DISCUSSION

The heifers in the trial were palpated and fetus age was found to range from 50-150 days, with the average age estimated to be approximately 115 days at the time of the first injection. Approximately 30% of the heifers aborted during the first week post injection with another 40% aborting by day 14 post injection. Another 4% of the heifers aborted the third week following injection. At the end of three weeks 71% of the Bovilene^R treated heifers and 75% of the Luprostiol^R treated heifers had aborted. The average number of days from injection to abortion was about 10 days with 29% of the Bovilene and 24% of the Luprostiol^R heifers failing to respond to the initial treatment. Even with close observation, not all of the aborted fetuses were recovered. Some heifers showed signs of straining, bloody discharge, etc. but required a palpation to confirm the abortion.

Those heifers not responding to the initial injection were retreated. At the time of the second injection, the estimated fetal age was 148 and 140 days for the Bovilene^R and Luprostiol^R respectively. Following the second injection, 42% of the heifers receiving a second injection of Bovilene^R aborted during the first week. Sixteen percent of the Luprostiol^R heifers aborted each week for the three week period post injection. Thus, 42% of the Bovilene^R and 50% of the Luprostiol^R treated heifers aborted following the second injection. One heifer in the Luprostiol^R treated group did not abort until January 19, 1987 which was 42 days following the second injection. While not confirmed, it is believed that this abortion was due to the second injection of Luprostiol^R. None of the heifers appeared to suffer adversely from the abortion except for one heifer that started to abort on the evening of December 22, 1986, and had not made any progress by the morning of December 23, 1986. She was palpated and found not to have any cervical dilation. She was treated with 10 cc of ECP plus 5 cc of Lutelyse and accomplished the abortion on December 24, 1986. The fetus was quite bloated and delivered in a backwards presentation. The heifer recovered without further complications.

The blood serum samples were assayed for progesterone levels by the Animal Science Department, North Dakota State University, under the direction of Dr. Dale Redmer, and average progesterone levels (nanograms per milliliter) are shown in Tables 3 and 4. Progesterone blood levels were dramatically reduced by 48 hours post injection and further reduced by 96 hours post injection. However, even with large reductions in progesterone blood levels, not all heifers aborted, which suggests that factors such as fetal age, individual animal variation, etc., regulate time of abortion. Heifers that received a second injection of Bovilene^R or Luprostiol^R had a lower progesterone blood level at 0 hours (3.2 and 3.52ng/ml) than they had at the time of the first injection, but their blood serum levels did not go below .52ng/ml. Both drugs were effective in causing a rapid decline in progesterone level, due to their ability to destroy the corpus luteum.

SUMMARY

Luprostiol^R, an analog of prostaglandin F2 alpha, was found to be an effective drug when used to terminate pregnancy in feedlot heifers that were estimated to be 150 days or less pregnant. One subcutaneous injection of 2 ml of Luprostiol^R caused 76% of the heifers to abort within 21 days. This compared to a 71% abortion rate when Bovilene^R was used.

A second injection given to heifers that remained pregnant at the end of 21 days caused an additional 42 to 50% abortion rate for the Bovilene^R and Luprostiol^R treated heifers. Although no unusual side effects were observed with either drug used in this trial, producers planning to abort feedlot heifers should do so at an early (less than 150 days) stage of pregnancy.

Table 1. Response of Pregnant Heifers to a 2 ml Injection of Bovilene^R or Luprostiol^R

	<u>BOVILENE^R</u>	<u>LUPROSTIOL^R</u>
No. of heifers treated on November 17, 1986	24	25
Average estimated age of fetus	115.6	116.2
Abortions during Week 1	7	8
Percent	29	32
Abortions during Week 2	9	10
Percent	37	40
Abortions during Week 3	1	1
Percent	4	4
Total heifers aborting	17	19
Percent	71	76
Average number days to abort	8.7	10.0
Heifers not responding	7	6

Table 2. Response of Pregnant Heifers to a Second Injection of Bovilene^R or Luprostiol^R

	<u>BOVILENE^R</u>	<u>LUPROSTIOL^R</u>
No. of heifers retreated on December 8, 1986	7	6
Average estimated age of fetus	148.4	140.3
Abortions during Week 1	3	1
Percent	42	16.7
Abortions during Week 2	0	1
Percent	0	16.7
Abortions during Week 3	0	1
Percent	0	16.7
Total abortions	3	3
Percent	42	50
Average days to abortion	2.66	10
Heifers not responding	4	3 <u>1/</u>

1/ One heifer aborted a "beagle dog" size fetus on January 19, 1987

Table 3. Results of Progesterone Assay on Blood Serum Collected at 0, 48 and 96 Hours Post Injection

<u>FIRST INJECTION</u>	<u>BOVILENE</u>	<u>LUPROSTIOL</u>
Heifers that aborted with one 2 ml injection	17	19
Average progesterone in ng/ml of serum:		
0 Hours	9.66	11.17
48 Hours	1.16	0.88
96 Hours	0.49	0.77
No. heifers that did not respond	7	6
Average progesterone in ng/ml of serum:		
0 Hours	10.51	8.38
48 Hours	2.15	0.93
96 Hours	0.97	0.86

Table 4. Results of Progesterone Assay of Blood Serum Collected at 0, 48, and 96 Hours Post Injection

<u>SECOND INJECTION</u>	<u>BOVILENE</u>	<u>LUPROSTIOL</u>
Heifers that aborted following second injection	3	4
Average progesterone in ng/ml of serum:		
0 Hours	3.20	3.52
48 Hours	0.96	0.67
96 Hours	0.73	0.52
Heifers not responding to injection	4	2
Average progesterone in ng/ml of serum:		
0 Hours	3.15	1.09
48 Hours	1.47	1.15
96 Hours	1.29	1.00