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Induced Calving in Beef Cattle

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Summary

Calving was induced in 44 Polled Hereford cows at 275 days' gestation. Twenty mgs. of dexamethasone (Azium) given intramuscularly caused parturition an average of 43.1 hours after injection (range 21 to 57). An injection of 30 mgs. of prostaglandin F_{2α} 40 hours after dexamethasone effectively increased predictability of calving. Seven of nine cows calved 2.5 to five hours post prostaglandin (average time of calving 44.9 hours after dexamethasone). Prostaglandin given 30 hours after dexamethasone or dexamethasone 40 hours after prostaglandin was less effective (average 46.6, range 34.5 to 57.5; average 75.3, range 63 to 100, respectively).

Calving ease did not differ between induced and noninduced cows, but viability of induced calves was lower; 88% of the induced cows retained placenta. Placentae were expelled an average of six days after calving regardless of treatment. Rectal palpations at three and five weeks postpartum showed cows treated with intramuscular injections of combiotic and intrauterine infusions of nitrofurazone plus proteolytic enzymes plus lacticin granules had faster uterine involution and more ovarian activity than cows treated with intrauterine infusions of nitrofurazone alone. However, more intrauterine-nitrofurazone treated cows conceived on first service and conceived sooner than cows receiving either of the other two treatments.

Introduction

The increasing intensity of cattle production and constantly rising costs force today's cattleman to strive to control each phase of the management program. Controlling the estrous cycle also controls time of parturition, however, currently available estrus synchronization methods have not been widely accepted. Therefore, researchers are inducing calving to study its effect on the cattle industry. Although certain compounds can be used to predict parturition with reasonable accuracy, the range is still rather wide. Retained placenta, by a high percentage of induced cows, also must be managed properly to maintain reproductive efficiency.

We sought to increase the predictability of induced calving by combining prostaglandin with dexamethasone. We also compared a systemic antibiotic treatment for retained placenta with two intrauterine treatments.

Experimental Procedure

Forty-four Polled Hereford cows, three-nine years old, were given one of four treatments to induce calving: (1) dexamethasone (Azium);

(2) dexamethasone plus prostaglandin $F_{2\alpha}$ (The UpJohn Co.) 30 hours later; (3) dexamethasone plus prostaglandin 40 hours later; or (4) prostaglandin plus dexamethasone 40 hours later. The dosages (20 mgs. dexamethasone and 30 mgs. prostaglandin) were given intramuscularly at 275 days' gestation. Observations were made for calving ease and calf viability. Assistance was given when necessary. Birth weights were recorded for all calves within 12 hours after birth.

Cows that had not expelled placenta by the day after calving were assigned to one of these treatments: (1) 20 cc combiotic intramuscularly for 3 days; (2) intrauterine infusions of nitrofurazone in sterile saline for 3 days; or (3) intrauterine infusions of nitrofurazone+ 100 mgs. α -chymotrypsin and 100 mgs. collagenase in sterile saline for 3 days followed on day 4 with an infusion of 6 g of lactinex granules in sterile saline. Days to placental expulsion were noted for each treatment. Rectal palpations were made at three and five weeks postpartum to estimate uterine regression and ovarian function.

Subsequent fertility of induced cows was recorded, and two-month weights of the calves were recorded.

Control data were collected for all observations from 12 cows that calved during the same time period as the treated cows.

Results and Discussion

Times of calving in response to the various treatment groups are shown in table 8.1. Gestation by nontreated cows averaged 283.4 days compared with 277 for induced cows, six days earlier. Cows given dexamethasone alone (group 1) calved an average of 43.1 ± 13.77 hours later. In groups where dexamethasone and prostaglandin were combined (2, 3, and 4), range of calving tended to be shorter than in group 1. Eight of nine cows in group 3 calved an average of 44.9 ± 5.37 hours after treatment; seven of nine calved 2.5 to 5 hours after the prostaglandin injection. One cow in group 3 did not calve in response to treatment. Calving time was less predictable in groups 2 and 4 than group 3.

Eight cows originally assigned to group 3 and four cows originally assigned to group 4 calved before receiving a second injection of either dexamethasone or prostaglandin, respectively.

Calves from induced parturition weighed less at birth than calves from control cows (seven of 44 died shortly after birth). Twenty percent of the induced cows required assistance and one caesarean section was performed. Calf viability of induced calves was lower than that of noninduced calves. However, average daily gains of the two groups did not differ.

Eighty-eight percent of the induced cows retained placentae compared with only 8.7% by noninduced cows (table 8.2). There was no difference in time when placenta were expelled among groups. Palpations at 3 and 5 weeks postpartum showed overall uterine and ovarian conditions most desirable in the combiotic treated group. Uterine regression in that group was rapid; few cows retained fluid or pus in the uterus. In addition, the ovarian score was better (more large follicles and ovulations) for

the combiotic group than for the nonretained animals. Uterine infusions of nitrofurazone alone yielded slower uterine regression with fluid and pus in the uteri of more cows.

Subsequent fertility of all cows is shown in table 8.3. Fertility did not correlate closely with rate of uterine regression or ovarian activity at three and five weeks postpartum. Cows treated with nitrofurazone alone required less time from calving to conception and the highest percentage of them conceived with the first service. Inducing parturition did not affect subsequent fertility. Six cows that were induced but did not retain placenta had higher conception rates (both first service and total) than induced cows that retained placenta. First service conception rate for cows that retained placenta was lower, but days from calving to conception did not differ.

Table 8.1. Indicated Data from Using Dexamethasone and/or Prostaglandin, $F_{2\alpha}$, to Induce Calving in Beef Cows.

Group	No. of cows	Hours from treatment to fetal expulsion mean \pm S.D. ^a
Dexamethasone (1)	5	43.1 \pm 13.77
Dexamethasone plus prostaglandin 30 hours later (2)	7	46.6 \pm 10.85
Dexamethasone plus prostaglandin 40 hours later (3)	9	44.9 \pm 5.37
Prostaglandin plus dexamethasone 40 hours later (4)	11	75.3 \pm 9.87
Non-induced controls	12	----
Dexamethasone calved before 40 hours	8	35.2 \pm 3.34
Prostaglandin calved before 40 hours	4	38.7 \pm 2.36

^aStandard deviation means that 68% of the cows in each groups calved within the range indicate + and - days indicated for each group.

Table 8.2. Treatment of Retained Placenta, Effect on Uterine, and Ovarian Functions.

Treatments	No. of cows	Days to placental expulsion	3 weeks			5 weeks		
			% with expected uterine size ^a	% with fluid or pus	Ovarian function score ^b	% with expected uterine size ^a	% with fluid or pus	Ovarian function score ^b
Combiotic (IM)	13	6.44	60	30	2.70	20	10	2.40
Intrauterine infusion of nitrofurazone	13	6.08	23	54	3.07	31	38	2.61
Nitrofurazone plus enzyme plus lactinex intrauterine	10	6.37	70	30	3.44	70	20	2.66
Non-retained	9	--	33	33	2.50	22	11	2.77

^aBased on an external diameter of the uterine horns of 60 mm at 3 weeks and 40 mm at 5 weeks.

^bScored as CL = 1, follicles > 12 mm = 2, follicles < 12 mm = 3, and no significant structures = 4.

Table 8.3. Postpartum Fertilities of Cows After Indicated Treatments for Retained Placenta.

Treatment	No. of cows	Days from calving to conception	First service conception (%)	Total conception (%) ^a
Combiotic (IM)	13	95.8	15.1	84.6
Intrauterine infusion of nitrofurazone	13	80.5	54	84.6
Nitrofurazone plus enzyme plus lactinex intrauterine	10	105.3	20	90
AVERAGE		92.9	31	86
Induced Non-retained	6	91.6	83.3	100
Non-induced Non-retained	12	97.2	66.7	100
AVERAGE		95.3	72	100

^aPercentage of cows conceiving during a 63-day breeding period.