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Effects of Energy Level and Lasalocid on
Productivity of
Fall-Calving, First-Calf Heifers¹

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Summary

Fall-calving, first-calf heifers (136 head) were fed TDN levels approximating 85% or 100% of NRC recommendations, with or without 200 mg/hd/day lasalocid. Those fed the recommended diet gained more weight from 130 days prepartum to calving and showed more improvement in condition score before calving than those on the low-energy diet. After calving, the group fed the recommended energy level lost less weight and condition and had better reproductive performance than the low-energy group. The only effect of lasalocid was to improve calf performance in the low-energy group.

Introduction

Dietary energy is the most expensive nutrient for the beef cow herd and is a major determinant of productivity. Ionophores such as lasalocid increase the efficiency of energy metabolism. Thus, supplementing beef cows with an ionophore may improve energy utilization and decrease feed costs. This research was conducted to determine the effects of two energy levels with and without lasalocid on productivity of first-calf heifers.

Experimental Procedures

Approximately 110 days before calving, 136 crossbred (Angus, Hereford, Brangus), first-calf heifers were assigned to four nutritional treatments: two levels of energy with and without lasalocid. Precalving diets were calculated to provide either 9.3 lbs of TDN per day or 11.0 lbs of TDN. Those levels represent 85 and 100%, respectively, of the NRC recommendation for a 725-750 lb heifer to gain 1.9 lbs/day during the last trimester of pregnancy. For approximately 130 days postcalving, diets were calculated to provide 11 or 13 lbs TDN (increased slightly above 85 and 100% of NRC recommendations, respectively, because of weather stress). Two supplements were formulated for each energy treatment to provide 0 or 200 mg lasalocid per head daily.

¹ Appreciation is expressed to Hoffmann-LaRoche for supplying lasalocid (Bovatec®) and partial financial support.
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The heifers calved between July 25, 1985 and January 2, 1986. Milk production was determined by the weigh-suckle-weigh method and milk samples were collected when calves born in a given month reached an average of 60 and 90 days of age. Postpartum performance was evaluated only on the 124 heifers nursing a calf for the duration of the trial. Heifers were inseminated artificially at the first observed estrus postcalving, and those returning to estrus were allowed two additional inseminations. Heifer-calf pairs were weighed off trial when: 1) conception occurred, 2) heifers had been inseminated three times, or 3) no signs of estrus had occurred by 120 days postpartum. The heifers were maintained in drylots both pre- and postcalving. A statistical technique (regression analysis) was used to estimate what weights 2 weeks precalving and condition scores at calving would have been, if heifers had been on their respective diets 90 or 130 days.

Results and Discussion

The main effects of energy level and lasalocid on precalving heifer performance are presented in Table 17.1. Heifers fed the recommended energy level gained .13 lb more per day ($P=.08$) than heifers fed the low energy level. Energy level had no effect on heifer weight at 2 weeks precalving or condition score at calving when estimated and compared at 90 days on trial. However, regression estimates for 130 days on trial showed that heifers fed the recommended energy level would have been 42 lbs heavier ($P<.001$) and would have had .4 units higher condition score ($P<.01$) than heifers fed the low energy level. Thus, reducing energy intake by 15% would be expected to influence heifer weight and body condition changes precalving but only after a prolonged precalving feeding period. Energy level had no influence on hip height or pelvic area changes precalving, calf birth weight, calving difficulty score, or gestation length (Table 17.1). Neither lasalocid nor the energy level x lasalocid combinations influenced data described above.

Heifer weight and condition changes postcalving are described in Table 17.1. At 130 days postcalving, heifers fed the recommended energy level weighed 37 lbs more ($P<.05$) and had .5 unit higher condition score ($P<.001$) than heifers fed the low energy level. This was a function of combined precalving energy effects followed by weight and condition loss (-30 lbs and -.3 units) during lactation among cows fed the low energy level. Postcalving weight and condition losses may have been minimized by the addition of lasalocid; however, treatment differences were usually nonsignificant.

The combined effects of energy level and lasalocid on milk production and calf performance were significant or approached significance at 60, 90, and 130 days postpartum (Table 17.2). Lasalocid supplementation to the low energy diet increased calf weight and average daily gain at 90 and 130 days, whereas supplementation to the recommended diet did not. Milk production response paralleled calf gain data. Calves nursing heifers fed the recommended diet weighed approximately 11 lbs more at 60, 90, and 130 days than those nursing cows fed either of the low energy diets (All $P<.10$). This advantage in weight gain was associated with a slight increase in milk production among cows fed the recommended level of energy.

Table 17.1. Least-Squares Means for Heifer Performance for Main Effects of Energy and Lasalocid

Item	Main Effects			
	Energy, % of NRC requirement		Lasalocid	
	85%	100%	-	+
Initial wt, lb	722	719	720	721
Precalving days on trial	108	109	109	108
Precalving ADG, lb	1.74	1.87	1.80	1.83
Heifer wt two ₁ weeks precalving, lb				
90 days on trial	882	884	882	887
130 days on trial	935 ^a	977 ^b	953	959
Condition score at calving ^{1,2}				
90 days on trial	5.2	5.3	5.3	5.2
Change from initial	.02	.12	.15	.07
130 days on trial	5.4 ^c	5.8 ^d	5.7	5.5
Change from initial	.18 ^e	.37 ^f	.29	.25
Hip height, in				
At calving	46	46	46	46
Change from initial	1.1	1.2	1.2	1.1
Pelvic area, cm ²				
Precalving	279.7	281.9	279.3	282.3
Change from initial	57.1	61.9	60.7	58.3
Calf birth wt, lb	60.3	62.3	61.4	61.2
Calving difficulty score ³	1.3	1.4	1.4	1.3
Gestation length, days ⁴	279	280	280	279
Cow wt, lb				
130 days postcalving ⁵	790 ^e	827 ^f	796	823
Change from calving	-30.0 ^c	0 ^d	-20.0	-9.5
Body condition score ²				
130 days postpartum	5.0 ^a	5.5 ^b	5.2 ^e	5.4 ^f
Change from calving	-.3 ^c	0 ^d	-.3 ^e	-.1 ^f

¹ Heifer weight and condition score data at 90 or 130 days on trial were estimated and compared by regression analysis.

² 1 = emaciated to 9 = obese.

³ 1 = unassisted to 2 = hand assistance.

⁴ Evaluated on 46 head.

⁵ As determined from weights and body condition evaluation by 24 hr and 130 days postpartum.

^{ab} Uncommon superscripts within a main effect differ (P<.001).

^{cd} Uncommon superscripts within a main effect differ (P<.01).

^{ef} Uncommon superscripts within a main effect differ (P<.05).

Percentage milk fat was not influenced by the individual nor combined effects of energy and lasalocid at 60 or 90 days (data not presented). Milk protein was .2% ($P < .05$) and .1% ($P = .14$) higher at 60 and 90 days, respectively, in milk samples from heifers fed recommended vs low energy diets.

A 15% reduction in energy intake from a level considered adequate decreased ($P < .05$) cycling activity by 18 percentage units during the 120 days when estrus was detected (Table 17.3). That reduction in cycling activity contributed to a 25 percentage unit decrease ($P < .01$) in overall pregnancy rate. The days from calving to first estrus (postpartum interval) did not differ between energy levels; however, if estrus detection had continued indefinitely, the postpartum interval of heifers fed the low energy level would probably have been longer and would have varied more about the mean in comparison with heifers fed the recommended energy level. Although heifers fed the recommended energy level maintained weight and condition score (5.5), 22% had not cycled by 120 days, which lead to a 74% overall pregnancy rate. Thus, fall-calving, first-calf heifers with a condition score of 5 at calving probably need to gain weight and condition during lactation for optimum reproductive performance. This study suggests that the level of energy recommended by NRC for postpartum heifers is too low for fall-calving heifers and dramatically illustrates the limitation of using NRC recommendations as absolute values. Additionally, results of a statistical analysis of the reproductive data (see pg. 55 in this report) suggest that a condition score of 6 at calving is required for optimum postpartum reproduction in fall-calving, first-calf heifers.

Fertility, expressed as days to conception, inseminations per conception, and first-service or overall conception rates did not differ between energy levels (Table 17.3). Neither lasalocid nor the energy level x lasalocid combinations influenced reproductive performance described above.

Table 17.2. Least-Squares Means for Milk Production and Calf Weights on Various Days Postcalving for Combined Effects of Energy and Lasalocid

Item	Combined Treatments			
	LE-C	LE-L	HE-C	HE-L
60 Days				
24 hr milk, lb	11.2	12.3	13.2	12.0
Calf wt, lb	132	142	148	144
Calf ADG, lb	1.14	1.23	1.28	1.23
90 Days				
24 hr milk, lb	10.8	11.9 ^d	12.5 ^b	12.3 ^d
Calf wt, lb	165 ^{ac}	185 ^d	187 ^b	183 ^f
Calf ADG, lb	1.14 ^{ce}	1.30 ^d	1.3 ^d	1.28 ^f
130 Days				
Calf wt, lb	230 ^a	252 ^b	258 ^b	253 ^b

^{ab} Uncommon superscripts within a main effect differ ($P < .01$).

^{cd} Uncommon superscripts within a main effect differ ($P < .05$).

^{ef} Uncommon superscripts within a main effect differ ($P < .10$).

Table 17.3. Least-Squares Means and Percentages for Reproductive Data for Main Effects of Energy and Lasalocid¹

Item	Main Effects			
	Energy		Lasalocid	
	LE	HE	C	L
Cycling activity by 120 days postpartum, %	60 ^c (36/60)	78 ^d (50/64)	70 (45/64)	68 (41/60)
First-service conception rate, % ²	54 (19/35)	65 (32/49)	64 (29/44)	54 (22/40)
Overall conception rate, % ³	88 (28/32)	98 (45/46)	95 (40/42)	92 (33/36)
Overall pregnancy rate, % ⁴	49 ^a (28/57)	74 ^b (45/61)	64 (40/62)	59 (33/56)
Interval from calving to:				
First estrus, days	69	63	63	69
Conception, days	77	71	71	77
Inseminations/conception	1.4	1.3	1.3	1.4

¹ Values in parenthesis were used in calculating percentages. Six cows were not given the opportunity for three inseminations and were excluded from overall conception and pregnancy rate calculations.

² Number conceiving to first insemination/number inseminated.

³ Number conceiving by third insemination/number inseminated.

⁴ Number conceiving by third insemination/number on trial.

^{ab} Uncommon superscripts within a main effect differ ($P < .01$).

^{cd} Uncommon superscripts within a main effect differ ($P < .05$).