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MONENSIN FOR WINTERING GESTATING COWS

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Monensin[2] is a biologically active compound produced by Streptomyces cinnamonensis (Haney and Hoehn, 1967). The compound improves feed efficiency in growing cattle by increasing the production of propionic acid and reducing acetic and butyric, with total volatile fatty acids remaining the same (Raun et al., 1974 and Dinius, Simpson, and Marsh, 1976). Monensin reduces feed intake without a reduction in daily gain of feedlot cattle (Brown et al., 1974 and Raun et al., 1974) and increases gains of pasture fed cattle. (Potter et al., 1974 and Oliver, 1975).

If similar results with monensin can be obtained with cows on a maintenance ration, the net result would be a savings in forage fed. This may provide a means to increase the size of an individual cow herd or a reduction of the total hay requirement. With low quality roughages that do not meet maintenance requirements, an increased energy utilization could reduce or eliminate the need for supplements.

This study was designed to test the effect of monensin on feed efficiency for maintaining cows on meadow hay and to determine if there is any subsequent effect on reproductive performance.

Experimental Procedures

Forty-eight spring-calving cows, between the ages of 5 to 7 were stratified by age and weight for random allotment to 2 treatments with 3 replications. Treatments included a control group receiving no monensin and a group on 200 mg of monensin per head per day. Barley was fed at the rate of 0.45 kg per head per day to facilitate intake of the monensin, the palatability of which is not well documented. Control animals also received 0.45 kg of barley.

Cows were gathered each morning and brought into a barn, with stalls and bunks designed for individual feeding, to received their supplement on an individual basis. The remainder of the day they were turned out into six adjacent lots where they had free access to water, salt, a 50-50 mix of bonemeal and salt and hay free choice. Hay intake was measured, on a replication basis, by weighing hay in daily with orts weighed back weekly. Hay was sampled for chemical analysis.

The winter portion of this trial ran from November 21 to February 27, a period of 98 days. Cows were weighed every 28 days after an overnight shrink from feed and water.

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Monensin is widely used as an anticoccidial and in order to not confound the experiment it was necessary to insure that the cows used in this trial were free of coccidial agents. Fecal samples were taken prior to initiation of the trial and found negative for coccidiosis.

Rumen samples were taken, via a vacuum pump and ruminal hose, to determine total and relative proportions of volatile fatty acids. Three samples were taken from each replication, which provided nine from each treatment. On the day rumen samples were taken, the supplements were fed at one-half hour intervals to allow for a constant sampling time of four hours after supplemental feeding. Hay was continually available. Feed samples were taken periodically for monensin analysis and results indicated the active monensin levels in the mixes were providing 200 mg per head per day at a constant level.

Calving dates and birth weights were recorded so adjustments could be made for differences in weight change due to conceptus, if needed (Salisbury and Von Demark, 1961). Subsequent conception rate was determined by rectal palpation and calving interval will be recorded. Interval to first estrus was also obtained using a combination of vasectomized bulls equipped with chin ball markers and visual appraisal. Cows were kept on their respective treatments throughout this period and continued on treatment for another full year. Data are not complete at this time.

Appropriate L.S.D. tests were applied to the data to test for significant differences among treatments at the $P < .05$ level (Steel and Torrie, 1960).

Results and Discussion

Gain data and hay intake results are presented in table1. Initial weights were 461 and 465 kg for controls and monensin supplemented cows, respectively, with final weights being 484 and 507 kg. Monensin fed cows out gained the controls 0.43 to 0.23 kg per day ($P < .05$) and consumed slightly less hay, 11.0 to 11.4 kg per day ($P < .06$). These results show that monensin substantially improved feed efficiency.

Calving records show that there was only a six day difference in stage of gestation between treatments with control cows being the furthest along. Differences in gain due to conceptus between treatments were small and accounted for slightly more (0.02 kg per day) of control cows' gain than those on monensin.

There were no differences in conception, with all cows in both treatments found pregnant by rectal palpation after a 60 day breeding season. Cows on monensin were observed in first estrus after calving an average of 13 days earlier than control cows. Estrus checks were taken for about 120 days after the first calf was dropped. All cows from the monensin treatment were found in heat and averaged 30 days to first estrus, while control cows averaged 43 days excluding six cows not found in heat during this period.

Table 2 shows the total volatile fatty acids in the rumen fluid and the proportions of propionate, acetate and butyrate. Monensin significantly ($P < .05$) increased propionate by about 31 % and decreased acetate and butyrate by 5 and 30 %, respectively. Total volatile fatty acids were not signifi-cnatly different.

TABLE 1. GAIN DATA AND HAY INTAKE

Treatment Lot no.	Initial weight	Final weight	Hay intake	Average daily gain
	kg	kg	kg	kg
Control				
1	472	482	11.4	0.10
3	451	483	11.3	0.33
5	462	486	11.5	0.25
Average	461	484	11.4	0.23*
Rumensin				
2	462	515	11.1	0.44
4	469	514	11.1	0.45
6	453	492	10.6	0.40
Average	465	507	11.0	0.43

* Means significantly different at the $P < .05$ level between treatments.

TABLE 2. VOLATILE FATTY ACID DATA[1]

Treatment Lot no.	Total mM/liter	Molar %		
		Acetate	Propionate	Butyrate
Control				
1	72.0	76.3	17.0	6.7
3	65.4	76.8	17.0	6.2
5	67.1	75.6	17.7	6.7
Average	68.2	76.2*	17.2*	6.5
Rumensin				
2	73.4	70.7	24.4	4.9
4	78.4	72.8	22.2	5.1
6	64.7	73.8	21.3	5.0
Average	72.2	72.4*	22.6*	5.0*

[1]Rumen samples taken from three animals per replication.

* Means significantly different at the $P < .05$ level between treatments.

Results of this study indicate that monensin did improve feed conversion for maintaining brood cows on roughage. This could mean substantial savings in hay requirements for wintering cow herds. Monensin has just recently been cleared for feeding cattle in confinement for slaughter and hopefully will be cleared for use as described in this paper.

Summary

Forty-eight gravid-mature Hereford cows were stratified by weight and age to two treatments with three replications. Treatments consisted of control groups which received meadow hay free choice plus 0.45 kg of barley per day and groups that received 200 mg of monensin in addition to the control diet. The feeding period ran from November 21 to February 27, with calves dropped during March and April. Cows were individually fed the supplemental feed. Hay was weighed in daily with orts weighed back weekly. Monensin fed cows outgained the controls 0.43 to 0.23 kg per day ($P < .05$) on slightly less hay intake ($P < .06$). Control cows consumed 11.4 kg of hay per day and monensin supplemented cows 11.0 kg. Feed efficiency was substantially improved by monensin. Rumen samples were obtained from cows on each treatment four hours after supplemental feeding for volatile fatty acid (VFA) determination. Total VFA production (mM/liter) and relative proportions of acetate, propionate and butyrate (Molar %) for controls and monensin fed cows were 68.2, 72.2; and 76.2, 72.4; 17.2, 22.6; and 6.5, 5.0 respectively. Propionic acid production was increased with monensin feeding and acetic and butyric decreased. Vasectomized bulls with chin ball markers were used to obtain first post-partum estrus. All cows from the monensin treatment were observed in estrus within a 120 day period after the first calf was dropped and averaged 13 days earlier than controls. Six of the control cows were not found in heat during this period. There was no difference in conception, with all cows in both treatments found pregnant by rectal palpation after a 60-day breeding season.

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