FEED INTAKE OF LIGHTWEIGHT, EARLY-WEANED BEEF AND DAIRY CALVES FED RECEIVING DIETS CONTAINING INCREASING LEVELS OF MONENSIN

S. I. Paisley[1] and G. W. Horn[2]

Story In Brief

Monensin was included in receiving diets fed to lightweight early-weaned calves at 0 (control), 10, 20 and 30g/ton of feed in two separate intake trials to determine the effect of increasing levels of monensin on intake of receiving diets offered ad libitum. Calves in both trials received similar complete mixed diets. In Trial 1, 16 Holstein heifer calves (avg wt 261 ± 56.3 lb) and 20 spring-born, early-weaned British crossbred steers and heifers (avg wt 272 ± 34.7 lb) with no previous exposure to monensin were equally distributed among four pens equipped with self-feeders in a 35-day (June 12 through July 17) intake trial. Calves were given a 7-day adjustment period and pen intakes were determined weekly. In Trial 2, 41 British crossbred fall-born calves (avg wt 198 ± 18.3 lb) were weaned at an average age of 71 days on November 30, blocked by age, and assigned to eight pens for a 38-day intake trial beginning December 5. Calves were bunk fed with pen intakes measured daily. Mean daily DM intakes during Trial 1, expressed as lb/head, were not affected by monensin. Daily gains were similar for all treatments. Trial 2 daily DM intakes, expressed as lb/head, were similar with no difference in daily gains. Monensin intakes ranged from 0 to 1.03 mg/kg BW for Trial 1 and 0 to .86 mg/kg BW for Trial 2. These results suggest that monensin can be added to receiving rations at levels required for coccidiosis control without affecting feed intake of lightweight calves.

(Key Words: Monensin, Feed, Intake, Growing Cattle, Coccidiosis.)

Introduction

Performance and overall health of freshly weaned calves depend greatly on the receiving ration fed during the initial weaning period. Major concerns during the initial period include dry matter intake and control of coccidiosis. Monensin, an ionophore approved for the control of coccidiosis in beef cattle, effectively reduces shedding of coccidia oocycts (Prichard and Thomson, 1993) while increasing daily gains of feeder cattle. However, there is some debate as to the use of monensin in receiving rations and its effect on feed intake. Essential to the use of monensin is determining the correct level that provides

---

[1]Graduate Assistant [2]Professor

control of coccidiosis while not reducing dry matter intake. The objective of these studies was to determine the effect of increasing levels of monensin on intake of a receiving ration for lightweight beef and dairy calves.

Materials and Methods

Trial 1. Sixteen Holstein dairy heifers (avg wt = 261 lb) and 20 beef calves (avg wt = 272 lb) were obtained from OSU herds to be used in a 35-day intake trial (June 12 through July 17,1995) conducted at the OSU Wheat Pasture Research Barn at Stillwater, OK. Beef calves used in the experiment consisted of nine steers and 11 heifers born in February and March and weaned on May 15th. Both groups of calves were fed similar high energy rations prior to the experiment, but had no previous exposure to monensin. On June 12, calves were immediately weighed and tagged with an insecticide ear tag. Prior to trial, dairy calves received a full complement of clostridial and respiratory vaccinations, with beef calves receiving a 7-way Clostridial vaccine upon weighing. Concurrent to weighing, calves were allotted to four pens, with dairy heifers, beef heifers, and beef steers equally distributed across pens resulting in four pens each containing four dairy heifers and five beef calves. Four receiving diets formulated to contain 0, 10, 20 and 30 g/ton monensin (Tables 1 and 2) were offered free choice using self feeders which were designed to measure individual calf intakes for each pen. All calves were initially bunk fed 5 lb/calf on day 1 of the trial, followed by 2.5 lb/calf for two days as calves adapted to the self feeders. Calves not eating from feeders after the adjustment period were individually haltered and led to the feeders. Days prior to their learning to eat from the feeders were deleted. Following the initial 7-day adjustment period, actual pen intakes were determined weekly by weighing back the feed remaining in the feeder. After monitoring the individual intake data and comparing it with actual lb of feed consumed, the individual intake data was determined to be inaccurate. Pen intake data reported for this study were determined from weekly weigh back records. Feed samples of all four diets were taken at the feedmill during sacking of the diets. Additional samples were taken for each pen every time feed was added to the self feeder. Self feeder samples for each pen were composited across days within each week. All feed samples were analyzed for monensin content with results listed in Table 2.

Trial 2. Forty-one head of fall-born, early weaned British crossbred steers and heifers (207 ± 5.58 lb; 71 ± .6 days of age) were obtained from a single OSU cow herd to be used in a 38-day receiving trial (December 5, 1995 to January 12, 1996). Calves were weaned five days prior to the start of the trial, and were vaccinated at weaning (November 30) with a 7-way Clostridial. Calves were blocked by age and assigned to eight pens in a randomized complete block design. Animals were bunk fed the same rations as in Trial 1 with pen intakes measured daily. Beginning on day seven, calves receiving diets containing 0 and 10g/ton monensin began to show signs of bloating. After the loss of one animal (10g/ton) and removal of three others from the trial due to bloat (0g/ton) as well as the occurrence of a respiratory virus outbreak on day 27, long stem Bermudagrass hay was offered at 1 lb/calf/day from day 28 until the end of the trial. Since hay intake was included in overall DM intake, data are presented as Period 1 (prior to sickness; days 1-27) and Period 2 (during and after sickness; days 28-38). Initial and final weights of calves were full weights. Fecal grab samples were collected from each calf when final weights were taken, and samples were evaluated for occurrence of oocysts on low power field.

Statistical Analysis. Trial 1 intake data were analyzed as a repeated measures design with intakes being measured each week of the trial. Trial 2 intake and performance data were analyzed as a randomized complete block design. Both trials were analyzed using GLM of SAS (1985). Pre-planned orthoganal linear, quadratic, and cubic contrasts were used to interpret the effect of monensin on intake.

Results

Trial 1. Daily intake of the receiving diet offered free choice in self feeders, expressed either as lb/head or %BW basis, was not affected by level of monensin (P>.13 and P>.39, respectively; Table 3). Final weight and daily gain were not affected, (P>.16; Table 4) indicating that increasing levels of monensin did not have an effect on intake and performance of dairy and beef calves.

Trial 2. Due to the characteristic fluctuations in environmental temperature and the age of the calves, health was a major concern throughout the trial. Prior to sickness, (Period 1) daily DM intakes expressed as lb/head or %BW increased linearly (P=.06 and P=.04, respectively) as level of monensin increased in the diet. This effect of monensin may be related to the reduced incidence of bloat in calves receiving diets containing 20 and 30 g/ton monensin. Addition of long stemmed hay during Period 2 improved DM intake across treatments compared with Period 1, and feed intake (lb/head) of calves receiving 0 and 10 g/ton monensin were enhanced, resulting in a cubic response (P=.09) to increasing levels of rumensin during Period 2. Total trial daily DM intakes, expressed as either lb/animal or %BW, were not affected by level of monensin (P>.13 and P>.60, respectively). Daily gains and feed efficiency of calves were also not affected by increasing levels of monensin

(P>.11 and P>.22, respectively). The percentage of calves shedding oocysts was reduced by increasing levels of monensin (P<.03) with the number of oocysts highest in calves receiving 0 and 10 g/ton monensin and no shedding observed in calves receiving the highest level of monensin.

The results of these trials indicate that monensin can be added to receiving diets for lightweight calves without affecting feed intake and live weight gain. Feeding receiving diets containing 20 and 30 g/ton monensin appeared to effectively inhibit shedding of oocysts. Based on these trials, monensin may be used in receiving rations for lightweight calves to control coccidiosis without affecting feed intake and performance.

Literature Cited

Pritchard, R.H. and J.U. Thomson. 1993. SDSU Beef Rept. 93-15:62.

SAS. 1985. SAS Inst. Inc., Cary NC.

Table 1. Feedstuff and nutrient content of receiving diet (DM basis).

Ingredients	
Corn (dry-rolled), %	49.1
Alfalfa pellets (ground), %	15.3
Cottonseed hulls, %	15.1
Soybean meal (47.5% CP), %	15.0
Cane molasses, %	4.0
Limestone (38%), %	1.0
Dical, %	.4
Salt, %	.2
Vitamin A-30 (30,000 IU/g)	++[a]
Vitamin E (50%)	++[b]
Rumensin 80 Premix[a]	++[c]
Nutrient	
Dry matter, %	88.4
NEm, Mcal/CWT	84.14
NEg, Mcal/CWT	50.59
Crude protein, %	16.21
Fat, %	2.93
Crude fiber, %	12.89
Potassium, %	1.23
Calcium, %	.84
Phosphorus, %	.40

[a] To result in 2000 IU Vitamin A/lb as-fed.
[b] To result in 22.5 IU Vitamin E/lb as-fed.
[c] Added to provide appropriate levels of monensin for each diet.

Table 2. Calculated and actual monensin concentrations (g/ton) in diets.

	Treatment 1	Treatment 2	Treatment 3	Treatment 4
Calculated	0	10	20	30
Actual	<3.6	9.8	21.3	31.2

Table 3. Dry matter intake of receiving diets containing increasing levels of monensin.

	Level of monensin, g/ton					Contrast[a]		
Item	0	10	20	30	SE[b]	L	Q	C
			Trial 1					
Intake, lb·hd^{-1}·d^{-1}	10.0	9.74	10.0	9.58	.17	.21	.59	.13
% BW	3.20	3.14	3.19	3.13	.053	.49	.96	.39
Monensin, mg^{-1}hd	0	47.7	96.1	143.2	3.45			
mg/kg BW	0	.35	.70	1.03.				
			Trial 2					
Period 1								
Intake, lb·hd^{-1}·d^{-1}	5.31	6.09	5.98	6.35	.220	.06	.42	.26
% BW	2.66	2.85	3.00	3.01	.075	.04	.32	.79
Monensin, mg^{-1}hd	0	30.5	59.8	95.2	1.69			
mg/kg BW	0	.31	.66	.99				
Period 2								
Intake, lb·hd^{-1}·d^{-1}	7.64	8.05	6.42	7.30	.411	.25	.61	.09
% BW	2.72	2.48	2.29	2.44	.147	.16	.21	.62
Monensin, mg^{-1}hd	0	40.3	64.2	109.5	4.49			
mg/kg BW	0	.25	.50	.81				
Overall								
Intake, lb·hd^{-1}·d^{-1}	6.03	6.70	6.12	6.64	.254	.35	.80	.13
% BW	2.55	2.51	2.55	2.61	.084	.60	.62	.86
Monensin, mg^{-1}hd	0	33.5	61.2	99.6	2.48			
mg/kg BW	0	.28	.56	.86				

[a] Observed significance level for linear (L), quadratic (Q), and cubic (C) contrasts.

[b] Standard error of the means.

Table 4. Performance of calves fed a receiving diet containing increasing levels of monensin.

	Level of monensin, g/ton					Contrast[a]		
Item	0	10	20	30	SE[b]	L	Q	C
				Trial 1				
Initial BW, lb	279	262	263	269	17.7	.72	.52	.86
Final BW, lb	352	332	340	345	20.5	.89	.57	.74
ADG, lb/d	2.08	2.02	2.21	2.17	.152	.51	.95	.47
Feed/gain	4.85	4.90	3.97	4.43				
				Trial 2				
Age, d	73	66	69	77	.63	.01	.01	.30
Initial BW, lb	205	213	200	211	5.59	.87	.77	.16
Final BW, lb	266	314	280	300	9.31	.20	.21	.04
ADG, lb/d	1.59	2.66	2.13	2.31	.223	.20	.14	.11
Feed/gain	3.99	2.52	2.89	2.89	.188	.27	.22	.38
Calves with oocysts, %	55	60	8	0	5.5	.01	.32	.03

[a] Observed significance level for linear (L), quadratic (Q), and cubic (C) contrasts.

[b] Standard error of the means.