Effect of Monensin on Forage Intake And Weight Gains of Wheat Pasture Stockers

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Story in Brief

Wheat forage intakes of steers grazed on wheat pasture and bolused with either 0 or 200 mg. of monensin/head/day were not significantly different ($P>.05$), and were very similar when expressed as pounds of forage dry matter per 100 lb of body weight. Weight gains of wheat pasture stockers were decreased from 1.67 to 1.23 lb/head/day ($P<.005$), and increased from 0.66 to 0.70 lb/head/day ($P>.05$) in two field trials where stockers received 200 (hand-fed) or 36 mg (fed in molasses-mineral blocks) of monensin/head/day, respectively. A significant interaction between monensin and type of implant was not observed ($P>.46$) in heifers grazed on wheat pasture.

Introduction

We reported in this report last year results of studies relative to the effect of Rumensin (Elanco trade name for monensin sodium) on (1) ruminal fermentation and (2) forage intakes of wheat pasture stockers. The forage intake data represented only the first period of a switchback trial. Cooperative field trials relative to the effect of monensin on weight gains of wheat pasture stockers were underway, but no data were available at the publication deadline for last years report. This report presents the forage intake data for both periods of the switchback trial, and the results of the cooperative field trials.

Experimental Procedure

Forage intake trial

Eight crossbred steer calves (500 lb) that grazed a single wheat pasture were utilized in a switchback design. Chromic oxide was used as an indigestible marker to estimate fecal outputs. Wheat forage intakes were calculated by dividing the fecal outputs by the estimated *in vivo* indigestibilities of hand-clipped forage samples taken during each period of the trial. *In vivo* forage digestibilities were estimated from *in vitro* dry matter digestibilities according to the relationship of Oh, Baumgardt and Scholl. All steers were bolused with four grams of chromic oxide in gelatin capsules twice daily (8:00 am and 4:00 pm) for a 7-day preliminary period and a 5-day fecal collection period during which rectal fecal samples were taken each time the steers were bolused with

chromic oxide. During each period of the trial one-half of the steers received 200 mg of monensin added to the chromic oxide capsules given at the morning dosage. Period I of the trial was conducted during November 17 to 28, 1976. Due to a less than optimal amount of available wheat forage shortly after the completion of period I, the steers were removed from wheat pasture and were not put back on wheat pasture until February 10, 1977. Period II of the intake trial was conducted during March 14 to 25, 1977, after the steers had had 32 days to re-adapt to wheat forage.

Effect of monensin on stocker weight gains

Two cooperative field trials were conducted as follows:

Trial 1. One-hundred and three (103) 500 lb Hereford X Angus and Hereford steers were randomly assigned to two separate wheat pastures and were fed 2 lb/head/day of a pelleted feed* that contained either 0 or 200 mg of monensin per 2 lb. The stocking rate was 1 steer/1.95 acres of wheat pasture. Both groups of steers had free access to a native range pasture located adjacent to each of the wheat pastures, and were fed large roll-bales of cheaty wheat hay on a free-choice basis during the 83-day trial (December 4, 1976 to February 26, 1977). Individual steer initial and final, shrunk live weights (overnight stand without feed or water) were measured. Since the two wheat pastures were different in size and were located about one mile apart, it was not possible to rotate the two groups of stockers among the two pastures during the trial.

The pelleted feed containing monensin was sampled four times during the trial for monensin assay, and contained 99.7, 94.9, 96.4 and 109.9 mg of monensin per lb (calculated = 100 mg monensin/lb).

Trial 2. One-hundred and twenty (120) heifers (average initial weight of 360 lb) were randomly assigned to two treatment groups, and were fed *ad libitum* molasses-mineral blocks produced by the A.E. Staley Mfg. Co. of Decatur, Illinois that contained either 0 or 400 mg monensin per pound of block for a 120-day period (November 15, 1976 to March 15, 1977). One-fourth of the heifers in each of the two groups were either not implanted with anything, or implanted with 15 mg of diethylstilbestrol (DES), 1 tube of Synovex-H, or 36 mg of Ralgro. All heifers were vaccinated for blackleg, malignant edema, leptospirosis (5 strains), treated for internal parasites with an injectable wormer, and treated for lice and grubs with a pour-on material.

Stocking rate was 1 heifer per 1.75 to 2.50 acres of wheat pasture, and the two groups of heifers were rotated among the two adjacent wheat pastures at 2-week intervals. Wheat forage growth was hampered during the first eighty days of the trial due to dry conditions and cold temperatures.

The molasses-mineral blocks were weighed four times during the trial so that block consumption could be calculated.

*58 percent grd. milo, 29 percent wheat middlings, 5 percent limestone, 7.5 percent molasses, 0.5 percent trace-mineralized salt.

Results and Discussion

Forage intake trial

Wheat forage intakes of steers bolused with either 0 or 200 mg monensin/head/day were not significantly different ($P>.05$), and were very similar when expressed as lb dry matter/100 lb of body weight (Table 1). The forage intakes during period II appear high. The steers were off of wheat pasture and grazed a dry, native grass pasture for 76 days between periods I and II during which time they only maintained their body weight. However, the average daily gain of all steers during a 30-day period from the beginning of the period II intake trial was 3.35 ± .23 lb.

Effect of monensin on stocker weight gains

Trial 1. Weight gains of stockers fed 200 mg monensin per day were decreased by 26 percent ($P<.005$; Table 2). Although wheat forage growth was restricted in the fall due to abnormally cold and dry weather, available wheat forage was not greatly restricted during the trial as evidenced by the performance of the control steers. An explanation for the reduced weight gains of the monensin-fed steers is not apparent since (1) differences in the amount of available wheat forage among the two wheat pastures were not discernible from visual observations made several times during the trial, and (2) since forage intakes of steers bolused with either 0 or 200 mg monensin per day were very similar in the forage intake trials. If 200 mg monensin/head/day does decrease forage intakes of wheat pasture stockers, whether or not forage intakes of steers *bolused* with monensin (as opposed to *feeding* monensin where it might be orally sensed) would be decreased may be a point of contention.

Table 1. Effect of monensin on forage intakes of wheat pasture stockers

	Control	Monensin[a]
DM/steer/day, lb		
Period I	13.3 ± 0.8	15.1 ± 1.1
Period II	22.6 ±0.9	21.8 ±2.0
DM/100 lb body wt, lb		
Period I	3.00 ± 0.14	3.03 ± 0.21
Period II	4.15 ± 0.12	4.10 ± 0.21

[a]200 mg/head/day.

Table 2. Effect of monensin on weight gains of wheat pasture stockers — Trial 1[a]

Monensin level, mg/hd/day:	0	200
Number of steers:	43	60
Average daily gain, lb:	1.67 ± .05	1.23* ± .05

[a]Cooperative Field Trial: December 4, 1976 to February 26, 1977 (83 days) Garber, Oklahoma.
*($P<.005$).

Additional wheat forage intake studies where monensin is *fed* to stockers are being conducted to clarify this point.

Trial 2. Block consumption of heifers grazed on wheat pasture is shown in Table 3. Monensin consumption varied from 28 to 44 mg/head/day (average equaled only 36 mg/head/day).

Available wheat forage was limiting during the trial as evidenced by the low average daily gains (Table 4). None of the differences among the average daily gains of the eight groups of heifers (top of Table 4) were statistically significant (P>.05) although weight gains varied from 0.57 to 0.81 lb/head/day. A significant interaction between level of monensin and implant was not observed (P>.46). In contrast to the negative weight gain response to monensin observed in Trial 1, weight gains (pooled across implants) of heifers that consumed an average of 36 mg monensin/head/day were slightly increased (P>.35) — e.g., 0.70 versus 0.66 lb/head/day (middle of Table 4).

Table 3. Block consumption[a] of heifers grazed on wheat pasture

		Control		Monensin	
Date	Days	Lb block/ hd/day	Mg monensin/ hd/day	Lb block/ hd/day	Mg monensin/ hd/day
11/15-12/22/76	37	.08	0	.09	36
12/22-1/26/77	35	.10	0	.11	44
1/26-2/23/77	28	.21	0	.09	36
2/23-3/15/77	20	.13	0	.07	28
Average:		.13	0	.09	36

[a]Control and monensin-containing blocks contained 0 and 400 mg of monensin per 1 lb of block, respectively.

Table 4. Weight gains of heifers grazed on wheat pasture*

	Control				Monensin			
	No implant	DES	Synovex-H	Ralgro	No implant	DES	Synovex-H	Ralgro
ADG (n=15)	.57[a]	.67[a]	.72[a]	.69[a]	.58[a]	.81[a]	.76[a]	.66[a]
			Control	Monensin				
ADG (n=60)			.66[a]	.70[a]				
		No implant	DES	Synovex-H	Ralgro			
ADG (n=30)		.57	.74[b]	.74[b]	.67			

*Cooperative Field Trial, November 15, 1976 to March 15, 1977 (120 days) Dill City, Oklahoma.
[a]Average daily gains (lb/head/day). Means with a common lettered superscript in a horizontal row are not statistically different (P>.05).
[b]Significantly different from mean of "no implant" (P<.05).

Implanting with DES or Synovex-H (bottom of Table 4) significantly increased heifer weight gains by about 30 percent ($P<.05$). Weight gains of Ralgro-implanted heifers were increased about 18 percent ($P>.05$).

At this date (January 17, 1978) monensin is *not* presently cleared by the FDA for use in stocker programs. However, the average daily gains of stockers grazed on low- to average-quality pastures (such as native bluestem and shortgrass pastures, and bermudagrass pastures throughout the summer) have been increased by about one-quarter of a pound/head/day by feeding monensin in experimental trials. Percentage increases in stocker weight gains on these types of pastures have ranged from 11 to 39 percent.

On the basis of the two field trials that we have conducted to date, the potential of monensin for increasing weight gains of wheat pasture stockers appears uncertain. Additional trials relative to the effect of monensin onweight gains of wheat pasture stockers are presently being conducted.

Literature Cited

Oh, Baumgardt and Scholl. 1966. J Dairy Sci. *49*:850.

Effect of Monensin on Forage Intake and Ruman Turnover Rate

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Story in Brief

Two trials were conducted to evaluate the effect of monensin on forage intake, rumen turnover rates, 24 hr volatile fatty acid patterns and rumen nitrogen components of cattle consuming low quality dry native range grass. In Trial 1 cows were fed a 30 percent protein soybean meal supplement with 0, 50 or 200 mg of monensin per cow per day. In Trial 2, mature ruminally cannulated steers were fed the same supplement with 0 or 200 mg of monensin. A third trial was conducted to estimate rumen turnover rate and cellulose disappearance rate of steers fed a high concentrate diet at a rate to meet maintenance requirements with 0, 50, 100 or 200 mg of monensin per steer daily.