INTAKE OF A SELF-FED MONENSIN-CONTAINING ENERGY SUPPLEMENT BY STOCKER CATTLE ON WHEAT PASTURE AND EFFECTS ON PERFORMANCE

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Story in Brief

Two trials were conducted to determine (1) intake of self-fed, energy supplements containing 75 mg monensin/lb by stocker cattle grazing wheat pasture and (2) in the second study, the effect of the supplement on cattle performance. Mean daily intake of supplement and monensin during the period of December 1 to March 14 of the first trial was 2.83 lb/head and 212 mg/head, respectively. In Trial 2, mean daily intake of supplement and monensin by steers of two pastures was (pasture 1) 2.63 lb/day and 197 mg/head and (pasture 2) 4.24 lb/day and 318 mg/head, respectively. Supplement intake in Trial 2 was much more variable than Trial 1. Weight gain of the steers was increased about .5 lb/day by the monensin-containing energy supplement. Apparent supplement conversion was 6.48 lb of supplement per lb of increased gain.

(Key Words: Monensin, Wheat Pasture, Growing Cattle.)

Introduction

Rumensin (monensin) and Bovatec (lasalocid) increased daily gains of growing cattle on wheat pasture by about .20 to .25 lb/day over that of the carrier supplement (Horn et al., 1981 and Andersen and Horn, 1987) and greatly improve the economics of supplementation programs for stocker cattle on wheat pasture. Research conducted at Clayton, New Mexico has shown that monensin decreases the incidence and severity of bloat on wheat pasture. Therefore, depending on how the ionophore is fed, monensin may be the preferred ionophore of the two for stocker cattle on wheat pasture. An alternative approach to including ionophores in mineral mixes or supplements that are designed to be hand-fed daily is to use monensin and

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salt to limit intake of free-choice supplements designed to be consumed at a level of about 2 lb/day. The objective of this study was to determine (1) intake of self-fed, monensin-containing supplements by stocker cattle grazing wheat pasture and (2) in the second trial, the effect of the supplement on cattle performance.

Materials and Methods

Trial 1

Twenty-five Hereford, Angus and Hereford x Angus fall-weaned heifers (456 lb mean initial weight) were used to determine voluntary intake of a self-fed, monensin-containing supplement by cattle grazing wheat pasture. The cattle were from one of the OSU beef cattle herds at the Lake Carl Blackwell Range just west of Stillwater. The cattle were placed on 50 acres of clean-tilled wheat pasture and had free-choice access to an energy supplement for the 125-day trial (December 1, 1988 to April 6, 1989). Composition of the energy supplement is shown in Table 1. The supplement

Table 1. Composition of energy supplement fed to heifers on wheat pasture (Trial 1).

Ingredient	% As-fed
Ground milo	63.33
Wheat middlings	20.91
Sugarcane molasses	4.78
Calcium carbonate	3.99
Dicalcium phosphate	2.26
Magnesium oxide	.60
Salt[a]	4.00
Rumensin 60 Premix	.125
Calculated Nutrient Content (as-fed basis)	
NE_{gain}, Mcal/cwt	39.6
Crude protein, %	10.8
Calcium, %	2.05
Phosphorus, %	.83
Magnesium, %	.55
Monensin content, mg/lb	75.0

[a] Fine gradation of Rock Salt (95.6 to 96.8% NaCL). Carey Salt Co.

was fed in covered feeders, with 16 feet of total bunk space, that were located near the water source. The water source consisted of a steel tank that was located in the southwest corner of the pasture. There was no other source of water, and no additional salt or mineral supplements were offered to the cattle. Supplement intake was measured twice weekly (i.e., at 4- and 3-day intervals) throughout the trial. Prairie grass hay was fed during periods of snow and ice cover of the pasture. Although this trial did not permit effects of the supplement on performance to be measured, weight gains of the heifers were measured twice during the trial. All weights were measured after 16- to 18-hour shrinks without feed and water.

Trial 2

Ninety-four British and exotic crossbred calves that weighed 488 lb were randomly allotted to four groups of 21, 23, 21 and 29 head per group according to breed and initial weight and were placed on four pastures of clean-tilled wheat pasture at a stocking density of 1.4 acres/head. These cattle had been purchased by an order buyer in Arkansas and had grazed Plains Bluestem pasture for 72 days after being received in Oklahoma prior to placement on wheat pasture. While grazing Plains Bluestem, the steers had free-choice access to a commercial mineral supplement that contained 18.0 to 21.5% salt, 13.0 to 15.5% calcium, 6.6% phosphorus, iodine and 720 mg lasalocid/lb. One-half of the cattle within each group received a subcutaneous injection of 120 mg of copper (as Ethylenedinitrilo-Tetraacetic Acid Copper Disodium Salt; BOVI-CU; Anthony Products Co., Arcadia, CA) immediately prior to being placed on wheat pasture. All cattle had free-choice access to large round bales of medium-quality bermudagrass hay throughout the trial. Treatments consisting of no energy supplement or a monensin-containing energy supplement were randomly assigned to the pastures. Supplements were fed in covered feeders with 20 feet of bunk space per group of cattle. As in Trial 1, supplement intake was measured twice weekly. Because of over-consumption of the first formula, the cattle receiving the supplement were given free-choice access to block salt on November 14 (day 19 of the trial) and the salt content of the supplement was increased from 4.00 to 6.00% (as-fed basis) on December 1 (day 36 of the trial). Composition of the supplements is shown in Table 2. Cattle that were not fed the energy supplement had free-choice access to a commercial mineral mixture throughout the trial. The mineral mixture was fed in weather vane type mineral feeders located near the waterers of each pasture. Guaranteed analysis of the mineral mixture was: calcium, 15 to 17%; phosphorus, not less than 4%; salt, 18.5 to 21.5%; magnesium, not less than 5.5% and vitamin A, not less than 150,000 I.U./lb. Intake of the commercial mineral mixture and block salt was measured weekly. All cattle weights were

Table 2. Composition (as-fed basis) of energy supplements fed to steers on wheat pasture (Trial 2).

Ingredient	First formula	Second formula
Ground milo, %	63.33	60.81
Wheat middlings, %	20.91	20.97
Sugarcane molasses, %	4.78	4.79
Calcium carbonate, %	3.99	4.00
Dicalcium phosphate, %	2.26	2.54
Magnesium oxide, %	.60	.75
Salt[a], %	4.00	6.00
Rumensin 60 Premix, %	.125	.125
Calculated nutrient content (as-fed basis)		
NE_{gain}, Mcal/cwt	39.6	38.3
Crude protein, %	10.8	8.9
Calcium, %	2.05	2.11
Phosphorus, %	.83	.88
Magnesium, %	.55	.64
Monensin content, mg/lb	75	75

[a] Fine gradation of Rock Salt (95.6 to 96.8% NaCl). Carey Salt Co.

Salt was changed to Carey Ev'r Flo Fine Mixing Salt on 1/19/90.

measured after 16 to 18 h shrinks without feed or water.

Ten .5 square meter quadrats were hand-clipped from each pasture periodically throughout the trial in order to estimate amounts of available forage. There was only about 980 lb forage DM/acre at the onset of the trial. On December 19 (day 53 of the trial) it was necessary to decrease stocking density in two of the pastures in order to maintain about equivalent amounts of available forage per steer in each of the pastures. Numbers of cattle were decreased from 21 to 10 in pasture 3 and from 21 to 17 in pasture 1 as shown in Table 5.

Results and Discussion

Trial 1

The mean and range of supplement and monensin consumption by heifers for the entire trial and from December 1 to March 14 (i.e., not including the early part of the grazeout period) is shown in Table 3. Mean supplement and monensin consumption during the entire trial was 2.75 lb/head/day and 206 mg/head/day, respectively. Supplement consumption ranged from 1.19 to 4.22 lb/head/day and monensin intake ranged from 89 to 316 mg/head/day. Mean supplement and monensin consumption during the period from December 1 to March 14 (i.e., middle portion of Table 3) was about the same as the total trial, but a smaller range of monensin consumption was observed (i.e., 137 to 316 mg/head/day. Two-thirds of the time during the December 1 to March 14 period, monensin intake ranged from 167 to 258 mg/head/day which was reasonably close to the desired intake of 150 to 200 mg. Weight gains of the cattle were excellent and averaged 2.53 lb/day for the 125-day trial as shown at the bottom of Table 3.

Table 3. Supplement and monensin consumption and weight gains of heifers grazing wheat pasture (Trial 1).

	Mean	Standard deviation	Minimum	Maximum
------------ December 1, 1988 to April 6, 1989 (36 Observations)[a] ---------------				
Supplement, lb/head/day	2.75	.64	1.19	4. 22
Monensin, mg/head/day	206	48.2	89	316
------------ December 1, 1988 to March 14, 1989 (29 Observations)[a] ------------				
Supplement, lb/head/day	2.83	.61	1.83	4.22
Monensin, mg/head/day	212	45.7	137	316
Live weight gains		lb/day		
December 1 to January 27 (56 days)		2.35		
January 27 to April 6 (69 days)		2.68		
December 1 to April 6 (125 days)		2.53		

[a] Supplement consumption was measured twice weekly.

Trial 2

Consumption of the monensin-containing energy supplement, mineral mixture and plain block salt by steers is shown for each pasture in Table 4. Daily supplement consumption by steers of both pastures was greater than desired. However, mean intake of supplement and monensin by steers of pasture 1 was 2.63 lb/head and 197 mg/head, respectively, which was within the range of 150 to 200 mg monensin/head/day. Consumption of

Table 4. Supplement, mineral and monensin consumption by steers grazing wheat pasture (Trial 2).[a]

	Mean	Standard deviation	Minimum	Maximum	Plain block salt (Mean ± SD)
Pasture 1					
Supplement, lb/hd/day	2.63	1.00	1.05	5.21	.021±.017
Monensin, mg/hd/day	197	75	79	391	
Pasture 2					
Supplement, lb/hd/day	4.24	1.02	2.73	6.42	.022±.011
Monensin, mg/hd/day	318	77	205	481	
Pasture 3					
Mineral mixture, lb/hd/day	.11	.031	.04	.15	
Pasture 4					
Mineral mixture, lb/hd/day	.13	.036	.06	.20	

[a] Thirty-four (34), 17 and 15 observations for supplement, mineral mixture and block salt, respectively, during the 120-day trial (10/26/89 to 2/24/90).

Table 5. Weights and daily gains of steers (Trial 2).

	Treatment					
	Control		Energy supplement		Means	
Pasture:	3	4	1	2	Control	Energy supplement
---------- October 26, 1989 to December 19, 1989 (53 days) ----------						
Number steers	21	29	21	23		
Initial weight, lb	493	489	490	482		
Final weight, lb	603	608	630	624		
Daily gain, lb	2.07	2.25	2.64	2.68	2.16	2.66
---------- December 19, 1989 to February 24, 1990 (67 days) ----------						
Number steers	10	29	17	23		
Weight, lb						
February 24, 1990	729	684	770	754		
---------- October 26, 1989 to February 24, 1990 (120 days) ----------						
Number steers	10	29	17	23		
Daily gain, lb	1.89	1.63	2.31	2.27	1.76	2.29

supplement by steers of pasture 2 was much greater and averaged 4.24 lb/day and 318 mg monensin. Provision of free-choice block salt did not affect supplement consumption by the steers. Steers consumed only about .02 lb of salt daily. An explanation for the large variation in supplement consumption between the two pastures is not readily apparent. Initially the supplement feeders were located close to the water supply in each pasture. Steers of pasture 2 seemed to spend quite a bit of time loafing in the area of the waterer and feeder; whereas those of pasture 1 did not. On day 27 of the trial, the feeders were moved further away from the waterers of each pasture in an attempt to decrease supplement consumption. This seemed to help for a while but did not last for very long. The feeders were about 106 and 415 feet away from the waterers of pastures 1 and 2, respectively.

Consumption of the commercial mineral mixture by control steers (i.e., steers of pastures 3 and 4) was about .12 lb/head for both pastures (Table 4).

Weight gains of steers were not influenced by the copper injection nor was the copper by supplement interaction significant. Therefore, data were pooled across copper levels. Because of the fairly large difference in supplement consumption by steers of pastures 1 and 2, average weights of the steers at the onset of the trial, on December 19 (day 53) and on February 24 (day 120) and the daily gains during the first 53 days and the total duration of the trial are shown for steers of each pasture in Table 5. Even though steers of pasture 2 consumed more supplement than was desired, performance did not appear to be decreased by the excessive amount of monensin. Daily gains of steers fed the monensin-containing energy supplement were .50 and .53 lb greater ($P < .05$) during the first 53 days and the total trial (120 days), respectively. Apparent supplement conversion, expressed as lb of supplement per lb of increased gain over the total trial, was 6.48 (i.e., 3.435 lb of supplement divided by .53 lb of increased gain). This figure along with the expected value of weight gain of the cattle can be used in evaluating the economics of this supplementation practice for wheat pasture stocker cattle.

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