EFFECT OF MONENSIN AND DIETARY SUPPLEMENTS ON GROWING STEERS FED COTTONSEED HULLS

C. B. Ammerman, Pravee Vijchulata, P. R. Henry
S. G. Potter and H. N. Becker
Animal Science Department, Gainesville

SUMMARY

Forty steers averaging 620 lb initially were used to determine the effect of 0 and 200 mg monensin/head daily and two levels of energy supplementation when cottonseed hulls were fed ad libitum for 126 days. The two supplements were based on either soybean meal or soybean meal plus corn with added minerals and vitamins. They were fed once daily to provide 1.4 lb crude protein/head daily and a total supplement intake of either 3.12, or 4.88 lb/head. Weight gains were not affected by treatment. Monensin reduced feed intake, which resulted in an average improvement in feed efficiency of 13%. Monensin also increased the molar percentage of propionic and isovaleric acids while decreasing acetic acid concentration in the ruminal fluid.

INTRODUCTION

Monensin, a relatively new antibiotic feed additive, has been found to improve the feed efficiency of finishing steers by increasing the ruminal production of propionic acid in relation to acetic acid. There are conflicting reports concerning the role monensin plays in improving the utilization of forages by cattle. Little information is available on the effect of monensin when cottonseed hulls serve as a major source of roughage.

OBJECTIVE

The objective of this experiment was to evaluate the effect of monensin when fed in combination with two levels of supplemental energy in rations for growing cattle consuming cottonseed hulls.

PROCEDURE

Forty steers of mixed beef breeding were fed for 126 days. The steers, with an initial average of 620 lb, were allotted randomly to four treatments of 10 steers each and were group fed once daily in the morning an average of either 3.12 lb of soybean meal or 4.88 lb of soybean meal and corn with or without 200 mg monensin per head daily (table 1). These supplements provided an intake of 1.4 lb crude protein per head daily for all animals and a metabolizable energy intake of either 3.47 or 5.80 Mcal/head/day, respectively. After the steers consumed the supplements, usually within 30 to 60 minutes, cottonseed hulls were offered ad libitum. At the end of the experiment, ruminal fluid from three steers

per pen was collected via stomach tube at nine hours after feeding supplements. Volatile fatty acids in ruminal fluid samples were analyzed by gas-liquid chromatography.

TABLE 1. COMPOSITION OF SUPPLEMENTS

Ingredients	Supplements[a]	
	Soybean meal	Soybean meal + corn
	(Percent)	
Corn, ground	-	46.3
Soybean meal (50% protein)	92.5	49.1
Biophos (16% Ca; 21% P)	2.8	1.3
Limestone, ground (33% Ca)	1.1	1.0
Trace mineralized salt	3.6	2.3
Vitamins A and D[b]	+	+
Total	100.0	100.0
Crude protein, %	45.5	29.3
Metabolizable energy, Mcal/kg	2.7	2.9

[a]Each supplement was fed to provide 1.4 lb crude protein with and without 200 mg monensin/head daily.

[b]Vitamins A and D were added to provide 20,000 IU vitamin A palmitate and 4,000 IU vitamin D_3 per head daily.

RESULTS AND DISCUSSION

From the performance data presented in table 2, it can be seen that neither monensin nor supplemental energy level affected average daily gain. Monensin, however, decreased feed consumption by 7.9 and 3.7%, respectively, for the soybean meal and soybean meal plus corn supplements. Total daily feed consumption of steers receiving monensin averaged 1.6 lb lower than that for the controls (25.85 vs 17.48 lb). Total daily feed intake for steers fed soybean meal plus corn was 26.14 compared to 27.19 for steers receiving the soybean meal supplement. Monensin improved feed conversion by 13% (15.72 vs 13.67). The higher total daily feed intake in steers receiving soybean meal as compared to those receiving the other supplement was expected, since steers in the latter treatment obtained more energy per day from the soybean meal plus corn supplement. The steers receiving additional corn had a better feed conversion than those offered soybean meal only since the corn had a higher digestible energy content than did the cottonseed hulls.

Analysis of ruminal volatile fatty acids collected from steers at nine hours after supplementation (table 3) indicated an increase of propionic and isovaleric acid concentrations in monensin treated steers from 13.5 to 18.4 and 1.5 to 2.0 molar percent, respectively. The increase of molar proportion of propionic acid by monensin caused a consequent decline of acetic acid from an average of 73.3 to 68.7 molar percent. There was no change in butyric acid. Similar findings in animals fed various diets have been confirmed in previous reports. Total volatile fatty acids were unaffected by monensin which is in agreement with the reports of most researchers.

TABLE 2. EFFECT OF MONENSIN AND SUPPLEMENTS ON PERFORMANCE OF STEERS[a]

Item	Monensin, 0 mg/head/day			Monensin, 200 mg/head/day		
	Soybean meal	Soybean meal + corn	Average	Soybean meal	Soybean meal + corn	Average
Initial weight, lb	619.3	622.0	620.6	622.8	620.5	621.7
Final weight, lb	835.9	845.5	840.7	855.1	867.4	861.2
Daily feed intake, lb						
Supplement	3.12	4.88	4.0	3.12	4.88	4.0
Cottonseed hulls[b,c]	25.19	21.76	23.48	22.95	20.77	21.86
Total[b,c]	28.31	26.64	27.48	26.07	25.65	25.85
Daily gain, lb	1.72	1.78	1.75	1.83	1.96	1.90
Feed/gain[b]	16.46	14.97	15.72	14.24	13.09	13.67

[a]Each value represents the average of data for 10 steers.
[b]Significant effect of monensin ($P<.01$).
[c]Significant effect of supplements ($P<.05$).

TABLE 3. EFFECT OF MONENSIN ON RUMINAL VOLATILE FATTY ACID CONCENTRATIONS AT NINE HOURS AFTER SUPPLEMENTS WERE OFFERED

Volatile Fatty Acid[a]	Monensin, mg/head/day	
	0	200
	molar %	
Acetic[b]	73.3	68.7
Propionic[b]	13.5	18.4
Butyric	11.1	9.7
Isovaleric[b]	1.5	2.0
Valeric	.7	.7
	mM/ml	
Total	82.6	86.9
Acetic:Propionic[b]	5.59	3.88

[a]Mean of six steers, ruminal samples collected on day 130 of the experiment.
[b]Significant effect of monensin ($P<.01$).