

# Ionophores and Digestibility of Feedlot Rations

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## Story in Brief

Monensin, lasalocid and salinomycin were added to a 95 percent concentrate whole shelled corn ration at a level of 30 g per ton. Adding ionophores increased digestibilities of dry matter, organic matter and nitrogen. Starch digestibility tended to increase with ionophores, but nitrogen retention was unaffected. Results suggest that these compounds may have slight biological differences. Increased organic matter digestion can explain increased biological efficiency of 3.2 percent with these compounds.

## Introduction

Ionophores are a class of feed additives which increase the efficiency of the feed use by feedlot cattle. Monensin is the most widely known ionophore. Salinomycin and lasalocid have been shown to have similar effects on efficiency but often depress intake less than monensin.

Energy, protein and starch digestibility were increased slightly with the addition of monensin to a whole shelled corn ration in two previous trials (Thornton, et al., 1978; Rust et al., 1979). Effects of these drugs on fecal measurements are outlined from other feeding studies in this report, but due to animal and feed intake differences, those measurements may be unreliable. This experiment was conducted to compare the effects of three similar compounds--monensin, lasalocid and salinomycin--on digestibility of a high concentrate ration.

## Experimental Procedures

A ration containing whole shelled corn and cottonseed hulls (Table 1) was fed at 2 percent of body weight to 12 crossbred steers. The average initial weight of the steers was 640 lb, and the feed intake was limited to 11 lb dry matter per head daily. Steers were rotated among diets so each steer received each drug for 14 days. Supplements containing lasalocid, salinomycin and monensin were fed to achieve dietary levels of 30 g per ton of feed or 33 ppm of dry matter. Periods were 14 days in length, with total urine and feces collected during the final 5 days. Rumen samples were collected by stomach tube on day 15 of each period. Digestibilities of dry matter, starch, protein and organic matter were calculated. Ruminant and fecal pH were measured.

## Results and Discussion

Addition of ionophores to this ration had no significant effect on ruminal pH but increased fecal pH (Table 2). Nitrogen percentage in fecal dry matter was higher with monensin than lasalocid or salinomycin supplementation. Fecal ash was also higher when steers were fed the monensin supplement than when fed

**Table 1. Ration composition, dry matter basis**

Ingredients	%
Whole shelled corn	88.58
Cottonseed hulls	5.16
Pelleted supplement	
Soybean meal	3.39
Alfalfa meal	.279
Dicalcium phosphate	.234
Calcium carbonate	1.069
Potassium chloride	.418
Salt	.318
Urea	.512
Trace mineral mix	.017
Vitamin A-30	.01
Drug <sup>a</sup>	+

<sup>a</sup>Premix added in amounts to yield dietary levels of 30 g per ton of feed of monensin, salinomycin or lasalocid.

**Table 2. Ruminal, fecal and urinary measurements**

Item	Drug			
	None	Monensin	Salinomycin	Lasalocid
Ruminal pH	6.23	6.16	6.29	6.23
Fecal pH <sup>a</sup>	5.67	6.15	5.91	6.03
Fecal dry matter, % <sup>c</sup>	29.3	29.9	28.3	31.1
Fecal starch, % DM	15.7	13.5	13.6	15.2
Fecal N, % DM <sup>b</sup>	2.90	3.11	2.99	2.89
Fecal ash, % wet matter <sup>b</sup>	2.25	2.47	2.20	2.36
Whole kernels in feces <sup>d</sup>	1.25	1.33	1.00	1.58
Urine, liter/day	5.92	7.06	8.88	6.99
Total fluid output, liter/day <sup>e</sup>	8.22	8.82	10.95	8.90

<sup>a</sup>Drugs altered measurement ( $P < .05$ ).

<sup>b</sup>Response to monensin differs from other drugs ( $P < .05$ ).

<sup>c</sup>Response to lasalocid differs from response to salinomycin ( $P < .05$ ).

<sup>d</sup>Kernels not detected = 0; few particles = 1; large amounts = 3.

<sup>e</sup>Fecal plus urinary water output.

the other two drugs. Fecal dry matter was greater with lasalocid than with salinomycin. Fecal starch tended to be slightly higher with control and lasalocid supplements. The amount of whole kernels of corn observed in the feces was slightly lower with supplemental salinomycin than with other drugs. Output of fluid in urine plus feces was increased by 16 percent with added drugs suggesting that these compounds may increase water intake.

Digestibility of both organic matter and dry matter was increased by the addition of all three ionophores (Table 3) with greater effects from added monensin than either lasalocid or salinomycin. On the average, organic matter digestion was increased by 3.2 percent by added ionophores. Starch digestion also tended to increase with drug additions, but the difference was not significant. Ash digestion tended to be greater with monensin and lasalocid supplementation.

Ionophores decreased fecal nitrogen output (Table 4) but had little effect on loss of nitrogen in the urine. The digestibility of nitrogen was enhanced by added

**Table 3. Digestibility**

Item	Drug			
	None	Monensin	Salinomycin	Lasalocid
Dry matter <sup>ab</sup> , %	81.4	84.8	82.5	83.0
Organic matter <sup>ab</sup> , %	81.0	85.0	82.6	83.1
Starch, %	95.4	96.7	96.3	96.0
Ash, %	62.0	66.3	61.6	65.4

<sup>a</sup>Drugs altered measurement (P<.05).

<sup>b</sup>Response to monensin differs from other drugs.

**Table 4. Nitrogen metabolism**

Item	Drug			
	None	Monensin	Salinomycin	Lasalocid
Nitrogen intake, g/day	87.42	85.09	82.74	89.63
Fecal nitrogen output <sup>a</sup> , g/day	27.40	23.14	24.59	25.24
Urinary nitrogen output, g/day	24.53	26.35	22.00	23.45
Digestibility, % <sup>a</sup>	68.6	72.6	70.0	71.7
Retention, g/day	35.49	35.60	36.13	40.94

<sup>a</sup>Drugs altered measurement (P<.05).

drugs while nitrogen retention was not significantly altered. Although these three compounds are chemically similar, some of their effects differ slightly. Since all three increased digestibility of most nutrients, they should all increase biological efficiency of feedlot steers.

### Literature Cited

- Rust, S. R. et al. 1979. Okla. Agr. Exp. Sta. Res. Rep. MP-104:55.  
 Thornton, J. H. et al. 1978. Okla. Agr. Exp. Sta. Res. Rep. MP-103:70.