EFFECT OF LASALOCID ON PERFORMANCE, RUMINAL FERMENTATION AND FORAGE INTAKE OF WHEAT PASTURE STOCKER CATTLE

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Story in Brief

Twenty-seven fall-weaned Hereford heifers that averaged 460 lb in year 1 (1982-83), and twenty-seven Hereford and Hereford x Angus heifers that averaged 488 lb in year 2 (1983-84), were blocked by initial weight (year 1), initial weight within breed (year 2), and were randomly allotted to three treatments. The heifers grazed a common wheat pasture for 100 days in year 1, and 101 days in year 2 and were individually fed a supplement supplying either 0, 100 or 200 mg lasalocid/head/day. Daily weight gains of heifers were increased .25 lb (2.51 vs 2.26) by the highest level of lasalocid. Digestibility of wheat forage and forage intake were not influenced by either level of lasalocid.

(Key Words: Stocker Cattle, Wheat Pasture, Lasalocid.)

Introduction

Supplementation programs for stocker cattle grazing winter wheat pasture offer a means of increasing daily gains and efficiency of forage utilization. Lasalocid, an ionophore, was recently cleared by the Food and Drug Administration for increased rate of weight gain in pasture cattle. However, little information is available on the effect of lasalocid on stocker cattle grazing winter wheat pasture. Results of a two year study to determine effects of lasalocid on weight gains, ruminal fermentation, and forage intake of stocker cattle grazing winter wheat pasture are reported herein.

Materials and Methods

Twenty-seven fall-weaned Hereford heifers that averaged 460 lb in year 1 (1982-83), and twenty-seven Hereford and Hereford x Angus heifers that averaged 488 lb in year 2 (1983-84) were blocked by initial weight in year 1, and initial weight within breeds in year 2, and allotted to three treatments. Treatments consisted of 0, 100 and 200 mg lasalocid/head/day. Heifers grazed a common wheat pasture for 100 and 101 days in years 1 and 2, respectively. The heifers were fed in individual feeding stalls 6 days/week, 2.33 lb supplement that was prorated to supply 0, 100 or 200 mg lasalocid/head/day. Ground corn was used as the carrier feed in year 1. In year 2, supplements consisted of (percent as fed): ground corn, 75 percent; cottonseed hulls, 10 percent; ground alfalfa hay, 8 percent; liquid molasses, 7 percent; and the desired amount of lasalocid. Supplements were fed in pelleted form (3/16 inch pellet).

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Initial, intermediate and final weights were measured each year following a 15 to 17 h drylot shrink without feed or water.

Wheat forage intake and digestibility of dry matter (DMD) and organic matter (OMD) were measured once during each of the 2 trials. Heifers were bolused with gelatin capsules that contained 4 g of chromic oxide twice daily (0800 and 1600 h) during 6-day preliminary and 5-day fecal collection periods. Fecal samples were taken from the rectum at the time of bolusing, dried, and were composited across sampling times for each heifer. Fecal outputs were calculated by the chromium dilution technique while forage DMD and OMD were determined using indigestible neutral detergent fiber (INDF) as an internal indigestible marker. The INDF concentrations of fecal and hand-clipped forage samples were determined as neutral detergent fiber remaining after a 144-h in vitro incubation with 40 ml of buffered rumen fluid.

At the end of each forage intake trial, rumen fluid samples were collected by stomach tube from 7 heifers per treatment. Samples were obtained 4 h after feeding the lasalocid supplements. Heifers grazed wheat pasture after consuming the supplements until rumen fluid samples were obtained. Ruminal fluid pH was measured with a pH meter and glass electrode. Ammonia and volatile fatty acid concentrations were measured by the magnesium oxide distillation method and by gas chromatography, respectively.

Results and Discussion

Effects of lasalocid on heifer performance are shown in Table 1. During the first 57 days of year 1, daily gains of heifers that received 200 mg lasalocid/day were greater than gains of heifers that received 0 or 100 mg lasalocid/day. However, differences among treatments were not significant ($P>.05$). During the last 43 days, daily gains of heifers that received 200 mg lasalocid/day were greater ($P<.05$) than those that received 0 or 100 mg lasalocid/day. Daily gains of heifers fed 200 mg lasalocid/day for the entire 100-day grazing period of year 1 were .23 to .26 lb greater ($P<.05$) than gains of heifers fed 0 or 100 mg lasalocid/day.

In year 2, increasing levels of lasalocid tended to increase daily gains of heifers over the entire grazing period. However, differences among treatments were not significant ($P>.05$).

Effects of lasalocid on weight gains of heifers in both years are shown at the bottom of Table 1. The year by treatment interaction was not significant ($P>.15$). Daily gains of heifers fed 200 mg lasalocid/day were .25 lb greater ($P<.05$) than those of heifers fed 0 or 100 mg lasalocid/day.

Forage Intake Trials

Effects of increasing levels of lasalocid on fecal outputs, DMD, OMD and intake of wheat forage by heifers are shown in Table 2. Data were pooled across years. Year x treatment interaction was not significant ($P>.15$) for any of the measurements. Forage DM and OM digestibilities were similar for heifers fed 0, 100 and 200 mg lasalocid/day. Forage DM intakes were unusually high. However, fecal ash concentrations were also high (7.0 to 15.0 percent) suggesting that the heifers consumed a considerable amount of soil with the forage. Because insoluble ash appears as a cell wall component in the NDF procedure, fecal NDF concentrations expressed as a percent of fecal DM) would have

Table 1. Effect of lasalocid on daily weight gains (lb) of heifers grazing wheat pasture.

		Mg lasalocid/head/day			
		0	100	200	
Year 1					SE(N=7)
No. of heifers		7	9	9	
Mean initial weight, lb		460[a]	462[a]	459[a]	
Grazing Interval	Days				
12/28/82-2/24/83	57	1.5[a]	1.54[a]	1.71[a]	.076
2/25/83-4/8/83	43	2.17[a]	2.03[a]	2.42[b]	.081
12/28/82-4/8/83	100	1.76[a]	1.73[a]	1.99[b]	.069
Year 2					SE(N=8)
No. of heifers		8	8	9	
Mean initial weight, lb		491[a]	497[a]	484[a]	
Grazing Interval	Days				
1/13/84-2/27/84	45	2.25[a]	2.54[a]	2.56[a]	.123
2/28/84-4/24/84	56	2.75[a]	2.79[a]	3.07[a]	.117
1/13/84-4/24/84	101	2.51[a]	2.68[a]	2.85[a]	.113
Years 1 and 2					SE(N=15)
No. of heifers		15	17	18	
Mean initial weight, lb		477[a]	478[a]	472[a]	
Average daily gain[c], lb		2.26[a]	2.26[a]	2.51[b]	.067

[a,b]Means in rows with no or different superscripts are different ($P \leq .05$).
[c]100- and 101-day grazing intervals of years 1 and 2, respectively.

Table 2. Effect of lasalocid on fecal output, digestibility of forage dry matter (DM) and organic matter (OM), and forage intake of heifers grazing wheat pasture[a].

Item	Mg lasalocid/head/day 0	100	200	SE
No. of heifers	16	17	18	
Fecal output, % of body wt				
DM	.66	.64	.68	.023
OM	.59	.58	.61	.021
Forage digestibility, %				
DM	84.78	84.25	83.83	.370
OM	82.26	81.42	81.27	.449
Forage intake, % of body wt				
DM	4.40	4.13	4.23	.187
OM	3.36	3.12	3.33	.141

[a]Pooled data of years 1 and 2. Differences among treatment means are not significant ($P > .05$).

Table 3. Effect of lasalocid on ruminal fermentation.

	Year 1				Year 2				OSL[a]
	Mg lasalocid/head/day				Mg lasalocid/head/day				
	0	100	200	SE	0	100	200	SE	year x trt
No. of heifers	6	7	7		7	7	7		
pH	6.9[d]	6.9[d]	6.6[e]	.07	7.2[d]	7.1[d]	7.0[d]	.14	.49
Ammonia (mg/100 ml)	10.57[d]	15.22[e]	17.81[e]	1.71	8.32[d]	11.95[d]	11.66[d]	1.44	.40
Total[b] VFA, mmole/liter	96.95[d]	109.35[d]	128.58[e]	8.90	74.54[d]	83.74[d]	77.82[d]	9.45	.21
VFA molar proportions[c]									
Acetic	56.6[d]	58.1[d]	56.6[d]	.89	59.8[d]	59.0[d]	60.0[d]	.93	.08
Propionic	20.7[d]	20.1[d]	18.9[d]	.62	21.0[d]	21.7[d]	21.7[d]	.57	.09
Isobutyric	1.9[d]	1.9[d]	2.2[d]	.18	1.3[d]	1.3[d]	1.3[d]	.07	.33
Butyric	16.3[d]	14.9[d]	17.4[d]	.86	14.8[d]	15.6[d]	13.4[d]	.84	.02
Isovaleric	2.9[d]	2.9[d]	2.8[d]	.23	1.2[d]	1.4[d]	1.7[e]	.13	.20
Valeric	1.6[d]	1.8[d]	2.1[d]	.24	2.0[d]	1.9[d]	1.8[d]	.15	.27
Acetic:propionic ratio	2.7[d]	2.9[d]	3.0[d]	.11	2.9[d]	2.7[d]	2.8[d]	.10	.17

[a] Observed Significance Level.
[b] Acetic, propionic, isobutyric, butyric, isovaleric and valeric acids.
[c] VFA molar proportions (moles/100 moles).
[d,e] Means in rows within year with different superscripts are different ($P<.05$).

been biased upwards. Thus, forage DM intakes would be biased upwards. Estimates of forage OM intakes would not be biased by high fecal ash concentrations. Intakes of forage OM were not, however, affected (P>.05) by either level of lasalocid.

Ruminal Fermentation Measurements

Ruminal fluid pH, ammonia and VFA concentrations of the heifers are shown in Table 3. Rumen fermentation data are presented by year since year x treatment interaction was significant (P<.10) for molar proportions of acetic, propionic and butyric acids.

In year 1, 200 mg lasalocid reduced rumen pH (P<.05). A similar, nonsignificant (P>.05) trend was observed for rumen pH in year 2. Rumen ammonia concentrations were increased (P<.05) by both levels of lasalocid in year 1. A somewhat similar trend for rumen ammonia concentrations was observed in year 2, but treatment means were not different (P>.05).

Consistent general trends were not observed with regard to effects of lasalocid on total VFA concentrations, molar proportions of individual acids and acetic:propionic acid ratios. Total VFA concentrations of heifers fed 200 mg lasalocid were increased (P<.05) in year 1. This effect was not observed in year 2. Neither level of lasalocid affected (P>.05) the molar proportions of acetic, propionic or butyric acids, or the acetic:propionic acid ratio in ruminal fluid samples. Isovaleric acid concentrations of heifers of year 2 were increased (P<.05) with increasing level of lasalocid.

This study indicates that 200 mg lasalocid/day is effective in increasing weight gains of stocker cattle on wheat pasture. The mechanism(s) by which weight gains were increased needs further study. Alterations by lasalocid of site of digestion of forage OM and flow of forage protein to the post-ruminal tract may be involved.