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Effectiveness of Lasalocid with Solar-Dried Acid Treated and Ensiled Shelled Corn Finishing Rations

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EFFECTIVENESS OF LASALOCID WITH SOLAR-DRIED, ACID TREATED AND ENSILED SHELLED CORN FINISHING RATIONS [1]

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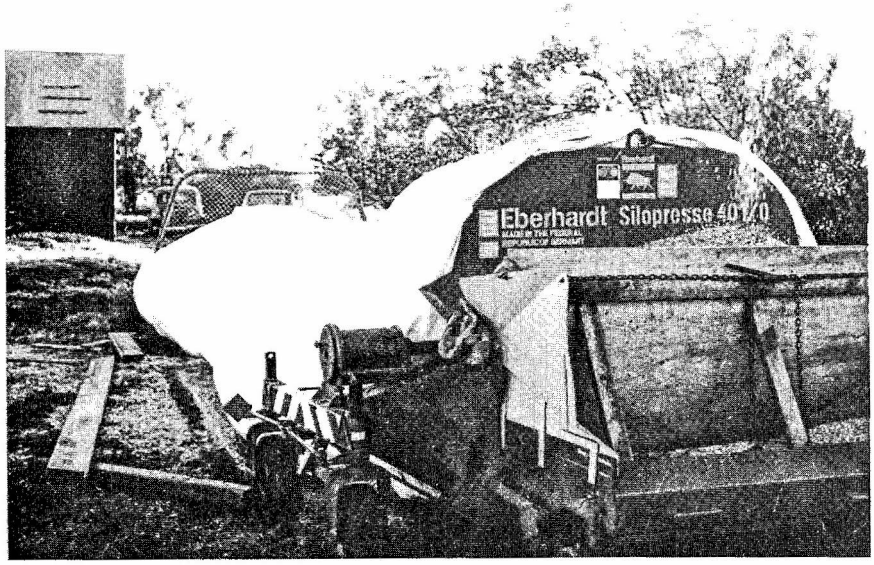
Summary

A high-concentrate finishing experiment was conducted with 120 yearling crossbred steers to determine the effectiveness of Lasalocid as a growth stimulant and coccidiostat and to compare the feeding value of three storage forms of whole shelled corn. Top-dressing a Lasalocid supplement increased steer gains by 4.3% and boosted feed efficiency by 8.3% while reducing feed intake about 4%. The incidence and severity of coccidia oocysts in cattle was markedly reduced by feeding Lasalocid at 40 grams per ton of air-dry total ration.

Steers fed solar-dried or ensiled shelled corn gained 0.15 to 0.20 lb. per head daily faster and were about 8.3% more efficient in feed conversion than their counterparts fed propionic acid-treated corn.

Neither corn storage form nor Lasalocid supplementation significantly influenced carcass measurements, including quality and yield grades.



Wet shelled corn being preserved with propionic acid or by ensiling in a Silopress bag.

[1] Experiment conducted at the James Valley Research and Extension Center, Redfield, South Dakota.

Introduction

Lasalocid sodium (Bovatec) is a commercial feed additive which has shown substantial promise as a cattle growth promotant in initial research trials. This compound appears to function in the rumen by stimulating a more efficient microbial fermentation, thereby increasing cattle performance. Previous studies have also indicated its usefulness as a ruminant coccidiostat. Lasalocid is not yet approved by FDA for use with cattle, however, and further research is necessary to determine its effectiveness under field conditions. Thus, a major objective of this study was to evaluate the feedlot performance and carcass characteristics of cattle fed high-concentrate finishing rations with and without Lasalocid. The coccidiostatic value of Lasalocid was also examined.

Three shelled corn storage forms (solar-dried, propionic acid-treated and ensiled) were also investigated in this trial because of the intensive interest in minimizing the energy costs required for drying or preserving high-moisture corn and to examine the relative feeding value of corn stored in these three ways. A horizontal plastic Silopress bag was used to store the ensiled shelled corn in order to gain experience with this ensiling system.

Procedures

One hundred twenty crossbred yearling steers averaging about 700 lb. were purchased in May, 1978, from a reputation backgrounder in the Gettysburg area. All of the steers originated from one herd out of black baldy cows and sired by three-quarter blood Limousin bulls. The cattle had been vaccinated, implanted and poured for external parasites in October, 1977, by the supplier. Upon arrival at the research feedlot, the cattle were backgrounded on weathered alfalfa-brome hay, whole oats and dried shelled corn for 6 weeks. The level of grain was gradually increased to 11 lb. of oats and 4 lb. of corn during this period. AS-700 crumbles were fed for the first 2 weeks after arrival. Prior to the start of the trial, the steers were eartagged, implanted with Synovex-S and dewormed with Tramisol injectable.

The corn used in this trial ranged from 20 to 26% moisture at harvest. The solar-dried corn was stored in an experimental steel bin equipped with a vertical, black metallic solar energy collector and fan. The propionic acid-treated corn was prepared by applying Grain Storer P (Co-op) at a rate of about 1.9 gallons per ton (36 bushels) of corn. This product was applied with a special mixing auger and the treated corn then stored in wooden grainery bins. The ensiled shelled corn was stored in a horizontal, 8 mil thick, white plastic "sausage" bag, 8 feet in diameter and about 100 feet long, using the Eberhardt Silopress ensiling system. The PTO driven Silopress machine compacts grain into the bag via a large rotating drum with metal fingers. This system worked quite effectively with whole shelled corn above 24% moisture, but capacity and packing efficiency fell off at lower corn moisture levels.

The cattle trial was initiated on June 16, 1978 (day 0). The animals were uniformly allotted into six pens of 20 head each on the basis of shrunk body weight obtained after an 18-hour stand without feed and water. Two pens of cattle were fed each of the three storage forms of shelled corn, with one pen on each type of corn receiving a top-dressed Lasalocid supplement and the other pen a control supplement.

The steers were fed in open, dirt lots, with daily feed records kept on each pen. The cattle were weighed at monthly intervals throughout the trial with shrunk weights obtained at the beginning and end of the experimental periods. One steer each was removed from the solar-dried and ensiled corn groups for reasons unrelated to the treatments.

Each of the experimental rations consisted of 83% whole shelled corn, 12% chopped alfalfa-brome hay and 5% pelleted supplement on a dry matter basis. High iodine, trace mineralized salt was offered free choice. The rations were developed to contain 11.5% crude protein, 0.32% calcium, 0.30% phosphorus, 0.60% potassium and 0.30% trace mineral salt with a nitrogen:sulfur ratio of 10:1.

The composition of the two pelleted supplements was equal, except that one included a Hoffman-LaRoche premix containing Lasalocid sodium. The level of Lasalocid in this supplement was designed to provide 40 grams of Lasalocid per ton of air-dry (90% dry), complete ration. The supplements consisted of 51% ground shelled corn, 20% soybean meal, 3.75% urea, 5% dry cane molasses, 6.25% limestone, 6.25% trace mineral salt, 5% potassium chloride, 1% calcium sulfate and 1.75% premix. Each pound of supplement supplied 30,000 IU of vitamin A. Minimal loss of Lasalocid activity occurred as a result of the pelleting process.

Samples of each feed were collected throughout the trial for chemical analysis. The average moisture and crude protein percentages of the feeds were: hay, 11.2 and 18.0; solar-dried corn, 13.4 and 11.1; acid-treated corn, 18.6 and 9.6; ensiled corn, 24.3 and 10.8 and supplements, 10.9 and 24.9, respectively.

The supply of high-moisture ensiled corn was exhausted after 97 days on trial. Therefore, the comparison of corn storage forms was terminated at that time. All pens of cattle were then slowly switched to a ration of 40% acid-treated corn, 43% solar-dried corn, 12% chopped hay and 5% supplement, dry matter basis, in order to continue the Lasalocid vs. control supplement comparison up to market weight. The supplements were removed from the rations after 119 days on trial in order to abide by the experimental withdrawal period for Lasalocid prior to slaughter. The cattle were then fed a common high-grain plus hay ration until slaughter.

Fecal samples were collected on day 0, 39 and 119 of the trial to evaluate the usefulness of Lasalocid as a coccidiostat. The samples were analyzed for coccidia oocyst (egg) counts using standard diagnostic techniques by the Animal Disease Research and Diagnostic Laboratory, SDSU, under the supervision of Dr. Martin Bergeland.

The cattle were sold on a grade and yield basis at a local packing plant so that detailed carcass measurements could be obtained.

Results

A summary of the feedlot performance and carcass traits of steers fed solar-dried, acid-treated and ensiled whole shelled corn rations is shown in table 1. Average daily gain and dry matter feed conversion during the 97-day trial were very similar for the solar-dried and ensiled corn fed cattle, but steers fed the acid-treated corn gained about 5% slower and were 8% less efficient than the other two groups.

The corn treated with propionic acid was lower in moisture (about 21%) at harvest than desired. Other studies have generally shown that the feedlot performance of cattle fed either acid-treated or ensiled shelled corn is superior to cattle fed solar- or conventionally-dried corn if the corn is harvested between 26 and 30% moisture. The fact that acid-treated corn in this study was harvested when somewhat drier (20-26%) than optimal may account for the lack of improved performance.

Carcass characteristics, including rib eye area, marbling, fat cover, quality and yield grades, were not significantly influenced by type of corn fed, with cattle on all treatments grading average choice. The ensiled corn fed steers had nearly twice the incidence of liver abscesses, however.

Table 1. Comparison of Solar-Dried, Propionic Acid-Treated and Ensiled Whole Shelled Corn for Finishing Cattle (97-day trial)

	Solar-dried	Acid-treated	Ensiled
No. steers	39	40	39
Init. shrunk wt., lb.	744	749	750
Final shrunk wt., lb.	1056	1046	1065
Avg. daily gain, lb.	3.21[a]	3.06[b]	3.25[a]
Avg. daily feed intake, lb. (as fed basis)			
Shelled corn	22.40	24.43	25.58
Chopped hay	3.16	3.18	3.17
Supplement	1.29	1.29	1.29
Total	26.85	28.90	30.04
Lb. feed dry matter/lb. gain	7.30[a]	7.84[b]	7.20[a]
Hot carcass wt., lb.	718	699	710
Yield grade	3.7	3.5	3.5
Quality grade	Choice	Choice	Choice
Percent liver abscesses	15.4[a]	12.5[a]	28.2[b]

[a,b] Values with different superscripts are significantly different ($P \leq .05$).

The results of the 119-day trial investigating the impact of Lasalocid on cattle performance are presented in table 2. The Lasalocid-fed steers gained 4.3% faster than controls and were 8.3% more efficient in feed conversion. The Lasalocid-fed cattle consumed 23.6 lb. of feed dry matter daily, while the control steers ate over 24.6 lb., resulting in a 4.1% reduction in dry matter intake with Lasalocid.

Table 2. Effect of Lasalocid on Cattle Performance (119-day trial)

	Control	Lasalocid
No. steers	59	59
Init. shrunk wt., lb.	748	747
Final shrunk wt., lb.	1133	1148
Avg. daily gain, lb.	3.23[a]	3.37[b]
Avg. daily feed intake, lb. (as fed basis)		
Shelled corn	25.03	24.05
Chopped hay	3.32	3.18
Supplement	1.35	1.30
Total	29.70	28.53
Lb. feed dry matter/lb. gain	7.63[a]	7.00[b]
Hot carcass wt., lb.	704	713
Yield grade	3.5	3.6
Quality grade	Choice	Choice
Percent liver abscesses	10.2[a]	27.1[b]

[a,b] Values with different superscripts are significantly different ($P \leq .05$).

The effect of Lasalocid on feed consumption during the early feeding period was more pronounced. During the first 14 days of the trial, feed intake was 11.5% lower with Lasalocid. However, steer gains were about 14% higher for the Lasalocid-fed cattle during the first weigh period. It should be noted that Lasalocid was fed at the full level of 40 grams per ton of air-dry ration from the first day of the trial on.

Lasalocid had no significant influence on carcass parameters, including fat thickness, rib eye area, percent kidney fat and quality and yield grades. A higher occurrence of liver abscesses was found in Lasalocid-fed cattle, however.

Lasalocid feeding had a dramatic beneficial effect on both the incidence and severity of coccidia oocysts (eggs) in the steers (table 3). Fecal samples were obtained from both control and Lasalocid steers on day 0, 39 and 119 of the trial. On day 0, 95 to 98% of the animals had appreciable numbers of coccidia oocysts in their feces. By day 39, the proportion of Lasalocid-fed steers with detectable numbers of oocysts had been reduced to about 17%, and the average score (an index of oocyst numbers) had dropped to 0.17 from an initial score of 2.90 on day 0. This reduction persisted at day 119.

Table 3. Coccidiostatic Effect of Lasalocid in Cattle

	No. steers	Percent of steers with coccidia oocysts			Avg. fecal oocyst score[a]		
		Day 0	Day 39	Day 119	Day 0	Day 39	Day 119
Control	59	94.9	94.9	86.2	2.92	2.79	2.29
Lasalocid	59	98.3	16.9*	13.6*	2.90	0.17*	0.17*

[a] Standardized clinical oocyst counting system: score of 1 = 1-5, 2 = 6-10, 3 = 11-20, 4 = 21-40, 5 = 41 or more oocysts per standard unit of fecal solution.

* $P \leq .05$.

The Silopress "sausage" bag was found to be an adequate ensiling structure for high-moisture, whole shelled corn. The corn ensiled in this study was somewhat lower in moisture than necessary for optimal fermentation and preservation and some spoilage occurred, especially after the bag was opened. The bags must be located on a well-drained, firm site away from hedgerows and undermath in order to permit year-round accessibility with mechanized equipment and freedom from rodent damage.