Parasitism in Feedlot Cattle

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Introduction

A survey of bovine gastrointestinal nematodes (1) was conducted from 1969 to 1971 on Kansas herds totaling 10,000 head. This survey indicated that inapparent or subclinical parasitism was the predominant form in Kansas. Cattle harboring few gastrointestinal nematode (roundworm) parasites may show no readily detectable ill effects so the cost of shifting the host-parasite balance may be questioned.

Factors such as changes in management practices, use of new anthelmintics, and increased interstate shipment of cattle generate legitimate concern over just what hazard the nematode parasite population presents (1).

These studies were conducted to determine the effects of anthelmintics on the performance (weight gain, feed efficiency, morbidity and mortality) of stressed calves which showed no readily detectable ill effects due to parasites.

Experimental Procedure

Calves used were 400 to 500 lb. choice-type Hereford, Angus and Hereford x Angus steer and bull calves purchased through sale arenas in or near Ft. Worth, Texas; Memphis, Tenn.; Oklahoma City, Okla.; and southeastern Kansas. Calves with horns were dehorned and bull calves were castrated at the origin of purchase or during processing at the Garden City Experiment Station (GCES).

On arrival (GCES), calves were weighed, tattooed, and vaccinated for infectious bovine rhinotracheitis, bovine virus diarrhea, leptospirosis, blackleg and malignant edema. The temperature was taken on all calves and those with over 103°F were given antibiotics and sulfa drugs. Calves with temperatures of 105°F or greater were treated for a minimum of 3 days or until their temperature fell below 103°F. Various combinations of antibiotics and sulfa drugs were used to determine the most effective combination.

Water was withheld for 4 hours after arrival. Loose grass hay was provided free-choice initially, but sparingly as calves went on rations.

Anthelmintics were administered during processing at the Garden City Experiment Station. Four trials were conducted to evaluate the efficacy of: levamisole (boluses, cattle wormer pellets and injectable solution); and thiabendazole boluses. Levamisole hydrochloride injectable solution (18.2%) was administered at 2 cc/cwt. Levamisole wormer pellets were mixed with other ration ingredients at 0.1 lb./cwt. of animal body weight at the a.m. feeding and all of the mix was consumed within 4 hours.

Rations and supplements fed during the four anthelmintic trials are presented in Table 1.

Results and Discussion

Trial 1.

In the first trial, 260 head of calves were purchased in Oklahoma City (93 head), Ft. Worth (95 head), and southeastern Kansas (72 head). Half of the calves were randomly allotted as controls (untreated) and the other half were each given one levamisole bolus during processing at the Garden City Experiment Station.

Calves treated with levamisole hydrochloride boluses gained more rapidly than control (untreated) calves for 31 and 51 days after treatment (Table 2). Untreated calves consumed more feed but were less efficient than those that were treated. Levamisole-treated calves had more morbidity and mortality, but cost of gain was lowest for this group.

Trial 2.

Two hundred seventy-nine (279) calves were purchased in March 1974 from Oklahoma City (85 head), Ft. Worth (97 head), and Memphis (97 head). On arrival at the Garden City Experiment Station they were allotted to one of four treatments: control; levamisole hydrochloride (boluses or injectable, 18.2% solution administered at 2 cc/cwt.); or thiabendazole boluses.

Data obtained in this trial (Table 3) indicate the complexity of subclinical or inapparent parasitism. These data indicate no advantage for anthelmintics; however, results from our other trials indicate an advantage. Since several factors influence the severity of parasitism in calves, such results as these can be expected with some groups of calves due to variables associated with geographical areas, management systems, and anthelmintics involved.

Trial 3.

The 192 calves used in this trial were purchased in March 1975 from Woodward, Okla. (94 head), and Ft. Worth, Texas (98 head).

Calves were randomly allotted to five treatments (Table 4). Those treated with anthelmintics gained more rapidly ($P<0.05$) and efficiently than untreated (control) cattle. Injecting calves with levamisole improved rate of gain ($P<0.05$), feed consumption, and feed efficiency over treating with other anthelmintics. Incidence of disease and sickness was low and no calves died. Sick calves responded rapidly to medica-

Table 1
Rations and Supplements Used in Anthelmintic Trials

Indicated data	Percent Composition Trial No. 1	2	3	4
Ration Ingredients[1]				
Corn silage	43.0	26.0	26.0	89.7
Ground alfalfa hay	18.0	30.0	30.0	-
Dry-rolled corn	-	32.0	32.0	-
Steam-flaked grain sorghum	31.0	-	-	-
Protein supplement	8.0	12.0	12.0	10.3
Ration Data[1]				
Crude protein	12.1	13.7	14.5	14.3
Digestible protein[2]	7.9	10.1	10.6	10.4
NEm, Mcal/cwt.[2]	72.4	78.0	78.0	71.0
NEg, Mcal/cwt.[2]	45.5	45.0	45.0	45.0
Supplement Ingredients[3]				
Cottonseed meal	21.5	66.5	66.5	90.3
Urea	4.4	-	-	-
Ground alfalfa hay	15.2	29.0	29.0	.3
Dry-rolled grain sorghum	45.7	-	-	-
Phosphorus	5.7	-	-	-
Salt	5.0	3.3	3.3	7.1
Limestone	1.8	-	-	2.1
Trace minerals	.5	.4	.4	.1
Vitamin A	.2	.2	.2	.1
Aureomycin S-700	-	.6	.6	-

[1]Dry-matter basis.
[2]Calculated values.
[3]As-fed basis.

Table 2
Effects of Levamisole on Performance of Stressed Calves (Trial 1)

Indicated data	March 12 to May 3, 1973, 51 days Control	Levamisole (bolus)
No. of calves	130	130
Avg. initial wt., lb.		
Avg. daily gain, lb.		
0-31 days	1.24	1.27
32-51 days	1.33	1.65
0-51 days	1.28	1.43
Sick calves (31-day), %	18.6	25.8
Times sick treated (31-day), avg.	2.1	3.1
Deaths (31-day), no. (%)	2 (1.5)	4 (3.1)
Daily feed consumption, lb.[1]		
0-31 days	11.0	10.5
32-51 days	13.3	12.0
0-51 days	11.9	11.1
Feed/lb. gain, lb.[1]		
0-31 days	9.16	8.17
32-51 days	9.59	7.76
0-51 days	9.33	8.01
Cost/cwt. gain, $[2]		
0-31 days	33.92	33.08
32-51 days	31.35	26.39
0-51 days	32.85	30.02

[1]Dry-matter basis.
[2]Includes feed, yardage, treatment, anthelmintic, and vaccination costs but not death losses.

Table 3. Effects of Anthelmintics on Performance of Stressed Calves (Trial 2)

Indicated data	March 26 to April 24, 1974, 29 days Control	Thiabendazole (bolus)	Levamisole Bolus	Injectable
No. of calves	93	47	92	47
Avg. initial wt., lb.	440	443	433	451
Avg. daily gain, lb.	1.60	1.41	1.48	1.54
Avg. feed consumption, lb.[1]	13.1	13.0	13.3	13.8
Feed/lb. gain, lb.[1]	8.35	9.25	9.10	8.97
Sick calves, %	41.9	51.1	51.0	38.3
Times sick treated, avg.	4.1	2.3	2.7	3.9
Deaths, no. (%)	2 (2.2)	0 (0)	2 (2.2)	2 (4.3)
Cost/cwt. gain, $[2]	40.50	43.83	43.73	44.86

[1]Dry-matter basis.
[2]Feed cost, $/T (as-fed basis): corn silage, 18; rolled corn, 84; alfalfa, 40; supplement, 116.

Table 4. Effects of Anthelmintics on Performance of Stressed Calves (Trial 3)

Indicated data	March 14 to April 24, 1975, 41 days Control	Thiabendazole (bolus)	Levamisole Pellets	Bolus	Injectable
No. of calves	38	38	38	39	39
Avg. initial wt., lb.	452	443	443	449	435
Avg. daily gain, lb.	1.59[1]	2.16[2]	2.12[2]	2.21[2]	2.47[3]
Avg. daily consumption, lb.	14.2	13.7	14.8	14.1	15.2
Feed/lb. gain, lb.	8.94	6.35	6.99	6.36	6.16
Sick calves, %[4]	13.2	10.5	7.9	7.7	10.3
Times sick treated, avg.	2.4	3.3	2.0	2.7	1.0
Cost/cwt. gain, $[5]	48.70	35.57	39.25	35.39	33.64

[1] [2] and [3]Values in a row not followed by a common reference differ significantly at $P<0.05$.
[4]No death losses.
[5]Includes cost for feed (ration cost was $98.74/T, dry-matter basis), vaccinations, drugs, anthelmintics, and yardage.

Table 5. Effects of Anthelmintics on Performance of Stressed Calves (Trial 4)

Oct. 25 to Nov. 23, 1976, 28 days			
		Levamisole	
Indicated data	Control	Bolus	Injectable
No. of calves	68	69	68
Avg. initial wt., lb.	410	408	421
Avg. daily gain, lb.	1.27[1]	1.56[2]	1.49[1 2]
Avg. feed consumption, lb.[3]	7.49	8.31	8.43
Feed/lb. gain, lb.[3]	5.94	5.40	5.71
Sick calves, %	54.4	33.4	38.3
Times sick treated, avg.	4.8	4.7	5.7
Deaths, no. (%)	1 (1.5)	1 (1.4)	6 (8.8)
Cost/cwt. gain, $[4]	37.62	34.24	36.39

[1] and [2]Values in a row not followed by a common reference differ significantly at $P<0.05$.
[3]Dry-matter basis.
[4]Includes feed, yardage, anthelmintic, and vaccination costs but not death losses.

Table 6. Summary of Effects of Anthelmintics on Performance of Stressed Calves

	Thiabendazole	Levamisole		
Indicated data	(bolus)	Pellets	Bolus	Injectable
	% Improvement (compared to untreated controls)			
Avg. daily gain	+12.0 (2)[2]	+33.3[1] (1)	+16.5[1] (4)	+23.0[1] (3)
Avg. feed consumption	- 2.1	+ 4.2	+ 1.3	+ 8.3
Feed/lb. gain	+ 9.1	+21.8	+10.8	+ 9.2
Sick calves	- 0.8	+40.2	+ 5.0	+20.1
Times sick treated	+ 3.2	+16.7	- 6.0	+14.8
Cost of gain[5]	+ 9.4	+19.4	+ 9.2	+ 7.8
	Death Losses			
Controls 5 (4) (1.5)	0[3] (2)[2] (0)[4]	0 (1) (0)	7 (4) (2.1)	8 (3) (5.2)

[1]Significantly different than untreated (Control) calves at $P<0.05$.
[2]Number of trials.
[3]Number of deaths.
[4]Percent deaths.
[5]Includes feed, yardage, treatment, anthelmintic, and vaccination costs but not death losses.

tion, so medicinal costs were minimal.

Cost of gains showed a definite economic advantage for calves treated with anthelmintics. Cost of gain by calves treated with levamisole (injectable) was less than for thiabendazole (bolus) or levamisole (bolus). Levamisole fed as cattle wormer pellets gave the poorest response of the anthelmintics used.

Trial 4.

Two hundred five (205) calves were purchased from Ft. Worth, Texas. They were randomly allotted to three treatments: control, and levamisole (bolus or injectable, 18.2% solution).

Calves given a levamisole bolus gained faster ($P< 0.05$) than untreated (control) animals (Table 5). Untreated calves also had a higher incidence of sickness but less death loss than those given injectable levamisole.

Levamisole (bolus or injectable) improved feed consumption, feed efficiency and cost of gain.

Summary of Results

Table 6 shows a composite summary of the four trials with anthelmintics. It should be noted that the levamisole cattle wormer pellets were evaluated in only one trial and thiabendazole bolus was evaluated in only two trials. Therefore, their response (% improvement) could have varied from the values presented had they been evaluated in all four trials. However, these results indicate their (levamisole cattle wormer pellets and thiabendazole bolus) overall response was similar to that obtained with levamisole bolus or injectable solution.

Calves given thiabendazole boluses had a higher incidence of sickness than those treated with levamisole, but death losses were fewer (no deaths occurred with thiabendazole boluses). If more calves that received levamisole had been diagnosed as sick, then treated, death loss would have perhaps been lower. However, this is only speculation and remains to be proved. Since death loss figures normally relate to only a small percentage of calves involved in a trial, the loss of one or two calves may seem to magnify values relating to death losses. Therefore, additional studies are needed before conclusions can be made regarding effects of anthelmintics on death losses.

Some very meaningful conclusions can be made

Table 7
Overall Summary of
Anthelmintic Effects

Indicated data	Percent Improvement Obtained with Anthelmintics*
Daily gain	19.2
Feed consumption	3.0
Feed efficiency	11.1
Sick calves	11.9
Cost of gain	9.8

*Values represent the overall average response obtained with the anthelmintics (levamisole bolus, pellets, and injectable; thiabendazole bolus) evaluated in Trials 1 through 4.

from these data. In general, rate of gain, feed efficiency and cost of gain were similar for both thiabendazole and levamisole. Therefore, an overall summary showing the percent improvement in performance obtained with anthelmintics (results composited for thiabendazole and levamisole) in four trials involving 936 stressed calves is shown in Table 7. In all perimeters shown here, the use of anthelmintics improved performance of stressed calves resulting in a substantial savings (9.8 percent) in cost of gain. However, cost of gain data did not include death losses. In these trials, death losses were higher for calves that received levamisole (bolus or injectable) than for untreated animals. As noted earlier, death losses involved only a small percentage of the animals, so more data need to be obtained on death losses before conclusions can be drawn relating to death losses (if any) associated with anthelmintics.

References

1. S.E. Leland, Jr., H.K. Caley, and R.K. Ridley. 1973. Incidence of gastrointestional nematodes in Kansas cattle. Am. J. Vet. Res., Vol. 34, No. 4.