Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 1 *Cattleman's Day (1993-2014)*

Article 1052

1985

Effect of vitamin supplementation of receiving diets on the performance of stressed beef calves

B. Lee

R. Stuart

K. Perryman

K. Ridenour

Effect of vitamin supplementation of receiving diets on the performance of stressed beef calves

Abstract

Ration formulation for stressed beef calves needs careful consideration, since low feed intakes, rumen dysfunction, and various other health and management problems may influence nutrient intakes and requirements. Supplementation with Vitamin E and B-complex vitamins in starting and receiving diets appears to improve animal performance and health.

Keywords

Cattlemen's Day, 1985; Kansas Agricultural Experiment Station contribution; no. 85-319-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 470; Beef; Vitamin; Performance; Health

Effect of Vitamin Supplementation of Receiving Diets on the Performance of Stressed Beef Calves

Bob Lee[1], Rob Stuart[2],
Kevin Perryman[2], and Ken Ridenour[3]

Summary

Ration formulation for stressed beef calves needs careful consideration, since low feed intakes, rumen dysfunction, and various other health and management problems may influence nutrient intakes and requirements. Supplementation with Vitamin E and B-complex vitamins in starting and receiving diets appears to improve animal performance and health.

Introduction

Vitamin requirements for beef cattle, as listed by the NRC (1984), range from values that are fairly well established and tested (vitamin A) to values that are good approximations (vitamins D and E), to cases where recommendations are practically nonexistent (B complex). Additionally, we have been taught not to worry about certain vitamins for beef cattle because they are thought to be adequately supplied by feedstuffs, or are synthesized in the rumen in adequate amounts to supply the animal. Compounding this problem is a lack of information on the nutrient needs of the stressed calf. Low feed and water intakes, as well as health problems, combine to form a different set of requirements for the stressed calf. We have ideas about energy, protein, water, and certain mineral requirements, but what about vitamins? To answer some of these questions, we examined the effect of vitamin supplementation on health and performance of newly arrived feedlot cattle.

Experimental Procedure

Three receiving studies utilizing beef calves weighing from 450 to 650 lb were conducted at the Garden City Experiment Station to determine the effect of various vitamin supplementation programs. The ration listed in Table 14.1 was fed ad lib in all the studies. All calves were processed within 24 hr after arrival and were vaccinated for IBR, PI_3, BVD, and 7-way clostridium. They also received a pour-on grubicide, and were dewormed, implanted, branded, and ear tagged for identification.

Experiment 1. Two hundred British crossbred steer calves weighing approximately 450 lb were trucked from Hopkinsville, KY to Garden City, KS. The

[1]Garden City Branch Experiment Station

[2]Hoffmann-LaRoche, Inc., Nutley, N.J.

[3]Micro Chemical, Inc., Amarillo, TX.

cattle were in transit 22 hr and shrank 9 percent. They were processed immediately after arrival and were assigned to the following treatment groups: Control (40,000 IU vitamin A and 4,000 IU vitamin D per head daily), or three levels of B-complex and vitamin E supplementation.

Experiment 2. Based on the results of experiment 1, 98 head of 650 lb steer calves were allotted to the following treatments: Control (40,000 IU vitamin A and 4,000 IU vitamin D per head daily); control plus 400 IU vitamin E per head daily, and Control plus E plus B-complex vitamins (600 mg niacin, 200 mg thiamin and 750 mg choline per head daily plus minor quantities of the other B-complex vitamins). The cattle had been preconditioned on native grass and were trucked 2 hours.

Experiment 3. The same treatments were used as in experiment 2, but we used 120 head of 450 lb freshly weaned calves, all from one ranch near McPherson, KS.

Results and Discussion

All three experiments showed the same pattern of improved performance and reduced morbidity when B-complex vitamins and vitamin E were added to the diet.

Table 14.2 shows the performance results of the different treatments for all three trials. A significant ($P<.08$) increase in average daily gain was observed when vitamin E was added, and an additional increase occurred when B-complex vitamins were added. A corresponding improvement was seen in feed to gain ratio.

Table 14.2. also shows the reducted morbidity, lower medicine costs per head, and decreased death loss with the various additional vitamin supplementation treatments.

Table 14.1. Ration Composition for the Stressed Calf Receiving Studies[a]

Ingredient	% As Fed
Corn, Dry Rolled	54.4
Alfalfa, Chopped	19.0
Pelleted Wheat Midds	10.0
Molasses	6.7
Corn Silage	5.1
Supplement[b]	4.8

[a] Deccox® was used the 1st 28 days, then Rumensin/Tylan® at 25 and 10 g/ton, respectively.
[b] Protein, mineral and salt mixture.

Table 14.2. Performance Summary of Calves on Three Receiving Rations with Vitamins

Item	Control	Vitamin E	B Complex plus E
Daily Gain, lb	2.65[a]	2.79[b]	2.94[c]
Feed Intake, lb as-Fed	16.74	16.50	15.56
Feed/Gain, lb	6.43[d]	6.11[de]	5.46[e]
Morbidity, %	43.6	42.5	43.4
No. Treatments per Calf Pulled	6.2	6.3	6.2
Medicine Cost/Head	$4.29	$4.00	$4.04
Death Loss, %	1.33	.67	0

[abc] P<.08.

[de] P<.02.

******

Thiamin and Niacin in the Rumen

Until the last few years, we assumed that rumen bacteria synthesize adequate amounts of the B-complex vitamins. Recent research is showing that assumption may be wrong.

The rate of thiamin synthesis in the rumen appears to be fairly low. Also, under certain conditions, rumen bacteria produce an enzyme that rearranges the thiamin molecule, and apparently creates a compound that is toxic to the central nervous system. The result is a condition called polioencephalomalacia. Many refer to the disease as "PEM." Affected cattle become very depressed, wander aimlessly, often press their heads against solid objects, and may be become blind. If not treated quickly, they will go into convulsions and die. If treated soon enough with large, IV doses of thiamin, they respond dramatically.

Niacin supplementation has improved performance of cattle and sheep in a number of experiments. In dairy cattle, niacin improves milk yield in early lactation, and may help prevent ketosis. Niacin appears to increase protein synthesis in the rumen. If niacin is fed, the rumen bacteria respond by synthesizing less niacin. But supplementation increases the rumen niacin level because niacin is generally supplemented at fairly high levels.

Both thiamin and niacin may be especially important to stressed animals, and animals adapting to high grain diets. A review of thiamin and niacin research in ruminants was recently (September, 1984) published by Kansas State researchers (Journal of Animal Science, 59:813).

******