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Effect of Vitamin E and Fat on the Health and Performance of Shipping Stressed Heifer Calves

W.T. Choat, C.R. Krehbiel, D.R. Gill, R.L. Ball, T.C. Stovall, J.A. Shriver and J.N. Carter

Story in Brief

One hundred-six crossbred heifer calves (382±32lb) were fed to determine the effect of adding vitamin E, fat or their combination to a receiving diet on health and the rate and efficiency of gain. Heifers were blocked by weight; within each weight block cattle were assigned to one of four dietary treatments in eight pens. The diets consisted of control, added vitamin E, added fat, or added vitamin E and fat. Health and performance of heifers were monitored for 42 d following arrival. Cattle were observed daily for signs of morbidity, and frequency, duration, and extensiveness of medical treatment were recorded. Heifers supplemented with high levels of vitamin E had greater ADG and feed efficiency from d 14 to 28. However, over the 42-d feeding period, performance and health were not affected by adding vitamin E or fat to the diet.

Key Words: Vitamin E, Feedlot, Morbidity

Introduction

Bovine Respiratory Disease has plagued the cattle industry for many years. There are a number of ways in which this disease can cost producers money; decreased performance, treatment costs, and death loss are just a few. Much research has been done to help alleviate these problems. One area of interest is the use of antioxidants in the receiving diet. Supplementing vitamin E, an antioxidant, at high concentrations in the diet of newly received calves has been shown to reduce morbidity while improving daily gains and feed efficiencies during a 28-d receiving period (Gill et al., 1986; Hays et al., 1987). It has also been shown that Agrado™, an antioxidant, can reduce the number of treatments required for recovery from BRD when fed to morbid heifer calves (Stovall et al., 1999). However little research has been done with the use of vitamin E, a fat-soluble vitamin, in combination with fat in the diet. The objective of this trial was to evaluate the effects of vitamin E and fat on the health and performance of newly received shipping stressed heifer calves.

Materials and Methods

One truckload of heifer calves (n=160) was purchased by order buyers from auction markets in Oklahoma and Arkansas and was shipped to the Willard Sparks Beef Research Center, Stillwater, OK. Upon arrival at the feedlot, calves were ear tagged and weighed individually (382±32lb). Cattle were then placed into a large pen and offered free choice access to long-stem prairie hay and water over night. On the morning after arrival, heifers were processed as follows: 1) individual weights recorded; 2) vaccinated with BRSV VAC 4® [1] [1], IM, Vision 7® [2] [2], SQ, and

1 [1] Bayer Corp. (Bovine Rhinotracheitis Virus; Bovine Virus Diarrhea Virus; Parainfluenza-3 Virus; Bovine Respiratory Syncytial Virus).

treated for internal and external parasites using Ivomec injectable®3 [3] , SQ; 3) started on antibiotic treatment if clinical signs of illness were detected; 4) a hospital card was initiated for calves diagnosed as morbid; 5) allocation to assigned pens, based on arrival weight; 6) revaccinated with BRSV VAC 4® 14 d post arrival. Cattle were blocked into two weight groups and were assigned into eight pens holding 10 to 14 animals each. Housing consisted of 40' x 100' feedlot pens with fence line cement bunks. Adjacent pens shared automatic waterers.

Treatment. During the 42-d receiving period, cattle were fed one of four receiving diets (Tables 1 and 2) that were balanced to NRC (1996) recommendations. Bunks were read at approximately 7:00 a.m., 1 h before feeding, to determine the amount of feed to be offered that day.

Health Management. After processing, cattle were checked once daily for clinical signs of illness. Animals that showed clinical signs of illness were moved to the processing area where body temperature was determined and a severity score (slight, moderate, or severe) based on subjective evaluation was assigned. Animals with severity scores of "slight or moderate" required a body temperature of 104°F or greater to be considered "sick". However, if animals had a severity score of "severe" they were automatically considered "sick" without a body temperature requirement. Sick animals received medical treatment based on a specified sequence of antimicrobial drugs (Table 3). Recovered animals that became sick again were designated as repulls. Following medical treatment heifers were returned to their original pens. During the 42-d receiving trial animals that were chronically ill and(or) lame were removed from the experiment.

Weight Determination. Heifers were weighed both by pen (platform scales) and individually (squeeze chute) on d 0, 14, 28, and 42 of the trial. At the beginning and end of the 42-d receiving trial, the cattle were taken off feed and water for approximately 16 h before the last weight was taken to establish initial and final shrunk weights.

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2 [2] Bayer Corp. (Clostridium Chauvoei; Septicum, Novyi, Sordellii and Perfingens Types C and D-Enterotoxia).

3 [3] Merck Animal Health (Ivermectin).

Statistical Analysis. Data were analyzed as a randomized complete block design with pen as the experimental unit, using GLM procedures of SAS (1998).

Results and Discussion

Feedlot Performance. Performance of heifers that gained more than 0.25 lb/d is summarized in Table 4. Average daily gain tended to be higher (*P*=.09) for heifers fed additional vitamin E from d 14 to 28 of the receiving period, but there were no significant differences (*P>.05)* between treatments in ADG throughout the trial. The addition of vitamin E and fat to the receiving diet did not significantly affect dry matter intake. However, due to the slightly higher ADG of vitamin E supplemented heifers from d 14 to 28, feed efficiency was increased (*P*=.03).

Health Performance. The influence of vitamin E and fat on health and morbidity is summarized in Table 5. There were no significant differences among treatments (*P*=.17).

Literature Cited

Gill, D. R. et. al. 1986. Okla. Agr. Exp. Sta. Res. Rep. MP-118:240.

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Table 1. Composition of diets on a dry matter basis.

Ingredient	Control	Vitamin E	Vit E & Fat	Fat
Soybean hulls	32	32	32	32
Corn Dent No. 2	27	27	27	25
Wheat midds	17	16	15	17
Cottonseed hulls	10	10	10	10
Supplement[a]	14	13	13	14
Yellow grease	-	-	2	2

Vit E® Premix[b]	-	2	1	-

[a]Supplement composition: Cottonseed meal, 56%, Soybean meal, (47.5% CP) 31.5%, Pellet partner (Molasses), 5%, Calcium Carbonate, 6%, Salt, 1.75%, Selenium-600, 0.08%, Bovatec-68, 0.16%, Vitamin A-30, 0.14%.

[b]Premix composition: Wheat midds, 97.06%, Rocovite-E-50 Adsorbate®, 2.94%.

Table 2. Calculated composition of diets (DM basis).

Nutrients	Ration composition			
	Control	Vitamin E	Vit E & Fat	Fat
NEm, mcal/cwt	82.89	82.91	85.70	85.14
NEg, mcal/cwt	51.43	51.39	53.67	53.28
Crude protein, %	15.54	15.32	14.95	15.35
Crude fiber, %	11.89	11.88	11.72	11.84
K, %	1.10	1.09	1.06	1.09
Ca, %	.77	.73	.73	.77
Phos, %	.47	.47	.45	.46

Table 3. Sequence of drugs (veterinarian prescribed).

Treatment	Drug	Amount mL/cwt	Admin-istered	Active period
No. 1	Micotil (Tilmicosin)	1.5	SQ	48 h

No. 2	Nuflor (Florfenicol)	6.0	SQ	72 h
No. 3	Excenel (Ceftiofur)	2.0	SQ	Two 48-h treatments

Table 4. Least squares means for receiving period performance c

Item	Treatment means				SE[b]	C vs trt	VE
	Control	Fat	VE + Fat	Vitamin E®			
Liveweight, lb							
Initial	378.15	379.98	381.64	378.46	25.12	.95	
ADG, lb							
Day 0 to 14	1.88	1.10	1.77	1.03	.41	.29	
Day 14 to 28	1.80	1.87	2.62	2.46	.32	.23	
Day 0 to 28	1.84	1.49	2.18	1.77	.22	.92	
Day 28 to 42	3.19	3.23	2.84	3.02	.16	.45	
Total	2.41	2.11	2.37	2.39	.13	.47	
DMI, lb							
Day 0 to 14	7.23	7.31	7.32	6.92	.29	.90	
Day 14 to 28	10.93	10.52	11.36	10.43	.91	.88	
Day 0 to 28	9.08	8.91	9.34	8.67	.58	.88	
Day 28 to 42	14.53	14.44	14.65	12.56	1.04	.62	
Total	10.90	10.76	11.11	9.97	.71	.75	
Feed/Gain, lb							
Day 0 to 14	4.13	8.06	4.41	7.20	2.12	.38	
Day 14 to 28	6.07	5.64	4.48	4.23	.44	.06	
Day 0 to 28	5.06	6.10	4.28	4.96	.68	.95	
Day 28 to 42	4.55	4.48	5.18	4.20	.41	.89	
Total[a]	4.58	5.12	4.69	4.17	.46	.88	

[a]Contrasts: C vs Trt = control vs all other treatments; VE vs No VE = Vitamin E® treatmen vitamin E; FT vs No FT = fat treatments vs treatments without fat.

[b]SE = Standard error.

Table 5. Least squares means for receiving period health performanc

Item	Treatment means				SE[b]	Cor	
	Control	Fat	VE + Fat	Vitamin E®		C vs trt	VE vs VI
Morbidity %[c]	42	62	46	54	.20	.64	.9
Morbidity %[d]	12	18	11	12	.06	.78	.5
Medical trts[e]	1.15	1.63	1.35	1.54	.19	.17	.7
Repulls[f]	2.0	4.0	1.0	2.0			

[a]Contrasts: C vs trt = control vs all other treatments; VE vs No VE = Vitamin E® treatments Vitamin-E; FT vs No FT = fat treatments vs treatments without fat.

[b]SE = Standard error.

[c]All cattle included.

[d]Observations/treatment that became sick after the fifth day of the trial only.

Observations/treatment = Control, 26, Fat, 26, VE + Fat, 28, Vitamin E, 26.

[e]Number of drug treatments required to cure the first illness.

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