

Feedlot Performance and Carcass Traits of Steers Fed a Natural Supplement

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Abstract

This study was conducted to evaluate supplements for natural feeding scenarios. One hundred sixty-two weaned steer calves were blocked by weight and allotted to one of three treatments with four pens per treatment. Treatments were 1) no additive; 2) natural additive (Rumatec[®]β Starter and Rumatec[®] Finisher, Ralco Nutrition Inc, Marshall, MN) and 3) an ionophore (monensin sodium, Rumensin[®], Elanco Animal Health, Indianapolis, IN). A common corn-based, totally-mixed ration was fed to appetite daily. Dry matter intake varied by period and tended to be less for the ionophore treatment during the growing phase ($P = 0.13$), the finishing phase ($P = 0.13$), or overall ($P = 0.11$). Daily gains were similar for all three treatments during growing ($P < 0.23$) and during finishing. Gains for cattle fed the natural supplement were equal for two weigh periods and reduced during the final period ($P < 0.01$). Over the entire trial, no difference in gain was observed ($P < 0.57$). Feed efficiency was not different during growing ($P < 0.76$) but naturally-supplemented calves were less efficient ($P < 0.04$) during finishing. Overall, ionophore-supplemented calves tended to be more efficient ($P < 0.10$) than natural. Carcass traits were not affected by supplement. The natural supplement compared in this study appears to support gains and feed efficiency equal to an ionophore during the growing phase and the early portion of finishing.

Key words: Beef feedlot, performance, natural supplement

Introduction

New markets are developing for “natural” cattle as consumers express interest in purchasing beef that has “never-ever” been administered growth implants, fed or injected with antibiotics, or had ionophores used in the feed. At this writing, there is no legal definition of natural, so individual companies are defining their own protocol for “natural” production. North Dakota Natural Beef LLP is marketing beef under the “Dakota Farms” label. This business venture was developed in collaboration with NDSU and the Beef Systems Center of Excellence. This entity is just one of many terminal markets for feedlot operators who want to sell into the “natural” beef market.

Natural beef production does not allow the use of some of the conventional practices we associate with good management. Ionophores and implants are specifically prohibited, but we know from past research that these management practices improve efficiency and profit. New feed additives are being developed with sometimes novel and unproven but potentially useful ingredients. This study evaluated two such natural products compared to no additives or a conventional ionophore in growing and finishing feedlot phases.

Materials and Methods

Steer calves used in this study were supplied by 26 members of the Eastern Dakota Feeder Calf club, with individual cattlemen providing 6 to 20 head each and retaining ownership during the fall and winter feeding period of 2006-2007. Steer calves ($n = 162$, avg. wt. 743.1 ± 8.76 lbs.) were blocked into four weight classes and allotted to three treatments by ranch source within weight block. Twelve pens housed 13 or 14 steers per pen. Treatments were: 1) control, no additives, 2) natural additive (Rumatec[®]β Starter and Rumatec[®] Finisher, Ralco Nutrition Inc,

Marshall, MN), and 3) ionophore, monensin sodium, (Rumensin[®], Elanco Animal Health, Indianapolis, IN). The natural supplement used in the growing phase was Rumatec[®] β Starter which is formulated with diatomaceous earth, alpha-hydroxy propionic acid, cobalt carbonate, fenugreek, processed grain by-products, dehydrated brewers yeast, and mineral oil. The Rumatec[®] Finisher product included yucca schidigera extract plus the same ingredients as the Rumatec[®] β Starter. The natural additives were fed at 0.5 oz per head daily. The ionophore was fed at 300 mg per head daily. Both additives were extended in a supplement mix that was manufactured at the Northern Crops Institute Feed Production Center (Table 1). Supplements were fed at 0.33 lbs. per head daily and all treatments were fed the same base mineral/vitamin supplement.

Table 1. Diets for natural feeding study.

	Growing Phase	Finishing Phase
	Percent, DM basis	
Corn, rolled	49.1	53.4
Wet distillers grains	9.2	15.6
Peas, rolled	20.6	13.8
Corn silage	11.4	8.1
Wheat straw, chopped	7.6	5.4
Supplement	2.1	1.7
	Percent of supplement	
Barley malt sprouts	0.652	0.652
Ground Limestone	0.158	0.158
Potassium Chloride	0.095	0.095
Zinc sulfate	0.001	0.001
Vitamin E	0.006	0.006
Di-calcium phosphate	0.025	0.025
Salt	0.055	0.055
Vitamin A, D premix	0.008	0.008
Nutrients in diets		
Dry matter, %	66.0	67.0
Crude Protein, %	14.2	13.8
Net Energy gain, Mcal/lb.	60.0	62.0

Upon arrival, steers were allowed to rest for 24 hours, weighed individually, and vaccinated for IBR, PI3, and 7-way plus somnus. The initial weight was used to allot steers to respective treatment and pen. Calves were sorted and weighed again for the initial weight of the trial. Calves were weighed at approximately 28-day intervals thereafter until market. Totally-mixed rations were delivered to fenceline bunks once daily ad libitum in the morning after bunks were read. Feed deliveries were recorded daily for each pen. Daily gains, dry matter intake, and feed efficiency were calculated for 28-day weigh period intervals. Calves were fed a high-energy, common growing diet for two months and a common finishing diet until slaughter (Table 1). During the growing phase, the natural product used was Rumatec[®] β Starter with Rumatec[®] Finisher used in the final three months of the feeding trial.

Steers were housed in pens of identical size and orientation with windbreaks to the northwest. Automatic fenceline waterers provided ice-free water. Bedding was provided weekly during

severe winter weather. Steers were marketed using a real time grid to Tyson Fresh Meats, Dakota City, NE, when it was estimated by visual appraisal that 60 percent would grade choice and backfat averaged 0.4 inches. Carcass data was collected after a 24-hour chill by an experienced and qualified individual in concert with on-site USDA graders.

Data were analyzed using SAS Mixed procedures (SAS Inst. Cary, NC) with pen as the experimental unit in a randomized complete block design. Significance is reported at $P < 0.05$.

Results and Discussion

Dry matter intake of steers fed the supplements tended to be greater ($P < 0.09$) for natural-supplemented calves (20.24 lbs./hd/d) compared to ionophore calves (19.25 lbs./hd/d) during period 1, and was greater ($P < 0.04$) during period 4 (23.74 vs. 22.07). The trend for natural calves to eat more was observed during the growing phase (Period 1 and 2) ($P < 0.13$), the finishing phase (Period 3-5) ($P < 0.13$) and overall (Period 1-5) ($P < 0.11$) with natural calves consuming 4.5, 5.1, and 4.9 percent more dry matter than ionophore calves during the respective time frames. Dry matter intake by control calves was intermediate in each case.

Table 2. Average weight (pounds) of steers by period during a natural feeding trial.

	Treatment			Std Err	P Value
	Control	Natural	Ionophore		
Initial Wt., Dec. 21	750.2	740.2	738.8	8.76	0.37
Period 1, Jan. 19	847.4	841.3	843.9	9.50	0.81
Period 2, Feb. 16	952.2	953.3	944.4	11.34	0.69
Period 3, Mar. 15	1057.1	1054.3	1045.4	12.84	0.64
Period 4, Apr. 12	1141.1	1135.7	1133.3	13.95	0.85
Final Wt., May 14	1259.5	1239.1	1248.9	14.56	0.38

Table 3. Dry matter intake by period, phase, and overall for a natural feeding trial.

	Treatment			St. Err	P Value
	Control	Natural	Ionophore		
	Pounds/hd/day				
Period 1	19.68 ^{ab}	20.24 ^a	19.25 ^b	0.37	0.09
Period 2	20.59	21.12	20.32	0.73	0.31
Period 3	22.41	23.28	22.26	0.95	0.20
Period 4	22.71 ^{ab}	23.74 ^a	22.07 ^b	0.93	0.04
Period 5	22.85	22.85	22.17	0.69	0.56
Growing Phase	20.14	20.68	19.79	0.37	0.13
Finishing Phase	22.60	23.29	22.17	0.79	0.13
Overall	21.65	22.25	21.21	0.41	0.11

^{ab}Values with different superscripts are significantly different ($P < .10$)

Average daily gains were greater for natural calves than ionophore calves during period 2 ($P < 0.03$) but less ($P < 0.01$) during period 5. No difference was detected ($P < 0.23$) during the growing phase with steers gaining 3.54, 3.74, and 3.61 lbs./hd/day respectively for control, natural and ionophore. Gains exhibited during the finishing phase were affected by the final weigh period with control (3.49 lbs.) and ionophore (3.46 lbs.) calves gaining more ($P < 0.02$)

than naturally-supplemented steers (3.25 lbs.). There was no obvious cause of significantly decreased gain of natural calves during the final weigh period.

Table 4. Average daily gain (pounds) of steers in a natural feeding trial.

	Treatment			St. Err	P Value
	Control	Natural	Ionophore		
Period 1	3.48	3.61	3.76	0.15	0.17
Period 2	3.61 ^{ab}	3.86 ^a	3.46 ^b	0.15	0.03
Period 3	3.50	3.61	3.61	0.16	0.6
Period 4	3.00	2.91	3.14	0.15	0.29
Period 5	3.70 ^a	3.23 ^b	3.62 ^a	0.16	0.01
Growing Phase	3.54	3.74	3.61	0.12	0.23
Finishing Phase	3.49 ^a	3.25 ^b	3.46 ^a	0.09	0.02
Overall	3.51	3.44	3.52	0.08	0.57

^{ab} Values with different superscripts are significantly different ($P < .10$).

Feed efficiency expressed as pounds of dry matter per pound of gain tended to be lower during period 4 for the natural calves (8.33) ($P < 0.07$) compared to ionophore calves (7.39) with control intermediate (7.98). An advantage ($P < 0.04$) was observed during the three-month finishing period for the ionophore (6.42) and control calves (6.54) compared to the natural calves (7.21). Overall, the advantage tended to favor ($P < 0.10$) the ionophore calves (6.03) and control (6.20) compared to the natural calves (6.48 lbs.).

Table 5. Feed efficiency (DM per unit gain) for steers in a natural feeding trial.

	Treatment			St. Err	P Value
	Control	Natural	Ionophore		
Period 1	5.73	5.62	5.13	0.28	0.19
Period 2	5.90	5.89	5.50	0.51	0.79
Period 3	6.09	6.50	6.15	0.37	0.72
Period 4	7.98	8.33	7.39	0.82	0.07
Period 5	6.22	7.26	6.26	0.39	0.08
Growing Phase	5.71	5.55	5.48	0.27	0.76
Finishing Phase	6.54 ^a	7.21 ^b	6.42 ^a	0.14	0.04
Overall	6.20	6.48	6.03	0.16	0.10

^{ab} Values with different superscripts are significantly different ($P < .10$).

Carcass traits were similar except marbling scores tended to be greater (469; $P < 0.09$) for ionophore calves compared to control calves (432), with natural calves intermediate (449). The same pattern is reflected in percent KPH ($P < 0.17$) at 2.45, 2.51, and 2.55 respectively, for control, natural, and ionophore treatments.

Table 6. Carcass traits of steers in a natural feeding trial.

Item	Treatment			St. Err	P Value
	Control	Natural	Ionophore		
Dressing percent	62.38	62.74	62.49	0.28	0.45
Marbling score*	432	449	469	16.64	0.09
Hot carcass wt., lb.	754	746	749	9.26	0.66
Fat thickness, in.	0.49	0.51	0.50	0.03	0.69
Ribeye area, sq.in.	12.81	12.76	12.79	0.19	0.96
KPH, %**	2.45	2.51	2.55	0.05	0.17
Yield Grade ***	2.98	3.04	3.00	0.11	0.86

* Marbling score is based on intramuscular fat in the ribeye, 300-399 = select;400-499 = low choice.

** Kidney, pelvic, heart fat estimate as a percent of carcass weight.

*** Yield grade is a composite score for describing the proportion of muscle to fat in the carcass. It is based on several criteria and used for determining value. Low numbers indicate a very lean carcass, high numbers a fat carcass.

Implications

Cattle fed the control treatment in this study performed equally to the additives, except for reduced marbling scores which would negatively affect carcass value. The control treatment was also a “natural” feeding protocol. Without any supplement, expert bunk management and ration formulation are required to maintain a stable rumen and keep cattle gaining. The natural supplement evaluated in this study appears to support the same performance as an ionophore during the growing and early phases of finishing. Additional study is warranted and in progress to explore the reason for the variation that occurred in the final feeding period. As demand for natural beef expands, more research will be conducted to determine best management practices that may include lower energy diets and improved bunk management. ◆



Steer calves from Eastern Dakota Feeder Calf Club finished with natural feeding practices.