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Daily or weekly rotational feeding of Bovatec®- and Rumensin®/Tylan® to cattle on a steam-flaked corn finishing ration

Abstract

One hundred sixty-five crossbred steers averaging 823 lb were utilized to evaluate the daily or weekly rotational feeding of ionophores. Treatments were (g/ton of feed, 90% dry basis): 1) Bovatec (B; 30), 2) Rumensin plus Tylan (RT; 25 and 10, respectively), 3) treatments one and two in a daily rotation (D), and 4) treatments one and two in a weekly rotation (W). Steers fed RT consumed less (P<.05) dry matter than B, D>or W steers. No differences (P>.15) in daily gain were observed, suggesting that the increased consumption by B, D) and W steers was accompanied by an al teration in passage rate and/or other kinetics of digestion, such that additional consumption was poorly utilized. Thus, RT steers gained 3.9% more efficiently (P=.06) than B steers and numerically more efficiently than D or W steers. No differences were observed among treatments for carcass quality or yield. Performance of D and W steers did not differ from that predicted by the performance of steers fed B and RT fed separately, indicating no synergism from alternate feeding of ionophores in this study.

Keywords

Kansas Agricultural Experiment Station contribution; no. 88-363-S; Cattlemen's Day, 1988; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 539; Beef; Bovatec®; Rumensin®/Tylan®; steam-flaked corn; Rotational feeding

Daily or Weekly Rotational Feeding of Bovatec® and Rumensin®/Tylan® to Cattle on a Steam-Flaked Corn Finishing Ration[1]

Robert Brandt Jr.[2]

Summary

One hundred sixty-five crossbred steers averaging 823 lb were utilized to evaluate the daily or weekly rotational feeding of ionophores. Treatments were (g/ton of feed, 90% dry basis): 1) Bovatec (B; 30), 2) Rumensin plus Tylan (RT; 25 and 10, respectively), 3) treatments one and two in a daily rotation (D), and 4) treatments one and two in a weekly rotation (W). Steers fed RT consumed less ($P<.05$) dry matter than B, D, or W steers. No differences ($P>.15$) in daily gain were observed, suggesting that the increased consumption by B, D, and W steers was accompanied by an alteration in passage rate and/or other kinetics of digestion, such that additional consumption was poorly utilized. Thus, RT steers gained 3.9% more efficiently ($P=.06$) than B steers and numerically more efficiently than D or W steers. No differences were observed among treatments for carcass quality or yield. Performance of D and W steers did not differ from that predicted by the performance of steers fed B and RT fed separately, indicating no synergism from alternate feeding of ionophores in this study.

Introduction

Much attention has been focused over the past several months on the rotational feeding of ionophores. Previous in vitro work has led some workers to conclude that ruminal microorganisms may adapt to an ionophore during a feeding period. Theoretically, then, alternating ionophores on a regular basis might maximize ruminal efficiency and feed utilization. Significant responses in daily gain and feed efficiency to weekly alternation of Bovatec (lasalocid) and Rumensin (monensin) compared to continual feeding of Rumensin were noted in a pilot study conducted at the Clayton Livestock Research Center, New Mexico State University. Several studies have been conducted to further evaluate the efficacy of ionophore rotation and length of rotation interval (daily, weekly, bi-weekly) on cattle performance. Presented here are the results of a study we conducted at the Southwest Kansas Experiment Station in late summer and early fall of 1987.

Experimental Procedures

One hundred sixty-five yearling steers, averaging 823 lbs and of mixed breeding (primarily the offspring Brangus bulls x exotic crossbred cows), were purchased from one source in western Kansas. Upon arrival, steers were individually weighed and ear-tagged for identification. Processing consisted of treatment for endo- and

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ectoparasites with an anthelmintic drench and pour-on grubicide, vaccination against IBR, PI_3, BVD (MLV vaccine) and seven clostridial strains. The steers were implanted with Ralgro® at processing on July 1 and reimplanted on day 56 of the trial. Steers were randomly allotted within five weight replicates to one of four treatments. Ionophore treatments were (g/ton of feed, 90% dry basis): 1) Bovatec (B; 30), 2) Rumensin plus Tylan (RT; 25 plus 10, respectively), 3) treatments one and two alternated daily (D), and 4) treatments one and two alternated weekly (W). All steers receiving Rumensin plus Tylan were fed 12.5 and 10 g/ton, respectively, until all cattle were placed on the final ration on day nine (Table 27.1).

Initial and final weights were the average of two consecutive early morning full weights. These weights were then adjusted to payweights for calculation of daily gain and feed efficiency. Steers were slaughtered when an estimated 70% of a weight replicate reached the low choice grade. Therefore, steers in the two heavy replications were fed for 92 d, while steers in the three light weight replications were fed for 105 d. All steers were slaughtered at the IBP plant in Holcomb, KS. Hot carcass weights and liver abscess scores were obtained at slaughter. Following a 24-hour chill, carcasses were railed off and evaluated for quality and yield grade. Ribeye area and backfat thickness were measured directly, while marbling and percentage kidney, pelvic, and heart fat were called by a federal grader.

Results and Discussion

Performance by steers during the eight-day step-up period and for the entire feeding period are presented in Tables 27.2 and 27.3, respectively. Steers on the daily and weekly rotation treatments were started on Bovatec. The first rotation on the W treatment consisted of eight days of Bovatec and six days of Rumensin/Tylan. Therefore, data from the B and W treatments were pooled over the step-up period. After the first rotation, W steers were kept on a seven-day rotation schedule. Steers fed B consumed an average of 1.42 lbs of dry matter per day more ($P<.05$) than RT steers during the step-up period. Intake by D steers was intermediate to B and RT. For the entire feeding period, dry matter consumption by RT steers was 4.4, 4.3, and 2.7% lower ($P<.05$) than for B, D and W steers, respectively. No differences ($P>.15$) were observed in average daily gain, although D steers gained 1.6% faster than those fed RT. Steers fed RT were 3.9% more efficient ($P=.06$) in converting feed to liveweight gain than those fed B, and numerically more efficient than D or W steers.

The predicted performance of D and W steers is presented in Table 27.4. Performance of steers fed any proportion of RT and B during a feeding period is predicted by simple regression between the observed values for RT and B. Any deviation from the predicted value (positive or negative) is indicative of synergistic or antagonistic effects, more commonly referred to as associative action. Consumption by D steers was approximately 1.9% greater than predicted. However, there were no other significant deviations for predicted vs. observed values in feed intake, daily gain or feed efficiency. This suggests that, in this trial, there was no associative action from alternate feeding of B and RT. Dietary net energy for gain (NEg), calculated from animal performance, was increased 1.26, 4.40, 2.37, and 2.94% compared to the calculated NEg content of the basal diet by B, RT, D and W treatments, respectively. Thus, response to B, D, or W treatments in this study was minimal.

Carcass data are presented in Table 27.5. No differences due to treatment were observed for any carcass variable measured. Incidence of liver abscesses was 7.3, 0, 0, and 7.3% for B, RT, D, and W steers, respectively. These extremely low incidence rates were attributed to the short length of the feeding period and season of year. Steers in this trial had an average carcass weight of 776 lbs, a dressing percentage of 64.06%, yield grade of 2.76, and 69% graded choice or better.

In conclusion, no synergistic effects from alternating B and RT were observed for animal performance or carcass quality and yield in this trial. Significantly higher intakes for B, D, and W steers resulted in no additional gain, suggesting that rate of passage or other kinetics of the digestive systems were altered in such a way that additional intake was poorly utilized. Furthermore, fat addition to high grain rations may alter site of starch digestion, potentially exacerbating situations where the capacity of the gastrointestinal system to digest starch and absorb endproducts is challenged. The influence of fat source on site and extent of starch digestion is currently being investigated. More research is needed to ascertain potential interactive effects, such as ration type and components, nutrient levels, and levels of ionophores used in the rotation. Furthermore, if intake alteration is a result of ionophore rotation, it must be evaluated over different seasons of the year.

Table 27.1. Composition of Diets Fed in Ionophore Rotation Trial

Item	Ration 1	Ration 2	Ration 3	HMC:DRC[a] Finisher	Flaked Corn Finisher
Days Fed	3	3	2	8	76-89
	------------------Percent of Dry Matter------------------				
Ingredient:					
HM Milo	52.0				
HM Corn			35.8	40.1	
Rolled Corn		57.2	35.8	40.1	
Flaked Corn					80.6
Alfalfa Hay	21.3	16.5	8.6	4.0	4.0
Corn Silage	16.6	16.5	8.6	4.0	4.0
Molasses	5.7	5.0	5.0	4.4	4.0
Yellow Grease			1.5	2.5	2.5
Supp. 8707	4.4	4.8	4.7	4.9	4.9
	------Calculated Nutrient Content, Dry Matter Basis------				
Crude Protein, %	13.1	12.8	12.3	12.0	12.0
NEg, Mcal/cwt	55.6	57.8	63.4	67.2	72.5
Calcium, %	.93	.88	.74	.66	.66
Phosphorus, %	.31	.33	.33	.34	.31
Potassium, %	1.08	.99	.81	.68	.65
Salt, %	.46	.50	.50	.50	.50
Suffur, %	.25	.22	.20	.19	.20
Magnesium, %	.25	.18	.17	.15	.17
Zinc, ppm	71	72	74	74	70
Cobalt, ppm	.31	.24	.22	.21	.23
Copper, ppm	22	17	16	14	15
Selenium, ppm	.36	.34	.30	.30	.30

[a]High Moisture and Dry Rolled Corn Ration.

Table 27.2. Intake and Gain of Steers Through the Step-Up Period[a]

Item	Bovatec[b]	Rumensin/Tylan[c]	Daily Rotation	SE[d]
No. Pens	10	5	5	
No. Steers	82	42	41	
Pay Weight, lb	825	824	825	
8 Day Wt., lb	857	853	858	
DM Intake, lb	19.07[e]	17.65[f]	18.01[ef]	.38
Daily Gain, lb	4.03	3.66	4.16	.28

[a]Eight days. Three step-up rations were used containing 56 (3 days), 58 (3 days) and 64 (2 days) Mcal of NEg/cwt.
[b]30 g/ton (90% dry basis).
[c]12.5 and 10 g/ton, respectively, 90% dry basis.
[d]Pooled standard error.
[ef]Means not sharing the same superscript differ (P<.01).

Table 27.3. Steer Performance During the Entire Feeding Period (July - October, 1987)

Item	Bovatec[a]	Rumensin/ Tylan[a]	Daily Rotation	Weekly Rotation	SE
No. Pens	5	5	5	5	
No. Steers	41	41	41	41	
Pay Weight In, lb[b]	824	824	825	825	1
Pay Weight Out, lb[c]	1211	1209	1216	1214	7
Daily Gain, lb[d]	3.89	3.87	3.93	3.89	.07
Daily Intake, lb DM	23.44[e]	22.45[f]	23.41[e]	23.06[e]	.19
Feed/Gain, lb DM	6.03[g]	5.81[h]	5.97[gh]	5.93[gh]	.08

[a]Levels in final ration (g/ton, 90% dry basis) were Bovatec (30), Rumensin (25) and Tylan (10).
[b]Intial weights adjusted to pay weight.
[c]Final live weights pencil shrunk 4%.
[d]Average of 100 days on feed.
[ef]Means not sharing the same superscript differ (P<.05).
[gh]Means not sharing the same superscript differ (P<.10).

Table 27.4. Observed vs. Predicted Performance of Steers Fed Bovatec and Rumensin/Tylan in a Daily or Weekly Rotation

	Daily Gain, lb	Dry Matter Intake, lb	Feed/Gain	Ration NEg, Mcal/cwt
Daily Rotation:				
Observed	3.93	23.41	5.97	74.63
Predicted[a]	3.88	22.95	5.92	74.97
Difference	.05	.46	.05	-.34
Weekly rotation:				
Observed	3.89	23.06	5.93	75.04
Predicted[a]	3.88	22.95	5.92	74.97
Difference	.01	.11	.01	.07

[a]From performance of steers fed Bovatec and Rumensin/Tylan separately.

Table 27.5. Carcass and Liver Abscess Data of Ionophore Fed Cattle

Item	Bovatec	Rumensin /Tylan	Daily Rotation	Weekly Rotation	SE
No. Steers	41	41	41	41	
Hot Carcass Wt., lb	775	772	779	779	5
Dressing, %	64.02	63.90	64.05	64.24	.2
Ribeye Area, sq. in	13.39	13.15	13.04	13.16	.18
Backfat, in	.47	.44	.47	.46	.02
Marbling Score[a]	5.07	5.10	5.11	5.12	.07
KPH Fat, %[b]	1.79	1.92	1.87	1.83	.06
Yield Grade	2.69	2.72	2.84	2.76	.10
Percent Choice	68	68	68	71	
Liver Abscesses, no.					
None (0)	38	41	41	38	
Slight (A-)	0	0	0	2	
Small (A)	3	0	0	1	
Severe (A+)	0	0	0	0	

[a]Scored by federal grader to nearest 1/10. Slight 50=4.5, Small 50=5.5.
[b]Scored by federal grader to nearest .5%.