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Effects of Lactobacillus Acidophilus and Yucca Schidigera on Finishing Performance and Carcass Traits of Feedlot Cattle

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Summary

A finishing trial evaluated effects of feeding a direct-fed microbial product(Nova-Cell®) and a saponin feed additive (Ruma Just®) as a 2x2 factorial in steam-flaked corn-based diets containing 11% wet distillers grains (DM basis). No interaction was observed between Nova-Cell and Ruma Just (P > 0.13). Feeding either Ruma Just or Nova-Cell had no impact (P = 0.20) on final BW, DMI, ADG, or F:G. Neither Nova-Cell or Ruma Just affected (P = 0.10) HCW, 12th rib fat, or LM Area. Marbling appeared to be improved (P = 0.03) when Ruma Just was added to the finishing diet.

Introduction

Feeding trials evaluating efficacy of direct-fed microbials (DFM) have indicated increases in ADG and decreases in F:G in feedlot cattle, enhanced milk production in dairy cows, and improved health and performance of young calves (2003, Journal of Animal Science, 81:E120-E132). In the production of DFM, species of bacteria identified as beneficial to the host animal are extracted from mixed cultures of bacteria. Single cultures like *Lactobacillus* potentially prevent ruminal acidosis in dairy cows (2002 Journal of Dairy Science, 85:429-433), and reduce fecal shedding of *Escherichia coli* 0157:H7 (2003 Journal of Animal Science, 81:E120-E132).

Yucca saponins increased ADG in feedlot cattle fed high-grain diets (1982, Western Section, American Society of Animal Science, 33:45-46). These steroidal saponins come from *Yucca Schidigera*. Other research has indicated saponins may increase propionate concentration (1994 Journal of Animal Science, 36:698-709). The purpose of the current study was to evaluate the effects of Nova-Cell (DFM, Nova Microbial Technologies, Omaha, Neb.) and Ruma-Just (Yucca Schidigera, Nova Microbial Technologies) alone or in combination on finishing performance and carcass characteristics.

Procedure

Yearling British x Continental steers (n = 384; initial BW=721±51 lb) were used in an experiment conducted at the Panhandle Research Feedlot (University of Nebraska–Lincoln Panhandle Research and Extension Center). Prior to the start of the experiment, cattle were given Bovi-Shield Gold (Pfizer Animal Health, New York, N.Y.), Vision 7 (Intervet/Shering-Plough, Millsboro, Del), Ivomec (Merial, Duluth, Ga.), Component TE-IS (Elanco Animal Health; Greenfield, Ind.), electronic and visual ID along with a UNL hot brand. Steers were reimplanted on day 55 with Component TE-S. Cattle were limit fed (2% of BW) a 50% forage diet for a total of five days before the initiation of the trial in an effort to reduce variation in gut fill at time of weighing. Steers were individually weighed two consecutive days (day 0 and day 1) after the limit feeding period to obtain an initial BW. Cattle were stratified by BW within respective weight block (8 blocks) and assigned randomly to 32 pens (12 steers/pen). Treatments (n = 4; 8 replications) were assigned randomly to pens within weight blocks. Treatments were arranged as a 2x2 factorial and consisted of 1) Control (no feed additives); 2) Ruma Just *(Yucca Schidigera*); 3) Nova-Cell (*Lactobacillus Acidophilus* NCFM); and Ruma Just and Nova-Cell.

A 21-day grain adaptation period was used, in which incremental percentages of steam-flaked corn replaced alfalfa hay to allow cattle to become acclimated to the final finishing diet. The final diet consisted of 71.9% steam-flaked corn, 7.3% corn silage, 3.7% alfalfa hay, 11% wet distillers grains plus solubles, and 6% liquid supplement (DM basis). The liquid supplement was formulated to provide 30 g/ton Rumensin (Elanco Animla Health; Greenfield, Ind.) and 8.8 g/ton Tylan (Elanco Animal Health). Diets containing the DFM product were formulated to provide 500 million CFU/steer daily of Nova-Cell and diets containing *Yucca Schidigera* were formulated to provide 1.0 g/steer daily of Ruma Just. Nova-Cell was stored at 32°F and was applied to the ration by use of a micro ingredient machine. Ruma Just was also added to the diets during mixing by a micro ingredient machine separate from the machine that applied the DFM product. After feeding diets containing Nova-Cell or Ruma Just, the feed truck was loaded with a diet that was to be fed to cattle not involved in the current study. This was done in an effort to eliminate the risk of cross contamination of either Nova-Cell or Ruma Just in diets that were not designated to contain either feed additive.

Feed bunks were visually evaluated each morning and were managed to allow for trace amounts of feed to remain in each bunk before feed

Table 1. Finishing performance of steers fed diets containing Nova-Cell and Ruma Just either alone or in combination.

	Control	Ruma Just	Nova-Cell	Ruma Just & Nova-Cell	SEM	Ruma Just *P*-value	Nova-Cell *P*-value	Inter *P*-value
Pens	8	8	8	8				
Steers	96	96	96	96				
Carcass-adjusted performance[3]								
Initial BW, lb	721	721	722	721	2.03	0.96	0.82	0.52
Final BW, lb	1357	1370	1366	1368	13.1	0.34	0.87	0.52
DMI, lb/day	23.4	23.6	23.7	23.7	0.30	0.93	0.20	0.88
ADG, lb/day	3.62	3.69	3.67	3.68	0.07	0.27	0.96	0.60
F:G	6.58	6.49	6.57	6.54		0.24[4]	0.30[4]	0.71[4]
Live performance[1,2]								
Final BW, lb	1356	1361	1364	1361	13.1	0.97	0.52	0.50
ADG, lb/day	3.61	3.64	3.66	3.64	0.07	0.94	0.57	0.61
F:G	6.59	6.57	6.61	6.63		0.92[4]	0.75[4]	0.47[4]

[1]All BW are shrunk 4% except initial BW.
[2]Live performance calculated from live BW on a pen basis collected prior to study initiation and on day of slaughter.
[3]Carcass adjusted performance calculated using 63% dressing percentage for all four treatments.
[4]*P*-value calculated form G:F.

Table 2. Carcass characteristics of steers fed diets containing Nova-Cell and Ruma Just either alone or in combination.

	Control	Ruma Just	Nova-Cell	Ruma Just & Nova-Cell	SEM	Ruma Just *P*-value	Nova-Cell *P*-value	Inter *P*-value
Carcass characteristics								
Hot carcass weight, lb	855	863	861	862	8.23	0.32	0.86	0.51
Marbling[1]	605	617	609	620	10.2	0.03	0.92	0.45
Fat depth, in	0.58	0.58	0.58	0.57	0.01	0.78	0.89	0.13
LM Area in^2	12.6	12.6	12.8	12.7	0.19	0.21	0.10	1.00
Calculated YG[2]	3.55	3.61	3.55	3.56	0.08	0.20	0.27	0.39
Dressing %	63.1	63.4	63.1	63.5	0.32	0.06	0.44	0.96

[1]500 = Small^0, 600 = modest^0, etc.
[2]Calculated as 2.50 + (2.5*fat depth, in) - (0.32*LM Area, in^2) + (0.2*2.5 KPH) + (0.0038*HCW, lb)

delivery. Cattle were individually weighed at the end of the trial. This BW (shrunk by 4%) was used to calculate live performance. Carcass adjusted performance was calculated using carcass weights adjusted to a common dressing percentage of 63%. Blocks 1-4 were on feed for 162 days while blocks 5-8 were on feed for 189 days.

Cattle were slaughtered at a commercial abbatoir (Cargill Meat Solutions, Fort Morgan, Colo.) on two different dates. Carcass data were collected by trained professionals from Diamond T Livestock Services (Yuma, Colo.). Hot carcass weight and liver score data were collected on the day of slaughter. Carcass 12th rib fat, preliminary yield grade, percentage of KPH, marbling score, LM area, and USDA quality grades were recorded following a 48-hour carcass chill. Animal performance and carcass data were analyzed using the mixed procedure of SAS (SAS Inst. Inc., Cary, N.C.) as a randomized complete block design with pen as the experimental unit. The Proc Glimmix procedure of SAS was used for determining the quality grade distribution.

Results

No significant interactions between Nova-Cell and Ruma Just were detected for the finishing performance and carcass characteristic data. There were no differences in DMI due to the main effect of Ruma Just (Table 1). Ruma Just also had no impact on finishing performance calculated on a live basis which included final BW, ADG, or F:G ($P > 0.05$). Finishing performance data analyzed on a carcass-adjusted basis indicated no differences in final BW, ADG, or F:G ($P > 0.05$). The main effect of Nova-Cell did not impact ($P = 0.20$) finishing performance characteristics (final BW, ADG, DMI, and F:G). The same finishing performance data calculated on a live basis also indicated no effect ($P = 0.52$) of Nova-Cell on finishing performance.

The addition of Nova-Cell to the finishing diets did not impact ($P = 0.86$) HCW, marbling, or fat depth (Table 2). However there was a tendency for cattle fed Nova-Cell to have slightly larger LM Area ($P = 0.10$). Neither Ruma Just nor Nova-Cell impacted calculated YG ($P = 0.20$). Cattle fed diets containing Ruma Just tended to have greater dressing percentages ($P = 0.06$). Feeding Ruma Just had no impact ($P = 0.21$) on HCW, fat depth, or LM area; however, marbling was increased ($P = 0.03$; 617) for steers in the Ruma Just treatment group. The difference detected in marbling due to the supplementation of Ruma Just did not translate to differences in quality grade data. Cattle fed diets containing Ruma Just tended ($P = 0.09$) to grade better than cattle that did not receive Ruma Just; however, no significant differences were detected. The main effect of Nova-Cell also did not impact quality grade ($P = 0.98$).

Data from the current study indicate that Ruma Just and Nova-Cell did not significantly impact finishing performance. However, the addition of Ruma Just to finishing diets appeared to increase marbling.

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