

EVALUATION OF GROWTH PERFORMANCE AND CARCASS CHARACTERISTICS IN RESPONSE TO ORAL DOSING AND DAILY ADMINISTRATION OF A YUCCA-DERIVED SARSAPONIN TO FINISHING STEERS

*B. E. Depenbusch, J. S. Drouillard, E. R. Loe,
M. E. Corrigan, and M. A. Greenquist*

Summary

Three hundred sixty-eight crossbred, yearling steers (737 lb) were used in a finishing trial comparing a yucca-derived sarsaponin (YUCCA) to a control diet. Finishing diets based on dry-rolled corn were fed for an average of 134 days before slaughter. Animals were randomly assigned to treatments and allotted to 54 pens with seven steers each. On day 0, cattle assigned to YUCCA were orally drenched with 50 mL of SarStart® *plus* (SarTec Inc., Anoka, MN), and control cattle were orally drenched with an equal volume of water. Steers receiving YUCCA were supplemented with 1 gram per steer daily of a dried yucca extract (SarStart® DSC) for the first 30 days on feed, and then with 0.5 gram per steer daily from day 31 to harvest. Body weight, dry matter intake, average daily gain, and feed efficiency were not different between treatments for either the first 30 days or for the entire finishing period. Dressing percentage, hot carcass weight, USDA quality grade, USDA yield grade, and percentage of liver abscesses also were not different between treatments. Incorporating yucca-derived sarsaponin in the ration and as an oral drench had no effect on animal performance or carcass characteristics.

Introduction

Sarsaponin is a product extracted from the desert plant *Yucca schidigera*, and it has detergent-like characteristics. Yucca initially was used as a feed additive to bind ammonia and reduce fecal odor. Further research revealed that yucca extract might favorably alter ruminal fermentation. Several studies have evaluated the effects of yucca-extract supplementation on digestion and performance of ruminant animals, with results being mixed. Differences in gain and efficiency of as much as 3% have been observed, but these differences generally have not been statistically significant. Differences in feed efficiency as little as 3% would have substantial economic impact for commercial feedlots.

The objectives of this study were to evaluate the impact of yucca supplementation on animal performance, feed efficiency, and carcass attributes of finishing feedlot cattle fed finishing diets based on dry-rolled corn. This study was designed to detect differences in feed efficiency as small as 3%.

Procedures

Three hundred sixty-eight crossbred, yearling steers (737 lb) were obtained

from a common source and used in a randomized complete-block design finishing trial comparing a dry-rolled corn diet supplemented with a yucca-derived sarsaponin (YUCCA) with a control diet. Upon arrival, steers were offered ad libitum access to chopped alfalfa hay and fresh water. Twenty-four hours after arrival, cattle were implanted with Component™ E-C and received Bovishield 4 and Fortress-7 vaccines. Body weights were measured at processing and were used to assign treatments. Fifty-four pens were used in this study (27 pens for control and 27 pens for YUCCA), with each pen containing seven animals. For reasons unrelated to treatments, two animals from YUCCA and eight animals from the control diet were removed from study. After treatment assignment, cattle assigned to YUCCA were orally drenched with 50 mL of SarStart® *plus*, and control cattle were orally drenched with an equal volume of water. Steers on the YUCCA treatment also were supplemented with 1 gram per head daily of a dried yucca extract (SarStart® DSC) in the diet for the first 30 days. SarStart® DSC was reduced from 1 gram to 0.5 gram per head daily from day 31 through harvest. Steers were allowed ad libitum access to four step-up diets, leading to the final finishing diet that contained 78% dry-rolled corn and 8% alfalfa hay (Table 1). Steers were housed in 54 concrete-surfaced pens (118 square feet), with overhead shade (59 square feet) covering the bunk and half of the pen. Pens included automatic water fountains and a 10.5-foot fence-line feed bunk. Total weight of steers in each pen was measured on day 30, 56, 74, and 120 with a pen scale. Weights also were measured just before harvest.

Cattle were harvested on two separate occasions because of visual differences in

body composition of animals. On day 120, 36 pens of the heaviest and more conditioned cattle (Group 1) were shipped to a commercial abattoir in Emporia, Kansas, where carcass data were collected. Hot carcass weight and liver abscess scores were obtained at the time of harvest. Ribeye area; subcutaneous fat thickness over 12th rib; kidney, pelvic, and heart fat; marbling score; USDA quality grades; and USDA yield grades were measured after a 72-hour chill. Final body weight was calculated by dividing hot carcass weight by a common dressing percentage of 63.5%. Animal performance and efficiency for cattle from these 36 pens were calculated by using the hot carcass adjusted weight. On day 148, the cattle from the remaining 18 pens (Group 2) were shipped to slaughter. Carcass data were not available for these cattle, and final body weights for these cattle were calculated by shrinking the gross live weights by 4%.

Table 1. Composition of Finishing Diet

Item	% of Dry Matter
Ingredient	
Dry-rolled corn	77.8
Steep	10.2
Alfalfa	7.6
Supplement ^a	2.3
Nutrient, calculated	
Crude protein, %	13.0
Fat, %	3.8
Calcium, %	0.70
Phosphorus, %	0.38

^aFormulated to provide 320 mg Rumensin and 90 mg Tylan per steer daily.

Results and Discussion

Receiving Data. Animal performance during the first 30 days of the finishing period is reported in Table 2. Body weights at day 30 were not different between treatments ($P>0.66$). Dry matter intake, average daily gain, and feed efficiency were not significantly different between treatments ($P\geq 0.31$).

Finishing Performance. Animal performance for the entire finishing period is reported in Table 3 for the animals harvested in Group 1 and in Table 4 for the animals harvested in Group 2. Carcass data were not collected for Group 2. As a consequence, average daily gain and efficiency of gain were calculated by using either a hot carcass adjusted live weight (Group 1) or the shrunk live weight of animals before shipping (Group 2). Initial body weights were similar ($P>0.99$) be-

tween treatments. Final weights, average daily gain, dry matter intake, and feed efficiencies were similar ($P\geq 0.26$) for control and yucca-supplemented cattle.

Carcass Data. Carcass data for Group 1 are reported in Table 5. Hot carcass weight and dressing percentage were not different between treatments ($P>0.30$). No differences between treatments were detected for ribeye area ($P>0.30$); kidney, pelvic, and heart fat ($P>0.90$); or 12th-rib fat thickness ($P>0.90$). No differences were detected for percentages of USDA Yield Grade 1, 2, and 3, and percentage Choice or better carcasses ($P>0.60$).

Implication. Orally drenching yearling steers with SarStart® *plus* and adding SarStart® DSC to a finishing diet based on dry-rolled corn had no effect on animal performance and efficiency in our study.

Table 2. Performance of Yearling Cattle during the First 30 Days of the Finishing Period

Item	Control	Yucca	SEM	P value
No. of head	188	187	-	-
No. of pens	27	27	-	-
Days on feed	30	30	-	-
Initial weight, lb	737	737	43	0.99
30-day weight, lb	851	855	45	0.66
Dry matter intake, lb/day	17.7	17.9	0.72	0.31
Average daily gain, lb/day	3.80	3.91	0.11	0.38
Feed:gain	4.65	4.57	0.15	0.57

Table 3. Overall Performance of Yearling Cattle (Group 1)

Item	Control	Yucca	SEM	P value
No. of head	120	124	-	-
No. of pens	18	18	-	-
Days on feed	120	120		
Initial weight, lb	774	774	38	1.00
Final weight, lb ^a	1159	1150	38	0.44
Dry matter intake, lb/day	22.2	22.0	0.69	0.47
Average daily gain, lb/day ^a	3.23	3.15	0.05	0.28
Feed:gain	6.86	6.97	0.22	0.41

^aCarcass-adjusted final weight calculated by dividing hot carcass weight by a common dress yield of 63.5%.

Table 4. Overall Performance of Yearling Cattle (Group 2)

Item	Control	Yucca	SEM	P value
No. of head	61	63	-	-
No. of pens	9	9	-	-
Days on feed	148	148		
Initial weight, lb	663	663	9.6	1.00
Final weight, lb ^a	1177	1196	16.9	0.45
Dry matter intake, lb/day	20.2	20.7	0.34	0.27
Average daily gain, lb/day ^a	3.17	3.30	0.07	0.26
Gain:feed	6.35	6.29	0.10	0.65

^aFinal weight calculated as live weight minus a common shrink of 4.0%.

Table 5. Carcass Characteristics of Yearling Cattle (Group 1)

Item	Control	Yucca	SEM	P value
No. of head	120	124	-	-
No. of pens	18	18	-	-
Days on feed	120	120	-	-
Hot carcass weight, lb	736	730	24	0.44
Dressing percentage	60.1	59.9	0.1	0.30
Longissimus muscle area, inch ²	13.2	13.1	0.41	0.32
Kidney, pelvic, and heart fat, %	2.2	2.2	0.04	0.94
12th-rib fat, inches	0.35	0.35	0.01	0.94
USDA Yield Grade				
1, %	4	3	1.7	0.61
2, %	78	76	4.3	0.70
3, %	18	21	4.4	0.49
Marbling score	449	442	3	0.13
USDA quality grade				
Choice, %	91	87	3.4	0.41
Select, %	9	13	3.4	0.41
Liver abscess, %	8	13	3.1	0.18