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ALTERNATE FEEDING OF CORN AND CORN SILAGE
DIETS TO FEEDLOT CATTLE

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Summary

One hundred twenty-eight Angus yearling steers (800 lb) were utilized in a trial to determine if feeding the concentrate portion of a 40% corn silage finishing diet separately from the silage would result in improved feedlot performance and feed conversion. Cattle fed the concentrate separately from silage achieved similar average daily gains and tended to have slightly better feed efficiency than cattle fed a completely mixed diet (2.26 vs 2.25 lb/head/day and 9.21 vs 9.89, respectively). Feeding completely mixed, high concentrate finishing diets resulted in the greatest performance and under current conditions is likely the most economical situation for most cattle feeders.

(Key Words: Associative Effects, Whole Shelled Corn, Corn Silage.)

Introduction

Including roughage in high concentrate diets reduces acidosis and intake problems. A nutritional advantage may be achieved by having all essential nutrients available to cattle at each feeding. Research has shown that, when mixed diets are fed to cattle, the mixture often has a lower feeding value than when the diet components are fed separately.

Negative associative effects may result from the presence of both fibrous and concentrate materials within the rumen. Optimal digestion of fiber and concentrate by feedlot cattle requires that distinct conditions be maintained within the rumen. Feeding roughages separately from concentrates in feedlot diets may optimize ruminal conditions for fiber digestion and slow rate of passage, increasing ruminal and post-ruminal starch digestion. It may also increase the efficiency of fermentation in the rumen by maintaining alternate populations of amylolytic and cellulolytic bacteria in a stage of rapid growth.

The objectives of this research were to determine if a negative associate effect exists when mixed diets of corn silage and whole shelled corn are fed and if feeding the whole shelled corn portion of the diet in the morning and corn silage in the evening could improve feedlot performance of steers.

Materials and Methods

One hundred twenty-eight yearling Angus steers were stratified by weight and randomly allotted to 16 pens. Three experimental diets (table 1) were used in four treatments with four replications per treatment. Treatments 1, 2 and 3 consisted of feeding diets 1, 2 and 3 as completely mixed rations twice daily. Treatment 4 consisted of feeding the concentrate portion of diet 2 at 8 am and the silage portion at 4 pm. The concentrate portion of all diets consisted of whole shelled corn and a pelleted, soybean meal-based supplement.

Cattle were weighed initially and at the end of the trial after an overnight (16 hour) withdrawal of feed and water. On the day prior to slaughter, a full weight was obtained to measure shrink. Cattle remained on feed until five of the eight head in each pen reached an estimated low choice grade (.4" fat over 12th rib as measured by a Cook's probe).

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TABLE 1. COMPOSITION OF DIETS FED TO STEERS^a

Item	Diet		
	1	2	3
Corn silage	10.00	40.00	70.00
Whole shelled corn	82.05	52.20	21.50
Supplement	7.95	7.80	8.50
Soybean meal	6.00	6.60	7.50
Potassium chloride	.50	--	--
Dicalcium phosphate	.05	.20	.20
Limestone	1.05	.65	.45
Trace mineralized salt	.30	.30	.30
Vitamin A-30	.03	.03	.03
Bovatec 68	.02	.02	.02

^a Percentage (DM basis).

Data were analyzed as a completely randomized design on a pen mean basis. Variables of interest were average daily gain, feed intake, feed conversion, days on feed, shrink, dressing percentage and carcass quality and yield grade. Means were separated using least significant difference procedures.

Results and Discussion

Performance and carcass data of the cattle are shown in table 2. Cattle were slaughtered at the choice grade and were of similar fatness as indicated by the dressing percentage and yield grade data.

TABLE 2. PERFORMANCE OF CATTLE

Item ^b	Treatment ^a				
	10%	40%	70%	am/pm	SEM ^c
Initial wt, lb	809	807	798	790	12.89
ADG, lb	2.58 ^f	2.24 ^g	1.89 ^h	2.26 ^g	.08
DMI, lb	24.55 ^f	22.19 ^h	23.17 ^g	20.70 ⁱ	.20
F/G	9.56 ^f	9.89 ^f	12.29 ^g	9.21 ^f	.34
Slaughter wt, lb	1089	1089	1084	1113	14.06
Shrink, % ^d	3.09 ^f	4.09 ^{fg}	5.58 ^g	4.69 ^{fg}	.55
Days on feed	109 ^f	126 ^f	152 ^g	144 ^g	5.44
Dressing percent	62.95	62.69	62.93	62.90	.33
Quality grade ^e	2.03	2.03	2.10	2.03	.05
Yield grade	2.63	2.78	2.66	2.72	.11

^a Percentage corn silage, dry matter basis.

^b ADG = average daily gain, DMI = average daily dry matter intake, F/G = feed efficiency.

^c Standard error of the mean.

^d (1 - slaughter wt/full wt)*100.

^e 2 = choice, 3 = good.

^{f,g,h,i} Means in same row with differing superscripts differ (P<.05).

Days on feed were 109, 126, 152 and 144 days for the 10%, 40%, 70% and am/pm treatments, respectively. The am/pm cattle were fed 18 days longer than the 40% cattle. Slaughter weight of the am/pm cattle was slightly greater than that of the other groups (1113 vs 1087 lb) and at 2.26 lb/head daily would account for 12 of the 18 additional days on feed for the am/pm cattle compared with the 40% cattle.

A linear relationship existed between level of corn silage in the diet and average daily gain. Cattle fed the 10% corn silage diet gained significantly faster ($P < .05$) and cattle fed the 70% corn silage diet gained significantly slower ($P < .05$) than cattle fed the 40% silage or am/pm diets (2.58 vs 2.24 and 1.89 vs 2.26 lb/head/day, respectively).

Dry matter intake was greatest for the 10% silage diet. Average daily intake was approximately 2.6% of body weight. This is higher than what typical intake of a 10% silage ration is likely to be. Intake was lowest for the cattle fed concentrate in the morning and silage in the evening. Initially, cattle refused to clean up the evening feeding of silage. After 3 weeks on trial, cattle started to consume all of their silage.

Significantly poorer feed conversion than what is generally expected was observed for the cattle fed the high concentrate diet. This reflects the high dry matter intake of these cattle. Cattle fed the high silage diet had the poorest feed conversion (12.29 vs approximately 9.55). Feed conversions for cattle finished on predominantly corn silage diets are likely to be this high.

Feed efficiency tended to be improved slightly (9.21 vs 9.89) by feeding concentrate in the morning and silage in the evening. This may be a function of improved energy utilization for the am/pm vs the 40% completely mixed treatment or it may reflect differences in energy concentration of the diets caused by the silage refusals. However, the total amount of silage that was weighed back would represent less than a 1% change in the silage content (39.6 vs 40.0%) and less than a .2% change in the NEg content (53.66 vs 53.60 mcals/cwt) of the diet.

These data do not show any evidence supporting the existence of negative associative effects when mixed diets of corn silage and whole shelled corn are fed. Cattle fed whole shelled corn tend to chew more than cattle fed processed corn. Perhaps this chewing stimulates saliva secretion and buffers the rumen, thereby improving ruminal conditions for cellulose digestion. Feeding a completely mixed high concentrate diet appears to be the most economical finishing program for cattle feeders.