CORN SILAGE LEVEL IN WHOLE SHELLED CORN DIETS FOR FEEDLOT STEERS

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Story in Brief

Sixty-four steers were fed whole shelled corn diets with either 4 percent or 20 percent corn silage as a source of roughage in a 103-day finishing trial. Both diets contained lasalocid (30 g/ton of feed) plus Terramycin (75 mg/head daily). Feed intake was 6.2 percent greater with the higher silage diet. Live weight gain was 4.1 percent faster with the higher silage diet, but when adjusted to an equal dressing percentage, weight gain was equal for both diets. Efficiency of feed use (live basis) was equal for the two diets, but based on carcass weight, efficiency was 5.6 percent greater for the lower energy diet. Calculated metabolizable energy content of the diet was 4.5 percent greater for the lower silage diet. Based on NRC values, the higher silage diet contained 3.9 percent less metabolizable energy than the lower corn silage diet. As energy values calculated for corn silage were 72 percent that of corn grain, compared with the NRC estimate of 78 percent, it does not appear that corn silage had a negative associative effect on value of the whole shelled corn in this experiment. The incidence of liver abscesses was reduced from 9 to 3 percent with addition of silage to the diet.

Introduction

Feedlot diets are formulated to produce least cost gains. High concentrate diet usually produce the most rapid and efficient gains, decrease the time which cattle need to be fed to grade choice and decrease overhead cost/pound of gain. Higher roughage levels often reduce the incidence of liver abscesses and some feeding problems, but will increase the amount of feed which needs to be handled and the amount of waste that accumulates in a pen. In addition, higher roughage levels may speed passage through the tract and reduce digestibility of starch from corn or milo grain. This reduces the efficiency of feed use of the grain in the diet. The degree of this "negative associative effect" appears to depend on source and level of roughage as well as grain processing (Garrett and Johnson, 1983; Rust et al., 1983). Whole shelled corn diets may have special problems. The classical work of Preston et al. (1972) indicates that when diets contain less than 15 percent corn silage, corn grain can be fed in the whole form, but when more than 15 percent corn silage is present in the diet, corn should be rolled or ground for best utilization. The objective of this study was to determine the effect of addition of corn silage (4 vs 20 percent of diet dry matter) to whole shelled corn diets on feedlot performance and carcass characteristics of feedlot steers.

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Materials and Methods

Sixty-four yearling crossbred steers with some Brahman breeding were selected from a group of 500 steers which had received routine feedlot vaccinations and ear tags at Hitch Feedlot, Guymon, Oklahoma. Steers were adapted to a starting feedlot diet in a single pen for 30 days prior to trucking 6 miles to Goodwell, Oklahoma on May 21, 1983.

On arrival, steers had a shrunk weight of 753 pounds. They were allocated to 2 treatments in 8 pens in 2 barns with one replication in the "steer" barn and three replications in the "bull" barn at Panhandle State University. Compositions of the adaptation and finishing diets are presented in Table 1. Steers received diet 1 for 2 days, diet 2 for 2 days, diet 3 for 5 days or the remainder of the trial in the case of the high silage treatment, diet 4 for 7 days, diet 5 for 7 days and diet 6 for the remainder of the trial. Steers were weighed full on days 28, 56, 84 and 103.

Corn silage harvested at Goodwell, Oklahoma was included in the diets at 4 or 20 percent of the dietary dry matter. The corn silage was a forage type averaging 27 percent dry matter and estimated to contain 45 percent of its dry weight as grain. Corn silage replaced corn grain in the final diet. Lasalocid (30 g/ton of feed) and Terramycin (75 g/head/day) was included in both diets. The combination of Terramycin and lasalocid is not cleared as yet by the FDA. Cattle were switched to an additive-free diet on day 103 which was fed for 7 days. Steers were trucked 70 miles to Booker, Texas for slaughter on day 103 or 110 of the

Table 1. Diet composition, dry matter basis[a]

Ingredient	Percentage
Corn silage	4.00 or 20.00
Soybean meal	3.71
Cottonseed meal	2.00
Limestone	1.00
Urea	.45
Molasses	.38
Salt	.30
Premix[b]	.02

[a] To provide 11.78% protein, .43% calcium, .34% phosphorus, .49% potassium and 3.23 mcal ME/kg dry matter.

[b] Pelleted supplement (7.86% of the diet) for specific treatments contained .478% Terramycin 10 (theory 96.64 g / ton, found 70 g / ton), .2816% Bovatec 68 (theory 383.35 g / ton, found 369.5 g / ton). Vitamin A-30 also included at .281% of the supplement. These were formulated to supply lasalocid at 30 g/ton of air dry feed, and to supply Terramycin at 75 mg/head daily (assuming a daily feed intake of 20 pounds of dry matter/head).

Silage was substituted for whole corn to get the cattle on feed. Diet 1 contained 40% corn silage, Diet 2 30%, Diet 3 20% (the high silage treatment was held on this diet), Diet 4 15% corn silage, Diet 5 10% silage, and the final ration contained 4% silage as indicated in the table.

trial and slaughter and carcass data were obtained. Weights are reported on a full basis, while gains and feed efficiencies were calculated using a 5 percent pencil shrink. Gains and feed efficiencies for the total trial were calculated from hot carcass weights adjusted to a 62 percent dressing percentage. After removal of barn effects, treatment means for performance and carcass data were compared using the statistical analysis package of SAS (Barr and Goodnight, 1976) and Duncan's Multiple Range Test.

Results and Discussion

Performance and carcass data are presented in Tables 2 and 3. Daily dry matter intake was from .5 to 1.8 pounds higher/head with the diet containing more silage. This difference increased with time on feed, so that intake continued to increase during the trial with the 20 percent silage diet while feed intake decreased with time on feed for cattle fed the 4 percent silage diet. If higher feed intakes are desired later in a feeding period, silage levels might be increased. Live weight gains also tended to be greater for the higher silage diet later in the finishing period which improved the efficiency of feed use. However, when total trial gains are adjusted for the lower dressing percentage of the cattle fed more silage (64.7 vs 64.1 percent), the gain advantage of the cattle fed more silage largely disappears and the efficiency advantage of the higher concentrate diet becomes apparent.

Table 2. Steer performance with corn silage at 4 or 20% of diet dry matter.

Corn silage level	4%	20%
Pens of steers	4	4
Steers	32	32
Weights		
Initial	758	747
56 days	962	943
103 days	1090	1089
Daily gains, lb		
0-56	2.78	2.67
57-103	2.58	2.95
0-103	2.69	2.80
0-slaughter	3.11	3.11
Daily feed, lb		
0-56	20.3	20.8
57-103	19.2[b]	21.0[a]
0-103	19.8[b]	20.9[a]
0-slaughter	19.4[b]	20.6[a]
Feed/gain		
0-56	7.29	7.82
57-103	7.51	7.16
0-103	7.37	7.47
0-slaughter	6.25	6.62
Metabolizable energy		
mcal/kg	3.08[a]	2.94[b]

[a,b]Means in a row with different superscripts differ ($P<.05$).

Table 3. Carcass characteristics of steers fed corn silage at 4 or 20% of diet dry matter.

Corn silage level	4%	20%
Carcass weight	682	675
Dressing percent	64.7	64.1
Liver abscess		
Incidence, %	9.4[a]	3.1[b]
Severity[c]	1	2
Rib eye area,	12.3	12.6
Kidney-heart-pelvic fat, %	1.73	1.62
Fat over rib in.	.43	.42
Marbling score[d]	10.8	11.1
Cutability, %	50.8	51.2
Percent choice	13.8	18.8

[a,b] Means in a row with different superscripts differ (P<.05).
[c] 1 = small size; 2 = many or moderate sized abscess.
[d] 10 = slight minus; 11 = average slight.

Presumably, the difference in dressing percentage is due to a difference in fill of the digestive tract. Degree of finish or fatness also can influence dressing percentage, but fat over the rib, kidney-heart-pelvic fat, marbling score and cutability values were almost identical for steers fed the two diets in this study. Greater digestive tract fill also can explain the advantage in rate of gain for steers fed the higher silage diet during the early portion of the feeding trial followed by lower gains during the last half of the study.

Replacement of 16 percent corn grain in the diet with corn silage (ME = 3.25 vs 2.53 mcal/kg for the two feedstuffs) should decrease ME content of the diet by 3.9 percent. Feed intake was 6.2 percent greater with the higher silage level suggesting that steers adjusted their feed intake to maintain an equal intake of metabolizable energy. Efficiency of feed use, adjusted for the difference in dressing percentage, was 5.9 percent greater for the higher concentrate diet and ME, calculated similarly, indicated a 4.5 percent superiority for the higher concentrate diet. Thus, these yearling steers were able to consume enough more feed with this level of silage added to maintain rate of carcass gain. The energy value calculated for silage in the high silage diet was 72 percent of that of corn grain, slightly below that expected from well eared corn silage as a percent of the ME value of corn grain (78 percent) but near what might be expected for a forage variety of corn silage. Thus, this level of corn silage apparently had no large negative associative effect on this whole shelled corn diet. Results do not support the suggestion of Preston et al. (1972) or of Garrett and Johnson (1983) who have indicated that when higher silage levels are fed, value of corn grain in the whole form decreases. Younger animal age, more fragile corn type, use of beef breed rather than Holstein steers may have increased the extent of chewing of the whole grain and the degree of rumination in this trial and improved the value of whole corn grain.

The incidence of liver abscesses was reduced with more roughage included in the diet. This is similar to results of many other studies and reviews (Woods and Foster, 1970) and may reflect fewer problems with acidosis and damage to the ruminal wall when more roughage is fed.

Though dressing percentages did not differ drastically with roughage level in these diets, the small differences altered calculated gain drastically. Since lower dressing percentages are common with higher roughage levels, comparisons across roughage levels must be adjusted for differences in dressing percentages to properly reflect energy gains of cattle and true carcass value. This was more vividly illustrated previously in a study by Gill and Lake (1975) where higher silage levels were fed. When considering the relative value of roughages and concentrates and growth rates of pastured cattle, differences in fill and dressing percentage must be removed for results to be properly interpreted.

Literature Cited

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