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Feeding pressed beet pulp in place of corn silage in a finishing diet resulted in equal feed efficiencies though dry matter intake was slightly affected.

Summary

Two trials were conducted to evaluate feeding pressed beet pulp as the roughage source in finishing diets. British crossbred steers were fed 8.5% corn silage, 8.5% beet pulp, or 12.5% beet pulp with the remainder of the diet consisting of dry rolled corn and supplement. When the two trials were analyzed together, average daily gain was higher in the corn silage treatment compared to the two levels of beet pulp. However, feed to gain conversions between the treatments were not different. Beet pulp can serve as a substitute for corn silage and even though dry matter intake may be slightly affected, feed efficiency will be equal.

Introduction

Sugar beet pulp is a byproduct of the sugar beet industry. After the sugar is extracted from the beet, the remaining fraction is mechanically pressed to around 24% dry matter. The pulp can be fed fresh or ensiled, allowing it to be accessible year round. Previous studies have shown that replacing corn silage dry matter with increasing levels of beet pulp have improved average daily gain and feed efficiency in growing beef cattle diets (1992 Nebraska Beef Report, pp. 24-25, 1993 Nebraska Beef Report, pp. 48-49, 2000 Nebraska Beef Report, pp. 36-37). Replacing all of the corn silage in the diet (10 % diet dry matter) with beet pulp resulted in similar daily gains and a trend toward improved feed efficiency in a feedlot finishing diet (1993 Nebraska Beef Report, pp. 48-49). The NDF and ADF of beet pulp (54% and 33%, respectively) are similar to those of corn silage (51% and 28%, respectively). Beet pulp has a highly digestible fiber fraction, and is therefore considered to be both an energy and roughage source in beef cattle diets. Because of similar energy values, the costs are usually comparable on a dry matter basis. However, little is known how or if beet pulp functions as a roughage source in the diet. Therefore, the objective of this experiment was to determine if beet pulp could replace corn silage (DM basis) as a fiber source in a feedlot finishing diet.

Procedure

Two groups of British crossbred yearling steers were used in separate trials in a complete randomized design. In Trial 1, 118 steers (initial BW 1030 lb) were assigned randomly to one of 12 pens with nine or 10 steers per pen. Pens then were assigned randomly to one of three dietary treatments, with four replicates per treatment. All steers were fed for 77 days. In Trial 2, 90 steers (initial BW 859 lb) were assigned randomly to one of nine pens with 10 steers per pen. Pens were then randomly assigned to dietary treatment as in Trial 1. There were 3 replicates per treatment and steers were fed for 133 days.

In both trials, steers were individually weighed for two consecutive days at the initiation of the trial and every 28 days throughout the feeding period. The three diet treatments (Table 1) on a DM basis were: 8.5% corn silage (CON), 8.5% beet pulp (8.5BP), and 12.5% beet

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pulp (12.5BP). The 8.5% beet pulp treatment replaced the 8.5% corn silage on a one to one basis. The 12.5% beet pulp treatment had the same level of NDF as that supplied by the 8.5% corn silage treatment. The remainder of the diets consisted of dry rolled corn and protein supplement. The diets were formulated to be isonitrogenous at 13% CP. In Trial 1, the beet pulp was stored on a concrete pad for several months prior to the trial, while it was fed fresh in Trial 2. Steers were implanted with Revalor S at the beginning of the finishing period. Carcass characteristics were taken at the time of slaughter. Final weights, used to calculate ADG and feed to gain, were calculated from hot carcass weight (HCW) adjusted to a common dressing percentage (62%). Performance data were analyzed using the GLM procedures of SAS with feedlot pen as the experimental unit. Quality grades were analyzed using the chi-square procedure of SAS. Significance was determined at P = .10 unless otherwise specified.

Results

Steer performance is shown in Table 2. Data were tested for treatment by trial interactions. There was no treatment by trial interaction for ADG (P = .18). Gains were higher in the CON treatment compared to the 8.5BP and 12.5BP treatments (P = .05). A significant trial by treatment interaction (P = .08) occurred for DMI, therefore dry matter intakes are reported within trial. In Trial 1, cattle consuming CON had a higher DMI (26.2 vs. 23.5 and 23.6, for CON, 8.5BP,and 12.5BP, respectively; P < .001) than steers fed the pulp rations, but no differences in DMI between the 8.5BP and the 12.5BP treatments occurred. In Trial 2, no differences in DMI across the treatments were indicated. The different responses observed for DMI as beet pulp replaced corn silage in the diet may have been due to the storage of the beet pulp. In Trial 1, the beet pulp was ensiled for several months prior to feeding and in Trial 2 the pulp was fed fresh. There was not a significant treatment by trial interaction (P = .96) in feed conversion. Therefore, data were pooled and no differences in feed conversion between the three treatments were detected. Beet pulp can effectively replace corn silage in a finishing diet and it appears that the feeding value is similar (DM basis).

Carcass data are shown in Table 3. There were no treatment by trial interactions (P > .10) for carcass characteristics, therefore data were pooled. Hot carcass weights were higher for the CON treatment (P < .10). The CON treatment had higher marbling scores compared to 8.5BP (P < .05), but it was not different from 12.5BP. Backfat was higher in the

Table 1. Diet dry matter composition and calculated nutrient analysis.

	Treatment[a]		
	CON	8.5BP	12.5BP
Diet composition, dry matter basis, %			
Corn silage	8.5	0	0
Beet pulp	0	8.5	12.5
Dry rolled corn	82.7	83.3	79.5
Protein supplement 58[b]	6.4	6.4	6.4
Protein supplement 40[c]	2.5	1.8	1.7
Calculated nutrient composition, dry matter basis			
Dry matter, %	76.3	70.7	65.4
Crude protein, %	13.0	13.0	13.0
NEm, Mcal/cwt	92.7	93.6	93.2
NEg, Mcal/cwt	63.6	63.6	63.2
Rumensin, g/ton	29.0	29.0	29.0

[a]CON = Dry-rolled corn control with 8.5% corn silage; 8.5BP = 8.5% bet pulp replacing corn silage; 12.5BP = 12.5% beet pulp replacing corn silage and dry rolled corn.
[b]Supplement contains 58 percent crude protein, with Rumensin at 420g/ton, air dry basis.
[c]Supplement contains 40 percent crude protein, air dry basis.

Table 2. Performance of steers in trial 1 and trial 2 fed dry-rolled corn based finishing diets with corn silage or wet beet pulp as the roughage source.

	Treatment[a]		
	CON	8.5BP	12.5BP
DMI, lb/day[b]			
Trial 1	26.2[c]	23.4[d]	23.6[d]
Trial 2	22.9	23.3	22.4
ADG, lb/day	3.44[c]	3.18[d]	3.19[d]
Feed/gain	7.17	7.41	7.26

[a]CON = dry-rolled corn control with 8.5% corn silage; 8.5BP = 8.5% beet pulp replacing corn silage; 12.5BP = 12.5% beet pulp replacing corn silage and dry-rolled corn.
[b]Significant treatment x trial interaction (P = .08).
[c,d]Means within the same row bearing different superscripts differ (P < .05).

Table 3. Carcass characteristics of steers fed dry-rolled corn based finishing diets with corn silage or wet beet pulp as the roughage source.

	Treatment[a]		
	CON	8.5BP	12.5BP
Trial 1 and Trial 2			
Hot carcass weight, lb	812[b]	796[c]	799[c]
Backfat, in	.39[d]	.38[e]	.38[e]
Ribeye area, in^2	13.2	13.1	13.1
Marbling score[f]	5.27[d]	4.84[e]	5.11[de]
Yield grade[g]	2.74	2.68	2.68
U.S.D.A. Choice or above, %[h]	59	43	59

[a]CON = dry-rolled corn control with 8.5% corn silage; 8.5BP = 8.5% beet pulp replacing corn silage; 12.5BP = 12.5% beet pulp replacing corn silage and dry-rolled corn.
[b,c]Means on same row with different superscripts are different (P < .10).
[d,e]Means on same row with different superscripts are different (P < .05).
[f]Slight 0 = 4.0, Slight 50 = 4.5, Small 0 = 5.0, Small 50 = 5.5, etc.
[g]Yield grade = 2.5 + (2.5 * backfat) + (.0038 * hot carcass weight) + (.2 * kidney-pelvic-heart fat) - (.32 * ribeye area).
[h]Chi-square statistic (P = .09).

CON treatment compared to the two levels of beet pulp ($P < .05$). No differences between treatments for ribeye area or yield grade were found. Quality grades were analyzed by chi-square distribution. The percent grading Choice or above varied by treatment ($P = .09$).

Feed conversions between the corn silage and beet pulp diets were similar. There was a difference in DMI between the CON and beet pulp treatments, although when the two levels of beet pulp were compared, they were not different. Beet pulp can serve as a replacement for corn silage in finishing diets and it has a similar feeding value. In this experiment, dry matter intake was slightly affected, however feed efficiency was not different when beet pulp was fed. These results agree with those reported in the 1993 Nebraska Beef Report (pp. 48-49) where daily gains and feed conversions were not different when 10% corn silage was replaced with 10% beet pulp on a DM basis in a finishing diet.

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