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Using Sugar Beet Pulp to Replace Wheat Straw when Limit Feeding Late Gestation Beef Cows

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Summary

Sugar beet pulp was evaluated as a partial replacement for wheat straw in an energy dense, limit fed ration for gestating multiparous beef cows. Body weight and body condition were similar between cows fed a diet of wet distillers grains:beet pulp:wheat straw in either a 20:20:60 or a 20:45:35 ratio (DM basis). Cows on both diets gained 0.5 of a condition score over an average of 76 days. These data suggest sugar beet pulp can effectively reduce wheat straw to 35% diet DM in a byproduct/crop residue diet limit fed to gestating beef cows.

Introduction

As grass becomes less available and, subsequently, more expensive, cattle producers are searching for ways to maintain cows with alternative, cheaper resources. Late gestation cows have been successfully maintained on limit fed diets (less than 2% BW, DM basis) consisting of wet distillers grains and wheat straw or cornstalks. However, in western Nebraska, ethanol byproducts are not as readily available as in eastern Nebraska. Sugar beet pulp, included at 20% DM in limit fed rations, reduced the dependence on wet distillers grains while maintaining cow performance (2012 Nebraska Beef Cattle Report, pp. 13-14). Wheat straw is available in limited quantities in western Nebraska because very little wheat is irrigated and dryland wheat straw is typically left in the field as cover. Therefore, the objective of this experiment was to determine if late gestation beef cows could be maintained on a limit fed diet where beet pulp replaced a portion of the wheat straw.

Table 1. Diet and nutrient composition of rations containing sugar beet pulp.¹

	Diet, % DM		Ingredient TDN, % DM	Ingredient CP, % DM
	20 PULP	45 PULP		
Wet distillers grains	20	20	108	27.9
Sugar beet pulp	20	45	80	9
Wheat straw	60	35	45	3.5
TDN	64.6	73.3	—	—
CP	9.8	11.2	—	—
DM	49.6	37.1	—	—
DM lb fed/cow/day	18.6	15.3	—	—
TDN lb fed/cow/day	12.0	11.2	—	—

¹Supplements contained limestone, trace minerals, vitamins, and formulated to provide 200 mg/cow daily monensin sodium.

Procedure

An experiment was conducted over two years using late gestation multiparous beef cows (n = 40; BW = 1199 ± 27 lb in year 1; n = 38; BW = 1315 ± 36 lb in year 2) to determine the effects of partially replacing wheat straw with sugar beet pulp in a limit fed diet. Cows were stratified by BW and body condition score (BCS) and allotted to pens (4 or 5 cows/pen) in a completely randomized design. Pens were randomly assigned to one of two treatments. Treatments were diets containing 20% wet distillers grains, 20% beet pulp, and 60% wheat straw (PULP 20) or 20% wet distillers grains, 45% beet pulp, and 35% wheat straw (PULP 45) on a DM basis (Table 1). Limestone was added (0.3 lb/day/cow) to both diets to ensure the Ca:P ratio was at least 1.2:1. In order to supply the cows with 11 Mcal/day of energy, based on the requirements for late gestation cows, 18.6 lb PULP 20 and 15.3 lb of PULP 45 were fed once daily/cow (DM basis). The experiment was terminated approximately six weeks before calving. Five days prior to obtaining final BW, cows were limit fed a common diet to minimize gut fill differences. Initial and ending BW, BW change, BCS, BCS change were determined. Both experiments were statistically analyzed using the mixed

procedures of SAS (SAS Institute, Inc., Cary, N.C.) with year as a random effect.

Results

Initial and ending BW, BCS, BW change, and BCS change were not different for the two treatments (Table 2; *P* > 0.84). These results agree with previous studies where ethanol byproducts and crop residues resulted in similar performance to hay when diets were formulated to contain the same energy density (2012 Nebraska Beef Cattle Report, pp. 13-14). Even though the diets were formulated to maintain BCS using the 1996 NRC, cows on both 20 PULP and 45 PULP gained approximately half a BCS over the average 76-day trials (Table 2). It is likely the energy requirements for confined cows are less than those for cow on range. It is also possible the passage rate is slower increasing digestibility for limit fed diets compared with *ad libitum* diets and, therefore, more energy is available to the animal. These results indicate ethanol and sugar byproducts can be combined with crop residue to maintain late gestation beef cows in limit fed, high energy diets. Additionally, sugar beet pulp can replace a portion of the crop residue, reducing the cost of the ration (Table 3) and improving

Table 2. Body weight and condition score of cows fed diets containing sugar beet pulp (year 1 and 2).

	20 PULP ¹	45 PULP	SE	P-value
Initial BW	1261	1255	61.5	0.85
Initial BCS ²	5.5	5.5	0.38	1.00
Final BW	1390	1388	81.4	0.94
Final BCS	6.1	6.1	0.48	0.87
Weight change	128	132	21.2	0.72
BCS change	0.54	0.57	0.12	0.84

¹20 PULP = diet containing 20% beet pulp, 45 PULP = diet containing 45% beet pulp.

²BCS on a scale of 1 to 9.

Table 3. Estimated costs of limit fed diets containing sugar beet pulp and *ad libitum* grass hay diets for gestating beef cows.

Commodity	DM ratio	Total lb Fed (DM basis)	Total lb Fed (as is basis)	Diet Cost (\$/day, as is) ²
WDGS:Pulp:straw ¹	20:20:60	18.6	38.7	1.25
WDGS:Pulp:straw	20:45:35	15.3	43.4	1.08
Hay	100	20.2	23.2	1.74

¹WDGS = wet distillers grains

²As is basis prices for WDGS delivered \$100/ton, wheat straw \$80/ton ground and delivered, meadow hay \$150 ground and delivered. Producers need to adjust prices to their location and current markets.

the handling characteristics of the diet. Although not a treatment in the trial, hay is included for comparison in Table 3. Good quality meadow hay would be lower in energy than the experimental diets and would need to be fed *ad libitum* to meet the cow's energy needs. When calculating the cost of the ration, producers need to factor in transportation, processing, and handling costs, as well as shrink for wet byproducts.

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