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Wheat Straw, Distillers Grains, and Beet Pulp for Late Gestation Beef Cows

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Procedure

Experiment 1

Three months prior to the initiation of the experiment, WDGS and ground wheat straw were mixed in a 30:70 ratio (DM) and water was added to reduce the mixture DM under 50% to aid packing and storage. The mixture was stored in a commercial agricultural bag.

Late gestation multiparous cows (n = 40) were stratified by weight and BCS and assigned randomly to one of eight confinement pens (five cows/pen). Pens were assigned randomly to one of two treatments. The two dietary treatments included either ground alfalfa hay (HAY), or a 30:70 WDGS:straw (WDGS) blend (DM). Diets were formulated to provide 11 Mcal/day to meet the energy needs of the cows. All cows were limit fed rather than allowed *ad libitum* access. Cows received 20.0 lb DM of HAY or 18.3 lb DM WDGS daily and fed for 77 days. Cows on the WDGS treatment also received 0.3 lb/day limestone to increase the Ca:P ratio to 1.2:1. Cows were limit fed alfalfa hay at 2% BW for five days prior to the initiation of the experiment and prior to collecting end BW and BCS to minimize gut fill effects. The experiment was terminated two weeks before calving. Initial and ending BW, BW

change, BCS, BCS change, and calf birth weight were determined.

Experiment 2

Fifty-seven late gestation multiparous cows were stratified by weight and BCS and assigned randomly to one of 12 confinement pens (5 cows/pen in three replications, and 4 cows/pen in the one replication). Pens were assigned randomly to treatments. The three dietary treatments (DM) were: 1) ground alfalfa hay (HAY), 2) 30:70 WDGS:wheat straw (WDGS), and a 20:20:60 WDGS:beet pulp:wheat straw diet (PULP). All diets were mixed and fed fresh daily for 84 days. Diets were limit fed to supply 11 Mcal/day. Cows on HAY were fed 17.2 lb DM/day, cows fed WDGS received 18.7 lb DM/day and cows fed PULP were fed 18.6 lb DM/day. The cows fed either WDGS or PULP diets were supplemented with 0.3 lb/day limestone to increase the Ca:P ratio to 1.2:1. Limit feeding and data collection was the same as Experiment 1. The experiment was terminated 4 weeks before calving. Initial and ending BW, BW change, BCS, BCS change, and calf birth weight were determined.

Ingredient samples were composited weekly and analyzed by a commercial laboratory in both experiments (Table 1).

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Summary

The feeding value of a mixture of 30:70 wet distillers grains:wheat straw or 20:20:60 wet distillers grains:beet pulp:wheat straw (DM) for late gestation beef cows was estimated. In Experiment 1, cows limit fed distillers grains and wheat straw gained as much weight and body condition as cows limit fed alfalfa hay. In Experiment 2, cows fed wet distillers grains and wheat straw or wet distillers grains, beet pulp, and wheat straw gained more weight and improved body condition compared with cows fed alfalfa hay. The results of these experiments indicate cows in late gestation will maintain body condition when limit fed by-products and crop residues to meet their energy requirements.

Introduction

In western Nebraska cows may be fed hay three to six months out of the year until green grass becomes available. Hay is often expensive and during years with drought, hail, insect, or fire damage can be in short supply. Alternative feeds can be economically important to the region. Wheat straw is typically abundant in western Nebraska, but digestible energy and palatability are low. Wet distillers grains (WDGS) and beet pulp, by-products of the ethanol and sugar industries, respectively, are highly digestible, nutrient dense, and palatable. Therefore, the objective of this study was to determine if late gestation cows could maintain body condition when limit fed by-products and crop residue.

Table 1. Nutrient composition of the diets (Experiment 1 and 2)¹.

Item	Exp. 1		Exp. 2		
	HAY	WDGS	HAY	WDGS	PULP
DMI, lb/day	20	18.3	17	18.7	18.6
CP, % DM	18.7	11.5	16.7	11.7	10.4
TDN, % DM	57.0	60.0	57.0	60.0	60.0
ADE, % DM	39.2	40.9	38.9	37.3	37.0

¹HAY = alfalfa hay, WDGS = 30:70 WDGS:wheat straw, PULP = 20:20:60 WDGS:beet pulp:wheat straw.

Results

Experiment 1

Initial and final BW, initial and final BCS, BCS change, and calf birth weight were not different ($P \geq 0.53$) among cows fed the two diets (Table 2). Cows receiving WDGS gained more ($P < 0.01$) weight (167 lb) compared with cows fed HAY (144 lb). These results are similar to previous data (2009 Nebraska Beef Cattle Report, pp. 11-12). In the previous study nonpregnant, nonlactating cows limit fed a 41:59 ratio of WDGS:ground cornstalks had greater final BW than cows limit fed that same ratio of condensed solubles and cornstalks or cows fed brome hay, stalks, and haylage *ad libitum*. These results suggest a 30:70 WDGS:ground wheat straw blend, mixed and stored for later use, can maintain BW and BCS of gestating beef cows when limit fed.

Experiment 2

In Experiment 2, the alfalfa was not as high in digestible energy as initially estimated, so although the diets were calculated to contain the same energy level, the alfalfa diet contained less energy than expected. Cows on the alfalfa treatment gained less (66 lb; $P < 0.0001$) compared with cows fed WDGS and PULP (147 and 162 lb,

Table 2. Animal performance in Experiment 1¹.

Item	HAY	WDGS	P value
Initial Weight, lb	1094	1089	0.86
Initial BCS	5.5	5.4	0.74
Final Weight, lb	1238	1256	0.53
Final BCS	5.8	5.8	1.00
Change in Weight, lb	+144	+167	0.01
Change in BCS	+0.34	+0.39	0.66
Calf Birth Weight, lb	81.8	81.6	0.96

¹HAY = alfalfa hay, WDGS= 30:70 WDGS:wheat straw, PULP = 20:20:60 WDGS:beet pulp:wheat straw.

Table 3. Animal performance in Experiment 2¹.

Item	HAY	WDGS	PULP	SE
Initial BW, lb	1094	1113	1083	33
Initial BCS	5.7	5.8	5.8	0.1
Final Weight, lb	1160 ^a	1259 ^b	1245 ^b	32
Final BCS	5.3 ^a	5.7 ^b	5.8 ^b	0.1
Change in BW, lb	+66 ^a	+147 ^b	+162 ^b	12
Change in BCS	-0.44 ^a	-0.08 ^b	+0.02 ^b	0.11

^{a,b}Means within rows differ $P < 0.003$.

¹HAY = alfalfa hay, WDGS= 30:70 WDGS:wheat straw, PULP = 20:20:60 WDGS:beet pulp:wheat straw.

respectively; Table 3). Body condition scores were not different at the initiation of the trial. Similarly, cows fed HAY had a lower ($P < 0.0001$) BCS of 5.3 while the cows receiving WDGS and PULP averaged 5.7 and 5.8, respectively. The two groups fed combinations of by-products and wheat straw mixed fresh daily maintained BCS while the cows receiving HAY lost 0.4 of a condition score. These results indicate cows in late gestation will maintain BW and BCS when limit fed WDGS and beet pulp mixed

with wheat straw to meet their energy requirements.

These two experiments suggest by-products and crop residues can be limit fed as an alternative to hay to maintain gestating beef cows when by-products and residues can be obtained more economically than hay.

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