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Type of Corn Bran and Corn Processing Method in Beef Finishing Diets

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Corn bran type has little effect on finishing steer performance in either dry-rolled or steam-flaked corn based finishing diets.

Summary

A finishing trial was conducted to evaluate the effects of drying corn bran on cattle performance in dry-rolled or steam-flaked corn diets. The inclusion of corn bran in dry-rolled or steam-flaked corn diets negatively affected feed conversion by 5.1% or 13.9%, respectively. Within both grain sources, drying corn bran had little effect on finishing steer performance. Feeding steam-flaked corn improved feed conversion by 17.0% compared with feeding dry-rolled corn without the inclusion of corn bran.

Introduction

When corn gluten feed is dried, the energy value is lowered (*1987 Nebraska Beef Report*, pp. 16 - 18). The exact cause of the lower energy value in dry corn gluten feed is not known, but may be due to some type of damage that occurs during the drying process. Corn gluten feed is comprised of two main components, corn bran and corn steep. Drying bran allows for incorporation of more corn steep when producing wet corn gluten feed and reduces variation in dry matter content of wet corn gluten feed. Previous work (*2000 Nebraska Beef Report*, pp. 61 - 62) has shown that the form of corn bran did not change the energy value in diets consisting of dry-rolled : high-moisture corn (60:40 ratio).

Feed efficiency tended to improve when wet corn gluten feed was added to feedlot diets containing corn processed more intensively than dry-rolling (*2001 Nebraska Beef Report*, pp. 59-63). The objective of this trial was to evaluate the effects of corn bran form in either dry-rolled or steam-flaked corn based diets on performance and carcass characteristics of finishing yearling steers.

Procedure

Three hundred forty crossbred yearling steers (780 lb) were stratified by weight and randomly assigned to one of 40 pens (10 steers/pen in replication one and eight steers/pen in replications two, three and four). Ten pens within replications were randomly assigned to one of 10 treatments. Treatments were assigned based on a 2 x 4 + 2 factorial design with factors of grain source and bran type. Grain sources were dry-rolled corn (DRC) or steam-flaked corn (SFC). Bran types were dry (90% DM) corn bran (DRY), wet (40% DM) corn bran (WET), dry corn bran rehydrated to 40% moisture (Rehy40), or dry corn bran rehydrated to 60% moisture (Rehy60). Corn bran was fed at 30% of the dietary dry matter, replacing either DRC or SFC. Dry and wet corn bran were produced from a wet milling plant located in Blair, Neb. (Cargill Inc.). Wet corn bran was stored in a silo bag. To produce Rehy60, similar moisture content as wet corn bran, the appropriate amount of water was added to dry corn bran prior to bagging. Rehydrated corn bran to 40% moisture was produced three times weekly with the addition of water to dry corn bran and then stored in a pile until used. The two control diets (NO BRAN) had no added bran. All diets were formulated to contain a minimum of 13.0% crude protein, 0.70% calcium, 0.45% phosphorus, 0.67% potassium, 28 g/t Rumensin, and 10 g/t Tylan (DM basis; Table 1). The same supplement was used in all diets at the same level, there-

Table 1. Finishing diet compositions (100% DM basis).

Ingredient Composition,%	NO BRAN	BRAN
Dry-rolled or steam-flaked corn	78	48
Bran	—	30
Corn steep	10	10
Alfalfa hay	3.5	3.5
Sorghum silage	3.5	3.5
Dry supplement	5	5
Nutrient Composition		
Crude Protein,%	13.00	13.66
DIP,%	7.66	9.41
UIP,%	5.34	4.25
Calcium,%	0.70	0.76
Phosphorus,%	0.51	0.44
Potassium,%	0.69	0.67

Table 2. Effects of grain source and bran type on animal performance and carcass characteristics.

	Treatments[a]										
	DRC					SFC					
	NO BRAN	DRY	WET	Rehy40	Rehy60	NO BRAN	DRY	WET	Rehy40	Reyh60	SEM
Days on feed	129	129	129	129	129	129	129	129	129	129	
Initial wt., lb	780	780	782	781	778	779	778	780	779	781	2
Final wt., lb[c]	1261^{d}	1266^{d}	1283de	1282de	1284de	1333^{f}	1283de	1299^{e}	1289de	1280de	16
DMI, lb/day	23.8^{de}	25.4^{fg}	25.6^{gh}	25.9^{gh}	26.7^{h}	23.4^{d}	24.6^{ef}	24.7^{ef}	24.4^{def}	24.2^{de}	0.6
ADG, lb	3.72^{d}	3.76^{de}	3.89^{def}	3.89^{def}	3.92^{def}	4.30^{g}	3.92^{def}	4.01^{f}	3.96^{ef}	3.87^{def}	0.12
Feed:gain	6.39^{de}	6.76^{f}	6.61^{ef}	6.69^{f}	6.80^{f}	5.46^{g}	6.28^{dh}	6.17^{h}	6.17^{h}	6.25^{dh}	0.12
Hot carcass wt, lb	795^{d}	797^{d}	808de	808de	809de	840^{f}	809de	818^{e}	813de	807de	10
Marbling score[i]	514	488	489	490	487	512	499	524	499	502	16
Choice or above,%	58.0	51.7	49.2	51.4	43.8	62.5	54.1	60.7	52.9	46.3	8.6
Ribeye area, in^2	14.9	15.3	15.0	15.6	15.3	14.5	15.4	15.6	15.6	15.3	0.4
Fat thickness, in	0.42	0.42	0.41	0.41	0.44	0.43	0.45	0.45	0.46	0.45	0.04
Yield grade	2.2	2.2	2.1	2.1	2.3	2.3	2.4	2.1	2.2	2.3	0.2

[a]DRC = dry-rolled corn, SFC = steam-flaked corn, NO BRAN = no corn bran, DRY = dry corn bran (90% DM), WET = wet corn bran (40% DM), Rehy40 = Rehydrated to 40% moisture corn bran, and Rehy60 = Rehydrated to 60% moisture corn bran.
[b]GR = grain source and BR = bran type.
[c]Final weight calculated as hot carcass weight divided by 0.63.
[d,e,f,g,h]Means within a row bearing unlike superscripts differ (P < 0.10).
[i]Marbling score: 400 = Slight 0, 450 = Slight 50, 500 = Small 0, etc.

fore, diets containing corn bran had higher percentage levels of CP and DIP due to the higher levels in corn bran compared to either dry-rolled or steam-flaked corn which it replaced. All diets contained corn steep liquor with distillers solubles at 10% of the diet DM. Sorghum silage was included in all diets, including step-up diets, at 3.5% (DM basis). Alfalfa hay was included at 3.5% (DM basis) in the final finishing diet. Step-up diets contained 41.5%, 31.5%, 21.5%, and 11.5% alfalfa hay (DM basis) replacing the corn in each treatment diet.

Initial weights were determined by the average of two consecutive early morning weights prior to feeding at the initiation of the trial. Steers were fed once daily and allowed ad libitum access to feed and water. Steers were implanted with Synovex® Plus™ on day 38. Cattle were fed for 129 days and harvested at a commercial packing plant where carcass data were collected. Hot carcass weight was collected the day of harvest and fat, ribeye area, marbling score, and yield grade following a 24-hour chill.

Results

Dry matter intakes (Table 2) were lower (P < 0.01) for steers fed SFC compared to steers fed DRC corn diets. Steers fed NO BRAN had lower (P < 0.01) DMI than steers fed DRY, WET, Rehy40, or Rehy60. Within DRC diets, ADG was similar among treatments. Daily gain in SFC diets was increased (P < 0.10) for the steers fed NO BRAN compared to the those fed DRY, WET, Rehy40, or Reyh60. In SFC diets, there was no difference between bran types for ADG. Daily gain was higher (P < 0.10) for steers fed SFC without bran compared to DRC without bran.

Feed conversion was better (P < 0.10) in DRC diets for those cattle fed NO BRAN compared to the those fed DRY, Rehy40, or Rehy60, however, cattle on the NO BRAN treatment had similar conversion to cattle fed WET. In SFC diets, steers fed NO BRAN had improved (P < 0.10) feed conversion compared to those fed DRY, WET, Rehy40, or Rehy60. Within each grain source, no significant differences in feed conversion were detected among bran types. When the two control diets are compared, steam flaking improved efficiency by 17.0%. In DRC and SFC diets, feeding corn bran decreased feed efficiency by 5.1% and by 13.9%, respectively.

Hot carcass weights were similar among treatments in DRC diets. In SFC diets, cattle fed NO BRAN had heavier carcasses compared to steers fed DRY, WET, Rehy40, or Rehy60. Cattle fed SFC diets tended to be fatter than cattle fed DRC diets, which led to higher marbling scores for steers fed SFC diets. There were no significant differences in percentage of carcasses grading Choice or higher, ribeye area, or yield grade among treatments.

This experiment shows drying corn bran has minimal effect on the nutritional value in either DRC or SFC diets. Feed efficiency was 2% higher for wet bran diets compared to dry. At 30% of the diet, this would be a 7% lower energy value for dry bran. It is important to note, however, that these differences were not statistically detected which may be due to the relatively small proportion (30% DM) within the diet. The wet and dry bran were statistically equal. Feeding SFC with no corn bran improved ADG and feed conversion compared to feeding DRC with no corn bran. Corn bran had lower apparent energy values than either SFC or DRC.

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