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C. N. Macken
University of Nebraska-Lincoln

Galen E. Erickson
University of Nebraska-Lincoln, gerickson4@unl.edu

Terry J. Klopfenstein
University of Nebraska-Lincoln, tklopfenstein1@unl.edu

C. T. Milton
University of Nebraska-Lincoln

Rick Stock
University of Nebraska-Lincoln, rstock3@Unl.edu

Effects of dry, wet, and rehydrated corn bran and corn processing method in beef finishing diets[1]

C. N. Macken*, G. E. Erickson*[2], T. J. Klopfenstein*, C. T. Milton*[3], and R. A. Stock†

*Department of Animal Science, University of Nebraska, Lincoln 68583-0908; and †Cargill Inc., Blair, NE 68008.

ABSTRACT: Two finishing trials were conducted to determine the effects of adding different types of corn bran, a component of corn gluten feed, on cattle performance. In Trial 1, 60 English crossbred yearling steers (283 ± 6.7 kg) were used in a completely randomized design with four dietary treatments. Treatments were diets with no corn bran, dry corn bran (86% DM), wet corn bran (37% DM), and rehydrated dry bran (37% DM). Bran was fed at 40% of dietary DM. All finishing diets had (DM basis) 9% corn steep liquor with distillers solubles, 7.5% alfalfa hay, 3% tallow, and 5% supplement. Gain efficiency and ADG were greater ($P < 0.01$) for cattle fed no corn bran compared with all treatments containing corn bran; however, no differences were detected across corn bran types. In Trial 2, 340 English crossbred yearling steers (354 ± 0.6 kg) were used in a randomized block design with treatments assigned based on a 2 × 4 + 2 factorial arrangement (four pens per treatment). One factor was the corn processing method used (dry-rolled corn, DRC; or steam-flaked corn, SFC). The other factor was corn bran type: dry (90% DM), wet (40% DM), or dry bran rehydrated to 40 or 60% DM. Bran was fed at 30% of dietary DM, replacing either DRC or SFC. Two control diets (DRC and SFC) were fed with no added bran. All finishing diets contained (DM basis) 10% corn steep liquor with distiller's solubles, 3.5% alfalfa hay, 3.5% sorghum silage, and 5% supplement. Corn bran type did not affect DMI (P = 0.61), ADG (P = 0.53), or G:F (P = 0.10). Dry matter intake was greater ($P < 0.01$) by steers fed bran compared with those fed no bran, and was greater by steers fed DRC than by steers fed SFC ($P < 0.01$). Interactions occurred ($P < 0.01$) between grain source and bran inclusion for ADG and G:F. The ADG by steers fed the SFC diet without bran was greater ($P < 0.01$) than by steers fed SFC diets with bran, whereas the ADG by steers fed DRC diets with or without bran was similar. Daily gain was 15.2% greater ($P < 0.01$) by steers fed SFC without bran than by steers fed DRC without bran. Gain efficiency was 16.9% greater ($P < 0.01$) for steers fed SFC without bran compared with steers fed DRC without bran. In DRC and SFC diets, feeding bran decreased ($P < 0.01$) G:F by 5.2 and 13.8%, respectively. The moisture content of corn bran had no effect on finishing steer performance, and drying corn bran did not affect its energy value in finishing cattle diets.

Key Words: Corn Bran, Corn Gluten Feed, Corn Processing, Finishing Cattle

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Introduction

Corn bran and steep (steep liquor plus distiller's solubles) are combined in various proportions to produce corn gluten feed (**CGF**; Stock et al., 2000). The steep:bran ratio varies considerably from plant to plant (Stock et al., 2000). Before the addition of steep to corn bran, corn bran may be dried to 85 to 90% DM. The main purpose of drying corn bran is to control moisture variation and to facilitate the incorporation of more steep in the wet CGF product; however, it is unknown whether such drying lowers the energy content of corn bran.

Corn gluten feed can be fed to finishing cattle in a wet form (40 or 60% DM) or dry form (90% DM). Drying CGF decreases its energy value (Green et al., 1987; NCR 88, 1989; Ham et al., 1995) compared with the wet form, but the cause of this decrease in energy value is unknown.

No research is available on the potential energy value reduction that might result from drying corn bran, as has been observed with drying corn gluten feed. There-

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[2]Correspondence: C220 Animal Science (phone: 402-472-6450; fax: 402-472-6362; e-mail: gerickson4@unl.edu).

[3]Current address: Midwest PMS, 4615 Deva Dr., Grand Island, NE 68801.

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Table 1. Formulated finishing diet compositions for Trial 1 (DM basis)

Item	CON[a]	BR[a]
Ingredient, %		
Dry-rolled corn	45.3	21.3
High-moisture corn	30.2	14.2
Corn bran	—	40.0
Corn steep	9.0	9.0
Alfalfa hay	7.5	7.5
Tallow	3.0	3.0
Dry supplement	5.0	5.0
Fine ground corn	2.14	2.68
Limestone	1.51	1.40
Urea	0.52	0.19
Sodium chloride	0.30	0.30
Ammonium chloride	0.25	0.25
Potassium chloride	0.10	—
Tallow	0.09	0.09
Trace mineral premix[b]	0.05	0.05
Rumensin-80 premix[c]	0.02	0.02
Tylan-40 premix[d]	0.01	0.01
Vitamin premix[e]	0.01	0.01
Chemical composition		
DM	77.6	54.5 to 78.6[f]
CP	13.6	13.6
Ca	0.71	0.67
P	0.43	0.36

[a]CON = no corn bran; BR = dry corn bran (86% DM), wet corn bran (37% DM), and dry corn bran rehydrated to similar moisture as wet bran.

[b]Contained (g/kg of premix): 130 Ca; 10 Co; 15 Cu; 2 I; 100 Fe; 80 Mn; and 120 Zn.

[c]Formulated to contain monensin at 30 mg/kg of dietary DM (176 g/kg of premix).

[d]Formulated to contain tylosin at 11 mg/kg of dietary DM (88 g/kg of premix).

[e]Contained 29.9 million IU of vitamin A, 6.0 million IU of vitamin D, and 7,000 IU of vitamin E/kg of premix.

[f]Dry bran diets were 78.6% DM, and wet bran and rehydrated bran were 54.4 and 54.8% DM, respectively.

fore, the objective of these studies was to determine the effects of drying corn bran on performance and carcass characteristics of finishing cattle in diets based on different corn processing methods.

Materials and Methods

Procedures for these studies were reviewed and approved by the University of Nebraska Institutional Animal Care Program.

Trial 1

Sixty crossbred (English breeds) yearling steers (283 ± 6.7 kg) were used in a completely randomized design to compare dry, wet, and rehydrated corn bran in finishing diets. Steers were individually fed using Calan electronic gates (American Calan, Northwood, NH). Treatments were assigned randomly to individual steers with four dietary treatments consisting of a negative control (**CON**), dry corn bran (**DRY**), wet corn bran (**WET**), and rehydrated corn bran (**REHY**). Corn bran was fed at 40% of dietary DM, replacing equal proportions of high-moisture and dry-rolled corn (Table 1). The concentration of corn bran was chosen to ensure that any energy differences would be observed with performance. Steep liquor plus distiller's solubles were fed at 9% of dietary DM as a separate ingredient. Dry and wet bran were produced from a wet milling plant (Cargill Inc., Blair, NE.). The DM contents of the corn bran were 86 and 37% for the dry and wet corn bran, respectively. Rehydrated corn bran was produced by adding water to dry corn bran before storage based on weight and measured DM of corn bran until the DM content of rehydrated bran was similar to the wet corn bran (37% DM). Rehydrated bran was mixed using truck mixers (Rotomix, J-Star Industries, Inc., Dodge City, KS) with weighing capability. All forms of corn bran were stored in silo bags (Ag-Bag Int., Warrenton, OR) until the time of feeding. Steers were fed their respective finishing diet at approximately 1.9% of BW, and adapted to full-feed by increasing the finishing diet 0.45 $kg \cdot steer^{-1} \cdot d^{-1}$ (DM basis) until ad libitum intakes were achieved at approximately d 15. Feed ingredients were sampled on a weekly basis to correct DM in the diets, with orts collected as needed (twice weekly on average). Diets were formulated (DM basis) to contain a minimum of 13.0% CP, 8.2% degradable intake protein, 0.7% Ca, 0.3% P, 0.6% K, monensin at 30 mg/kg of diet DM (Elanco Animal Health, Indianapolis, IN), and tylosin at 11 mg/kg of diet DM (Elanco Animal Health). Steers were implanted at trial initiation with Synovex Plus (28 mg of estradiol benzoate + 200 mg of trenbolone acetate; Fort Dodge Animal Health, Overland Park, KS) and fed for 146 d. Steers were fed once daily between 0700 and 1100 and allowed ad libitum access to feed (once adaptation was achieved) and water.

Initial BW were obtained on three consecutive days after being limit fed at 2% (DM basis) of BW for 5 d to minimize differences in ruminal fill. Final BW was calculated from hot carcass weight divided by 0.63 (standardized dressing percent). Hot carcass weights were collected on all steers at the time of slaughter, whereas other carcass traits were collected following a 24-h chill. Dietary and corn bran NE_g values were calculated, based on performance data, using the iterative procedure described by Owens et al. (2002).

Data were analyzed as a completely randomized design using the Mixed procedure of SAS (SAS Inst., Inc., Cary, NC), with only treatment in the model. Least squares means were separated using the LSD method when a significant ($P < 0.05$) F-test was detected.

Trial 2

Three hundred forty crossbred (English breeds) yearling steers (355 ± 0.6 kg) were stratified by BW and assigned randomly to one of 10 open-lot pens within each block (four blocks; 10 steers per pen in Block 1 and eight steers per pen in Blocks 2, 3, and 4). Pens were assigned randomly to one of 10 dietary treatments (four pens per treatment). Treatments were assigned based on a 2 × 4 + 2 factorial design. Factors included

Table 2. Formulated finishing diet compositions for Trial 2 (DM basis)

Item	NOBR[a]	BR[a]
Ingredient, %		
Dry-rolled or steam-flaked corn	78.0	48.0
Corn bran	—	30.0
Corn steep	10.0	10.0
Alfalfa hay	3.5	3.5
Sorghum silage	3.5	3.5
Dry supplement	5.0	5.0
Fine ground corn	2.13	2.13
Limestone	1.62	1.62
Urea	0.61	0.61
Sodium chloride	0.30	0.30
Ammonium chloride	0.25	0.25
Trace mineral premix[b]	0.05	0.05
Rumensin-80 premix[c]	0.02	0.02
Tylan-40 premix[d]	0.01	0.01
Vitamin premix[e]	0.01	0.01
Chemical composition		
DM	76.4 to 77.6	56.0 to 77.5[f]
CP	13.9 to 14.2	14.5 to 14.9
Ca	0.70	0.70
P	0.46	0.40

[a]NOBR = no corn bran; BR = bran fed as either dry, wet, or rehydrated corn bran to 40 or 60% DM.
[b]Contained (g/kg of premix): 130 Ca; 10 Co; 15 Cu; 2 I; 100 Fe; 80 Mn; and 120 Zn.
[c]Formulated to contain monensin at 31 mg/kg of dietary DM.
[d]Formulated to contain tylosin at 11 mg/kg of dietary DM.
[e]Contained 29.9 million IU of vitamin A, 6.0 million IU of vitamin D, and 7,000 IU of vitamin E/kg of premix.
[f]DM for diets varied based on bran DM, with 77.1, 56.2, 58.7, and 69.8 for diets containing dry, wet, rehydrated to 40%DM, and rehydrated to 60% DM, respectively.

corn processing method and corn bran type. Corn processing methods were dry-rolled corn (**DRC**) or steam-flaked corn (**SFC**). Corn bran types were DRY, WET, corn bran rehydrated to 40% moisture (**REHY40**), or corn bran rehydrated to 60% moisture (**REHY60**). Corn bran was fed at 30% of the dietary DM (Table 2) and replaced either DRC or SFC. Two additional diets were fed without corn bran (**NOBR**). The DRY and WET were produced from a wet milling plant (Cargill Inc., Blair, NE). The REHY60 was produced by adding water to DRY before storage until the DM content was similar to the wet corn bran (40% DM). The WET and REHY60 were stored in silo bags. The REHY40 was produced three times weekly with the addition of water to DRY and then stored in a commodity shed until used. This procedure was done to simulate the amount of moisture that would be added when steep is added to bran to make a 60% DM wet CGF. Rehydrated bran (REHY40 and REHY60) was mixed using truck mixers (Rotomix, J-Star Industries, Inc.) with weighing capability. Steam-flaked corn was processed to a flake density of 0.34 kg/L (26 lb/bushel) at a commercial feedlot (Mead Cattle Co., Mead, NE) and delivered weekly. All diets contained (DM basis) 3.5% alfalfa, 3.5% sorghum silage, and 10% corn steep. Steers were adapted to finishing diets in 21 d using DRC or SFC (treatment dependent) to replace alfalfa hay (41.5% alfalfa hay for 3 d, 31.5% for 4 d, 21.5% for 7 d, and 11.5% for 7 d, DM basis). Feed ingredients were sampled on a weekly basis to correct DM in the diets. Diets were formulated to (DM basis) contain a minimum of 13.5% CP, 7.9% degradable intake protein, 0.70% Ca, 0.35% P, 0.67% K, monensin at 31 mg/kg of diet DM, and tylosin fed at 11 mg/kg of diet DM. Steers were implanted with Synovex Plus on d 38 and fed for a total of 129 d. Steers were fed once daily between 1000 and 1100 and allowed ad libitum access to feed and water.

Initial BW were obtained on two consecutive days after being limit fed at 2% (DM basis) of BW for 5 d to minimize ruminal fill differences. As in Trial 1, final BW was calculated from hot carcass weight divided by 0.63. Daily gain, DMI, and G:F were calculated on a pen basis. Hot carcass weights were collected on all steers at the time of slaughter, whereas other carcass traits were collected following a 24-h chill. As in Trial 1, dietary and corn bran NE_g value were calculated, based on performance, using the iterative procedure described by Owens et al. (2002).

Data were analyzed as a randomized block design using the Mixed procedure of SAS, where block was considered random and pen was the experimental unit. The interaction between corn bran type and corn processing was evaluated. If no significant interaction was observed, the main effect of corn bran type was evaluated. If no significant differences ($P < 0.05$) for corn bran type were observed, the average of corn bran type, corn processing method, and their interactions were analyzed as a factorial. When significant interactions were observed between corn bran and processing method, simple effects of corn bran feeding within corn processing method are presented.

Results

Trial 1

Dry matter intakes (Table 3) tended to be higher ($P < 0.07$) for steers fed DRY compared with CON, WET, and REHY, whereas cattle fed CON, WET, and REHY had similar intakes. Daily gains were greater ($P < 0.01$) for cattle fed CON compared with those fed DRY, WET, and REHY, which resulted in greater ($P < 0.05$) carcass weights and final calculated weights for the CON cattle. Daily gains and final weights were similar among cattle fed DRY, WET, and REHY. Gain efficiency for cattle fed CON was improved ($P < 0.01$) by 18.1% compared with those cattle fed diets containing corn bran. No difference was detected for G:F among corn bran types (DRY, WET, and REHY). Fat thickness ($P = 0.51$), marbling score ($P = 0.12$), and USDA yield grade ($P = 1.00$) were not different among treatments.

Trial 2

No interaction was detected for cattle performance between corn processing and bran type, therefore main

Table 3. Effects of corn bran type on cattle performance and carcass characteristics for individually fed steers (Trial 1)

	Treatment[a]					
Item	CON	DRY	WET	REHY	SEM	*P*-value
No. of observations	15	15	15	15	—	—
Days on feed	146	146	146	146	—	—
Initial BW, kg	286	283	285	284	7	0.99
Final BW, kg[b]	543[e]	509[f]	503[f]	508[f]	10	0.02
DMI, kg/d	9.54	10.34	9.48	9.51	0.26	0.07
ADG, kg	1.76[e]	1.55[f]	1.49[f]	1.53[f]	0.05	<0.01
G:F	0.185[e]	0.151[f]	0.158[f]	0.161[f]	0.005	<0.01
NE_m, Mcal/kg[c]	2.33	1.96	2.05	2.09	—	—
NE_g, Mcal/kg[c]	1.42	1.13	1.20	1.23	—	—
Hot carcass wt, kg	342	321	317	320	6	0.02
Fat thickness, cm	0.86	0.82	0.70	0.71	0.09	0.51
Marbling score[d]	483	486	455	451	12	0.12
Yield grade	1.93	1.93	1.93	1.93	0.19	1.00

[a]CON = no corn bran; DRY = dry corn bran (86% DM); WET = wet corn bran (37% DM); and REHY = dry corn bran rehydrated to similar moisture as wet bran.
[b]Final weight calculated as hot carcass weight divided by 0.63.
[c]Dietary NE concentrations calculated from Owens et al. (2002) using NRC (1996) values; the corn mixture contained 2.18 Mcal/kg of NE_m and 1.50 Mcal/kg of NE_g.
[d]Marbling score: 400 = Slight 0; 450 = Slight 50; 500 = Small 0; and so on.
[e,f]Within a row, means without a common superscript letter differ, $P < 0.05$.

effects of bran type are presented in Table 4. Similar to the results of Trial 1, type of bran had no effect on performance. Cattle fed dry bran had similar DMI to the three wet bran types (WET or REHY bran types). Gain efficiency also did not ($P = 0.10$) differ among the bran types. These data suggest that drying bran compared with feeding the wet bran direct from the plant has no effect on energy content of bran. The REHY40 and REHY60 were equal to dry bran and wet bran, suggesting that diet DM percent did not affect performance, despite dietary DM ranging from 56.0 to 77.5% (Table 1).

Because no differences were observed for corn bran type, data were pooled for cattle fed different bran types

Table 4. Main effects of corn bran type on cattle performance and carcass characteristics (Trial 2)

	Treatments[a]					*P*-value[b]		
Item	DRY	WET	REHY40	REHY60	SEM	C	BT	INTR
No. of pens	8	8	8	8	—	—	—	—
Days on feed	129	129	129	129	—	—	—	—
Initial BW, kg	354	355	354	354	1	0.18	0.17	0.07
Final BW, kg[c]	579	587	585	583	6	0.24	0.45	0.39
DMI, kg/d	11.37	11.45	11.44	11.56	0.22	<0.01	0.61	0.10
ADG, kg	1.74	1.80	1.78	1.77	0.04	0.19	0.53	0.29
G:F	0.154	0.157	0.156	0.154	0.002	<0.01	0.10	0.69
NE_m, Mcal/kg[d]	2.16	2.19	2.18	2.15	0.02	<0.01	0.07	0.56
NE_g, Mcal/kg[d]	1.28	1.31	1.30	1.28	0.02	<0.01	0.10	0.61
Carcass wt, kg	365	370	368	367	4	0.24	0.45	0.39
Fat thickness, cm	1.10	1.09	1.10	1.14	0.07	0.10	0.50	0.45
Marbling score[e]	493	506	495	494	12	0.04	0.30	0.39
LM area, cm^2	99.1	98.7	100.7	98.6	1.6	0.32	0.95	0.23

[a]DRY = dry corn bran (90% DM); WET = wet corn bran (40% DM); REHY40 = rehydrated to 40% moisture corn bran (60% DM); and REHY60 = rehydrated to 60% moisture corn bran (40% DM).
[b]C = main effect of corn processing method; BT = overall *F*-test statistic for main effect of corn bran type, and INTR = corn processing method and corn bran type interaction.
[c]Final weight calculated as hot carcass weight divided by 0.63.
[d]Dietary NE concentrations calculated from Owens et al. (2002) using NRC (1996) values.
[e]Marbling score: 400 = Slight 0; 450 = Slight 50; 500 = Small 0; and so on.

Table 5. Effects of corn processing method and corn bran inclusion on cattle performance and carcass characteristics (Trial 2)

	Treatment[a]						
	DRC		SFC		P-value[b]		
Item	NOBR	BR	NOBR	BR	C	B	INTR
No. of pens	4	16	4	16	—	—	—
Days on feed	129	129	129	129	—	—	—
Initial BW, kg	355	355	354	354	0.10	0.58	0.73
Final BW, kg[c]	573[f]	581[f]	606[g]	585[f]	<0.01	0.14	<0.01
DMI, kg/d	10.81	11.78	10.65	11.13	<0.01	<0.01	0.13
ADG, kg	1.69[f]	1.75[f]	1.95[g]	1.79[f]	0.01	0.12	<0.01
G:F	0.157[f]	0.149[g]	0.183[h]	0.161[f]	<0.01	<0.01	<0.01
NE_m, Mcal/kg[d]	2.20[f]	2.10[g]	2.49[h]	2.24[f]	<0.01	<0.01	<0.01
NE_g, Mcal/kg[d]	1.31[f]	1.24[g]	1.54[h]	1.35[f]	<0.01	<0.01	<0.01
Carcass wt, kg	361[f]	366[f]	382[g]	369[f]	<0.01	0.14	<0.01
Fat thickness, cm	1.07	1.07	1.11	1.15	0.10	0.72	0.74
Marbling score[e]	514	488	512	506	0.06	0.09	0.30
LM area, cm^2	96.0	98.7	98.6	99.8	0.16	0.11	0.53

[a]DRC = dry-rolled corn; SFC = steam-flaked corn; NOBR = no corn bran fed; and BR = corn bran fed as dry, wet, or rehydrated corn bran.
[b]C = corn processing method; B = with or without corn bran; and INTR = corn processing method and corn bran interaction.
[c]Final weight calculated as hot carcass weight divided by 0.63.
[d]Dietary NE concentrations calculated from Owens et al. (2002) using NRC (1996) values.
[e]Marbling score: 400 = Slight 0; 450 = Slight 50; 500 = Small 0; 550 = Small 50; and so on.
[f,g,h]Within a row, means without a common superscript letter differ, $P < 0.01$.

to test the interaction between corn processing method and corn bran inclusion. An interaction ($P < 0.05$) was observed between corn processing and bran inclusion for ADG, G:F, and final BW; therefore, data were analyzed to test effects of corn processing method with or without corn bran. Dry matter intakes (Table 5) were lower ($P < 0.01$) by steers fed SFC- vs. DRC-based diets. Steers fed no corn bran had lower ($P < 0.01$) DMI than steers fed corn bran. An interaction was observed ($P < 0.01$) for ADG between corn processing method and corn bran inclusion. Within DRC diets, ADG did not differ ($P = 0.18$) between cattle fed bran vs. those not fed bran. In SFC diets, ADG was greater ($P < 0.01$) by the steers fed no corn bran than by those fed corn bran. In diets with no corn bran, cattle fed SFC had 15.2% greater ($P < 0.01$) ADG than those fed DRC-based diets. No difference was detected ($P = 0.19$) for ADG when cattle were fed SFC or DRC in diets containing corn bran.

An interaction ($P < 0.01$; Table 5) for corn processing method and corn bran inclusion was observed for G:F. Gain efficiency was greater ($P < 0.01$) for steers fed no corn bran than for those fed corn bran in DRC- (5.4%) or SFC-based (13.7%) diets. Gain efficiency was greater ($P < 0.01$) for cattle fed SFC than for steers fed DRC with (8.1%) or without (16.9%) corn bran inclusion.

Hot carcass weights (Table 5) were similar among treatments in DRC diets. In SFC diets, cattle fed no corn bran had heavier ($P < 0.01$) carcasses than steers fed corn bran. Cattle fed SFC diets tended ($P = 0.10$) to be fatter than cattle fed DRC diets. Steers fed corn bran tended ($P = 0.09$) to have lower marbling scores than those fed no corn bran, as did cattle fed DRC ($P = 0.06$) compared with cattle fed SFC. There were no significant differences detected for LM area among treatments.

Discussion

Corn bran type (dry or wet) seems to have no effect on apparent feeding value in corn-based finishing diets. In addition, drying corn bran and adding partial rehydration did not affect the energy value of corn bran. Overall, drying corn bran separately from steep has a minimal effect on energy value and does not explain the differences observed in energy value between wet and dry CGF (Green et al., 1987; NCR 88, 1989; Ham et al., 1995).

Feeding corn bran in finishing diets by replacing corn has been shown to be beneficial in improving cattle performance. Krehbiel et al. (1995) showed that feeding wet CGF minimizes the challenges of acidosis. Corn bran is a component of wet CGF and inclusion in the diet should result in similar effects in controlling acidosis. Scott et al. (1997) fed diets that contained 0, 15, or 30% (diet DM) corn bran that replaced DRC. Cattle fed 15% corn bran had increased DMI, ADG, and G:F compared with cattle fed no corn bran. When cattle were fed 30% corn bran, DMI was increased compared with cattle fed no corn bran, with ADG and G:F being similar to cattle fed no bran. Performance at the 15% concentration of corn bran suggested that acidosis was

being controlled, and at the 30% concentration, acidosis was being controlled with the first 15%, but the second 15% (i.e., from 15 to 30% corn bran) decreased performance. Presumably, the next increment of corn bran was depressing performance by replacement of a higher energy feed ingredient (corn) with a lower energy feed ingredient (corn bran).

Comparing our data to those of Scott et al. (1997), both studies observed an increase in DMI when cattle were fed corn bran. When corn bran was fed at or above 30% of dietary DM, gain was similar between cattle fed diets with or without corn bran in DRC-based diets. However, in contrast to the results of Scott et al. (1997), G:F decreased when corn bran was included in the diet at or above 30% of diet DM. One difference between the studies was that our studies had 9 or 10% steep (DM basis) added, whereas Scott et al. (1997) did not use steep. Erickson and Klopfenstein (2001) observed results similar to those from this study for G:F, as 30% inclusion of corn bran decreased G:F compared with cattle fed no corn bran. Calculating NE_g (Owens et al., 2002) in our studies, corn bran in Trial 1 was 61% of the value of the 60:40 ratio of high-moisture and dry-rolled corn mixture. In Trial 2, corn bran was 82 and 60% the value of DRC and SFC, respectively.

Processing corn to a greater extent than dry rolling has been shown to improve cattle performance (Owens et al., 1997). A recent review by Zinn et al. (2002) showed that feeding SFC to cattle improves NE_g by 18.8% compared with feeding whole, ground, or dry-rolled corn. Increases of 5.4 and 12.2% were observed for ADG and G:F, respectively, and a 6.1% decrease in DMI for cattle fed SFC compared with those fed whole, ground, or dry-rolled corn was also observed. In our data, when corn bran was not fed (i.e., comparing DRC and SFC control diets), the observed DMI change was smaller (–1.4%) and the increases in ADG (15.2%) and G:F (16.9%) were greater than what was observed in the review by Zinn et al. (2002). Calculating NE_g (Owens et al., 2002), SFC was 18.7% greater than DRC, similar (18.8%) to results reported by Zinn et al. (2002).

Implications

Drying corn bran before the inclusion of steep liquor plus solubles has a limited effect on apparent energy value; therefore, drying corn bran does not explain the loss in energy value of drying corn gluten feed. Replacing corn with corn bran at concentrations at or higher than 30% of dietary dry matter decreased gain efficiency in finishing cattle. Feeding steam-flaked corn-based diets improved feed efficiency and daily gain, while decreasing intake compared with feeding dry-rolled corn-based diets to finishing cattle.

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