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# Corn Steep and Bran:Germ Meal Ratio in Steam-flaked Corn Based Finishing Diets

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Based on feedlot performance, corn steep has a higher energy value than corn bran:germ meal in steam-flaked based finishing diets.

## Summary

*A finishing trial was conducted to evaluate corn steep:bran/germ meal combinations in steam-flaked based diets. Feed efficiency improved in a linear fashion as steep level increased. Feed efficiency was similar between cattle that received no byproducts compared with cattle fed 25% corn byproducts that contained 50% steep. Feed efficiency was decreased for levels of 37.5, 41.7, and 45.8% steep compared to no byproduct or 50% steep. Daily gain was similar among treatments.*

## Introduction

Corn steep is a blend of steep liquor and distillers solubles and is a component in the manufacturing of corn gluten feed. Based on data published in the Nebraska Beef Cattle Research Report (Scott et al., 1997), steep has more energy than corn bran and germ meal (GM); but high levels of steep without corn bran and GM may cause handling problems and mineral imbalances.

Corn bran is a highly digestible fiber source that is a component of corn gluten

feed. In the manufacturing of corn gluten feed, wet corn bran is pressed and may be dried before steep is added. Germ meal is a medium protein, highly digestible fiber source that remains after oil is extracted from the germ. Germ meal contains more energy than corn bran, but less energy than steep.

When WCGF is included in steam-flaked corn based diets, feed conversion has been variable. Perhaps the ingredients comprising wet corn gluten feed interact with the type of grain fed in the diet. Therefore, the objective of this research was to determine the interaction of steep and bran/GM level when fed in steam-flaked corn diets.

## Procedure

One hundred sixty crossbred steer calves (693 lb) were stratified by weight and assigned randomly to 1 of 20 pens (8 steers/pen). Pens were assigned randomly to 1 of 5 treatments. Treatments were assigned based on four ratios of steep to bran/GM mix plus a negative control

(CON). Wet corn gluten feed (WCGF) was fed at 25% of dietary DM. Wet corn gluten feed was made by mixing the different components into the diet. Bran/GM was mixed weekly and added to the diet as one ingredient. Bran/GM mix was of 60% bran, 24% GM, and 16% fine-cracked corn (DM basis). Bran/GM was mixed with steep into the diet to produce four levels of steep in the WCGF: 37.5% steep; 41.7% steep; 45.8% steep and 50.0% steep (DM, Table 1). Tallow was added at 3.5% (DM basis) to all diets. All diets were formulated to contain a minimum of 14.0% crude protein, 0.70% calcium, 0.28% phosphorus, 0.60% potassium, 31 g/ton Rumensin and 10 g/ton Tylan (DM basis; Table 1). Supplements were fed in two phases to supply UIP early in the finishing stage when calves may be deficient in MP. Phase 1, UIP was supplemented to calves using feather and blood meal (50:50) at 1% of the dietary DM. Phase 2, UIP was replaced with urea when the cattle were estimated to weigh 875 lb. Corn silage was included in all

Table 1. Finishing diet ingredients.

Ingredient, % DM	Treatments <sup>a</sup>				
	CON	37.5% steep	41.7% steep	45.8% steep	50.0% steep
Steam-flaked corn	81.5	56.5	56.5	56.5	56.5
Corn silage	10.0	10.0	10.0	10.0	10.0
Dry supplement	5.0	5.0	5.0	5.0	5.0
Tallow	3.5	3.5	3.5	3.5	3.5
Steep	—	9.4	10.4	11.5	12.5
Bran/SEM mix					
Bran	—	9.4	8.8	8.1	7.5
Germ meal	—	3.8	3.5	3.3	3.0
Fine-cracked corn	—	2.5	2.3	2.2	2.0

<sup>a</sup>CON = 0% WCGF, 37.5% steep = 25% WCGF made with 37.5% steep, 41.7% steep = 25% WCGF made with 41.7% steep, 45.8% steep = 25% WCGF made with 45.8% steep, and 50.0% steep = 25% WCGF made with 50.0% steep.

**Table 2. Animal performance and carcass characteristics with different steep to bran/GM ratios in WCGF added to steam-flaked corn based diets.**

Item	Treatments <sup>a</sup>					SEM	P-value
	CON	37.5% steep	41.7% steep	45.8% steep	50.0% steep		
Days on feed	132	132	132	132	132		
Initial wt., lb	694	692	696	691	693	1	0.12
Final wt., lb <sup>b</sup>	1322	1315	1345	1342	1343	10	0.19
DMI, lb/day <sup>c</sup>	21.1 <sup>d</sup>	22.7 <sup>ef</sup>	23.0 <sup>f</sup>	23.1 <sup>f</sup>	22.4 <sup>de</sup>	0.2	<0.01
ADG, lb <sup>g</sup>	4.76	4.72	4.93	4.94	4.93	0.08	0.18
Feed:gain <sup>g</sup>	4.44 <sup>d</sup>	4.80 <sup>e</sup>	4.68 <sup>ef</sup>	4.67 <sup>ef</sup>	4.56 <sup>df</sup>		0.02
Hot carcass, lb	833	829	848	846	846	7	0.18
Marbling score <sup>h</sup>	516	533	531	538	528	9	0.55
Choice or above, %	71.9	81.3	78.1	75.0	74.6	6.9	0.89
Fat thickness, in	0.49 <sup>d</sup>	0.56 <sup>e</sup>	0.58 <sup>ef</sup>	0.63 <sup>f</sup>	0.57 <sup>ef</sup>	0.03	0.03
Yield grade	2.4 <sup>d</sup>	2.8 <sup>e</sup>	2.8 <sup>e</sup>	2.8 <sup>e</sup>	2.8 <sup>e</sup>	0.1	0.04

<sup>a</sup>CON = 0% WCGF, 37.5 = 25% WCGF made with 37.5% steep, 41.7 = 25% WCGF made with 41.7% steep, 45.8 = 25% WCGF made with 45.8% steep, and 50.0 = 25% WCGF made with 50.0% steep.

<sup>b</sup>Final weight calculated as hot carcass weight divided by 0.63.

<sup>c</sup>Quadratic effect of steep % of WCGF ( $P < 0.10$ ).

<sup>d,e,f</sup>Means within a row with unlike superscripts differ ( $P < 0.10$ ).

<sup>g</sup>Linear effect of steep % of WCGF ( $P < 0.10$ ).

<sup>h</sup>Marbling score: 400 = Slight 0, 450 = Slight 50, 500 = Small 0, etc.

diets, including step-up diets, at 10% of diet DM. Step-up diets contained 35, 25, 15 and 5% alfalfa hay (DM basis) replacing the corn in each treatment diet and fed for 3, 4, 7 and 7 days, respectively.

Initial weights were determined as the average of two consecutive early morning weights before 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-C on day 1 and reimplanted with Revalor-S on day 46. Cattle were fed for 132 days (Jan. 17 to May 29, 2002) and harvested at a commercial packing plant where carcass data were collected. Hot carcass weight was collected the day of harvest and fat, marbling score and yield grade following a 24-hour chill.

## Results

Dry matter intake was similar for CON and 50.0% steep. However 37.5, 41.7 and 45.8% steep had higher ( $P < 0.10$ ) DMI than CON (Table 2). Cattle fed 50.0% steep had similar DMI compared to those fed 37.5% steep. Therefore, DMI responded in a quadratic ( $P = 0.03$ ) fashion for ratio of steep to bran/GM. Daily gain was statistically similar among treatments though there was a linear trend for ADG to increase as steep level increased in byproduct inclusion. Feed conversion was similar between CON and 50.0% steep. A linear decrease for improvement of feed conversion was detected as the percentage of steep in the WCGF increased, suggesting steep has a higher energy value than corn bran/GM meal in steam-flaked corn based diets.

Hot carcass weight and marbling score were similar among treatments. Cattle that were fed CON had less ( $P < 0.05$ ) fat and lower YG than those fed WCGF, suggesting that the CON cattle composition of gain was different than cattle fed WCGF. Presumably feed conversion for the CON cattle would increase if they were fed to the same fat thickness as the cattle fed WCGF. Therefore, the feed conversion data are unclear on whether CON cattle were more efficient due to diet energy or composition of gain. It is unclear how to correct for composition of gain effects on feed conversion. Marbling scores were not different among the treatments.

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