Evaluation of de-germed corn distiller's grains fed to finishing heifers

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Summary

Six hundred and ten crossbred-yearling heifers (765 lbs) were fed for 118 days in a finishing study comparing three different diets. The first diet served as the control (CONTROL) and it contained no distiller's grains. The second diet contained a traditional corn dry distiller's grains with solubles (DDGS) which is about 11% crude fat. The third and final diet contained a partially de-germed (DEGERM) corn DDGS. The DDGS contained about 11% crude fat whereas the DEGERM DDGS contains about 4% crude fat.

Two hundred and ninety nine crossbred-yearling steers (800 lbs BW) were fed for 114 days in a finishing study comparing seven different finishing diets containing distiller's grains with solubles. Two diets contained dry sorghum distillers with one containing alfalfa hay and one without. Likewise, two other diets contained wet sorghum distillers with or without alfalfa hay. Dry corn distillers with hay and wet corn distillers with hay were used to compare sorghum verse corn distillers. The last diet contained no distiller's grains and served as the control. This study suggests that distiller's from sorghum and corn grains are a comparable product ($P>0.12$). When feeding sorghum wet distiller's grains, alfalfa hay can be reduced or removed without deleterious effects on animal performance ($P>0.12$). However, the removal of alfalfa hay from sorghum dry distiller's diet did have a negative effect on animal performance ($P<0.06$). Results from

this study suggest that wet distiller's grains are slightly more efficient than dry distiller's (P=0.08).

Introduction

Rapid expansion of the fuel ethanol industry has provided for large increases in availability of distillery. Distiller's grains are the predominant byproduct yielded from fermentation of grains into fuel ethanol. During this process, starch is removed from the grain and residual components of the grain are concentrated into the distiller's byproduct. Distiller's grains contain the bran, which is high in fiber, and the germ, which is high in fat. Combining these components with the solubles fraction yields distillers grains with solubles (DGS). Given the relatively high fiber content of DGS, they are generally best suited for use as feed for ruminants, such as dairy and beef cattle. It is conceivable that DGS grains could be used as a replacement for alfalfa hay due to their relatively high fiber content.

Fat content in distiller's grains typically ranges from 10-12% crude fat on a dry basis. Past research at Kansas State University suggest that moderate levels full-fat corn germ may decrease dry matter intake while improving daily gains and feed efficiency. In addition the percent of livers condemned due to abscess were decreased with full-fat corn germ. However, carcass quality and yield tended to decrease with increasing levels of full-fat corn germ.

The objective of this study was to ascertain differences in animal performance and carcass characteristics due to the germ in the corn distiller's grain.

Experimental Procedures

Six hundred and ten crossbred-yearling heifers (765 lbs) were obtained from two different sources and used in a completely randomized block design study comparing three different finishing diets (Table 1). The first diet served as the control (CONTROL) and it contained no distiller's grains. The second diet contained a traditional corn dry distiller's grains with solubles (DDGS) which is about 11% crude fat. The third and final diet contained a partially de-germed (DEGERM) corn DDGS which is about 4% crude fat. All diets were formulated to contain 14% crude protein.

Upon arrival at the feedlot, heifers were offered ad libitum access to chopped alfalfa hay and fresh water. Forty-eight hours after arrival, cattle were identified with uniquely numbered ear tags in both ears and received injections of Bovishield 4 and Fortress-7 vaccines. In addition, animals were administered Safe-guard via an oral drench and implanted with Revalor H. Body weights were also recorded at the time of processing. At processing animals were sorted into the different pens according to the order they came though the hydraulic restraining chute (i.e. first animal went to first pen, second animal went to second pen etc…). Twenty four pens were used in this study with eight pens per treatment and 24 to 25 animals per pen. Heifers were allowed ad libitum access to four step-up diets leading to the final finishing diet (Table 1). Heifers were housed in 24 dirt-surfaced pens (??? ft^2) with automatic water fountains and ??.? linear feet of bunk space. Weight of each pen was determined on day 28, 68, and 92. Pen weights also were taken (Day 118) just prior to shipping to a commercial abattoir.

Cattle were shipped to a commercial abattoir in Emporia, KS, where carcass data were collected. Hot carcass weight and liver abscess scores were obtained at the time of

harvest. Ribeye area; subcutaneous fat thickness over 12th rib; kidney, pelvic, and heart fat; marbling score; USDA quality grades; and USDA yield grades were measured following a 24-hour chill. Final body weight was calculated by dividing hot carcass weight by a common dressing percent of 63.5%.

Results and Discussion

Finishing Performance.

Animal performance data is summarized in Table 2. Initial weights were similar between treatments (P>1.00). Dry matter intakes were similar (P>0.12) between CONTROL and DDGS, (20.1 and 20.7 lb/day, respectively). When compared to DDGS, Heifers fed the DEGERM DDGS consumed less (P=0.01) fed than the heifers fed DDGS, (19.7 and 20.7 lb/day, respectively). Likewise, average daily gains were similar (P>0.21) for CONTROL and DDGS, 2.55 and 2.61 lb/day, respectively). As with dry matter intakes, heifers fed DEGERM DDGS tended (P=0.07) to gain less weight than heifers fed DDGS, (2.44 and 2.61 lb/day, respectively). Feed efficiency for all diets were similar (P>0.32), (7.89, 7.93, and 8.08 for CONTROL, DDGS, and DEGERM DDGS, respectively).

Carcass Data.

Dress yield was similar (P=0.38) for CONTROL and DDGS, (60.9 and 60.7%, respectively). However, heifers fed the CONTROL diet tended (P=0.07) to dress better than heifers fed DEGERM DDGS, (60.9 and 60.3%, respectively). Carcass weights, 12th rib fat thickness, and kidney, pelvic, and heart fat were not different between treatments (P>0.27). Similarly, USDA yield grade and quality grade, marbling score, and liver abscesses were not different between treatments (P>0.28).

Implications

Similar to past research, the fat content contained in the DEGERM DDGS reduced dry matter intake and tended to decrease average daily gains when compared to the traditional DDGS. However, the higher levels of fat in DDGS did not influence feed efficiency, carcass merit or liver abscess scores. After considering animal performance and carcass quality, there appears to be no economical advantage to the additional cost required to remove the germ from corn DDGS.

Table 1. Experimental Diets

Item	Control	DDGS	DEGERM DDGS
Ingredient			
Steam-flaked corn	80.9	71.2	71.9
Distiller's grains	0.0	13.0	13.0
CSB	5.0	5.0	5.0
Alfalfa	6.0	6.0	6.0
Soybean Meal	2.9	0.0	0.0
Urea	1.2	0.7	0.0
Supplement	1.8	1.9	1.9
Nutrient, calculated			
Diet DM, %	82.1	82.8	82.8
Crude protein, %	14.0	14.0	14.0
Fat, %	3.8	4.8	3.9
Calcium, %	0.7	0.7	0.7
Phosphorus, %	0.3	0.3	0.3

Table 2. Animal performance and efficiency of yearling heifers.

Item	CONTROL	DDGS	DEGERM DDGS	SEM	P value
No. of head	203	204	203	-	-
No. of pens	8	8	8	-	-
Days on feed	118	118	118	-	-
Initial weight, lb	765	765	765	10.0	1.00
Final weight, lb	1066	1073	1054	14.8	0.42
Dry matter intake, lb/day	20.1[a]	20.7[ab]	19.7[ac]	0.35	0.04
Average daily gain, lb/day	2.55[x]	2.61[xy]	2.44[xz]	0.07	0.16
Feed:gain	7.89	7.93	8.08	0.002	0.57

[abc]Means within row with different superscripts differ (P<0.05).
[xyz]Means within row with different superscripts differ (P<0.10).

Table 3. Carcass characteristics of yearling heifers fed different distiller's grains.

Item	CONTROL	DDGS	DEGERM DDGS	SEM	P value
Hot Carcass weight, lb	677	681	669	9.39	0.42
Dressing percentage	60.9	60.7	60.3	0.003	0.17
Longissimus muscle area, in^2	n/a	n/a	n/a	-	-
Kidney, pelvic, and heart fat, %	2.24	2.24	2.20	0.08	0.91
12^{th}-rib fat, in	0.32	0.35	0.32	0.02	0.27
USDA yield grade					
Yield grade 1, %	41.1	32.6	38.9	4.91	0.27
Yield grade 2, %	39.8	47.5	41.8	3.10	0.21
Yield grade 3, %	18.6	18.9	19.3	3.65	0.99
Yield grade 4, %	0.5	1.0	0.0	0.47	0.35
Yield grade 5, %	0.0	0.0	0.0	-	-
Average yield grade, %	1.78	1.88	1.80	0.08	0.46
USDA quality grade					
Prime, %	1.0	0.5	0.5	0.54	0.74
Choice, %	40.2	46.9	43.4	5.48	0.51
Select, %	52.9	49.2	50.7	5.29	0.77
No Roll, %	4.0	2.0	3.9	1.15	0.39
Low Grade, %	1.9	1.4	1.5	0.60	0.39
Marbling Score	385	392	397	8.52	0.27
Liver Abscess, %	4.9	4.9	3.9	1.7	0.87