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Comparative study of three expeller process soybean meals in diets for lactating dairy cows

Abstract

Forty-eight primiparous Holstein cows were used in two simultaneous 3x3 Latin squares with 28-day periods to evaluate expeller soybean meal from three sources. Six pens containing eight cows each were utilized. Cows were pen fed diets formulated in accordance with NRC (2001) recommendations and based on the assumption that the three sources of soybean meal were nutritionally identical. Diets contained on a dry matter basis, 24.3% chopped alfalfa hay, 9.3% field processed corn silage, 9.2% whole fuzzy cottonseed, 19.2% wet corn gluten feed (Minnesota Corn Processors, Inc., Columbus, NE), and 38% grain mix (70.2% dry rolled corn grain, 18.44% expeller soybean meal, 2.15% wet molasses, 3.47% Menhaden fish meal, and 5.74% min/vit premix). The sources of expeller soybean meal were Grain States Soya, Inc., West Point, NE; NCKP, LLC., Washington, KS; and Bruning Grain and Feed, Bruning, NE. All cows averaged 77 lbs. of milk and consumed approximately 55 lbs. of dry matter daily. Dry matter intake averaged 3.9% of body weight and their production efficiency (ECM/DMI) was 1.45. No differences due; Dairy Day, 2002, Kansas State University, Manhattan, KS, 2002;

Keywords

Diary Day, 2002; Kansas Agricultural Experiment Station contribution; no. 03-121-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 898; Dairy; Soybean; Expeller processed; Cows

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COMPARATIVE STUDY OF THREE EXPELLER PROCESS SOYBEAN MEALS IN DIETS FOR LACTATING DAIRY COWS

V. Burgos, J. E. Shirley, and E. C. Titgemeyer

Summary

Forty-eight primiparous Holstein cows were used in two simultaneous 3×3 Latin squares with 28-day periods to evaluate expeller soybean meal from three sources. Six pens containing eight cows each were utilized. Cows were pen fed diets formulated in accordance with NRC (2001) recommendations and based on the assumption that the three sources of soybean meal were nutritionally identical. Diets contained on a dry matter basis, 24.3% chopped alfalfa hay, 9.3% field processed corn silage, 9.2% whole fuzzy cottonseed, 19.2% wet corn gluten feed (Minnesota Corn Processors, Inc., Columbus, NE), and 38% grain mix (70.2% dry rolled corn grain, 18.44% expeller soybean meal, 2.15% wet molasses, 3.47% Menhaden fish meal, and 5.74% min/vit premix). The sources of expeller soybean meal were Grain States Soya, Inc., West Point, NE; NCKP, LLC., Washington, KS; and Bruning Grain and Feed, Bruning, NE. All cows averaged 77 lbs. of milk and consumed approximately 55 lbs. of dry matter daily. Dry matter intake averaged 3.9% of body weight and their production efficiency (ECM/DMI) was 1.45. No differences due to source of soybean meal were observed.

(Key Words: Soybean, Expeller Processed, Cows.)

Introduction

Several expeller process soybean meals with similar specifications are available to dairy producers in Kansas at varied prices. Some of these products have been evaluated in research studies but others have only on-farm results without a control group for comparison. Cow performance data obtained in comparative studies with known products will improve our decision making process. The purpose of this study was to determine if cow performance or price is the deciding factor when comparing three expeller process soybean meals.

Procedures

Forty-eight primiparous Holstein cows were used in two simultaneous 3×3 Latin squares with 28-day periods. Cows were housed and fed in a freestall facility at the Kansas State University Dairy, Manhattan, Kansas. Six pens containing eight cows each were utilized. Cows were pen fed diets formulated in accordance with the Dairy NRC (2001) and based on the assumption that the three sources of soybean meal were nutritionally identical. Diets contained, on a dry matter basis, 24.3% chopped alfalfa hay, 9.3% processed corn silage, 9.2% whole fuzzy cottonseed, 19.2% wet corn gluten feed (Minnesota Corn Processors, Inc., Columbus, NE.), and 38% grain mix (70.2% dry rolled corn grain, 18.44% expeller soybean meal, 2.15% wet molasses, 3.47% Menhaden fish meal, and 5.74% min/vit premix). The experimental diets (Table 1) differed only in source of expeller soybean meal; 1) Soy Best, 2) NCKP, and 3) BGF (Bruning Grain and Feed) and were

offered ad libitum as a total mixed ration twice daily. Cows were fed each diet for 28 days with pen feed intake and individual cow milk yield measured daily. Milk samples (AM/PM composite) were analyzed for milk composition weekly with analysis of milk protein, fat, lactose, solids-not-fat, urea nitrogen, and somatic cells measured by the Heart of America DHI Laboratory, Manhattan, Kansas. Body weights and condition scores were measured initially and at the end of each 28-day period.

Results and Discussion

The first lactation cows used in the study averaged 77 pounds of milk and consumed approximately 55 pounds of dry matter daily. Dry matter intake as a percentage of bodyweight averaged 3.9% and they gained an average of 28 pounds of bodyweight (1 lb per day) during the 28-day feeding period. Results of the study are depicted in Table 2. No differences due to source of soybean meal were observed in any of the parameters measured.

Table 1. Ingredient and Nutrient Composition of Diets

Ingredient	Diet (% of dry matter)		
	Soy Best	NCKP	BGF
Alfalfa hay	22.87	22.87	22.87
Corn silage	9.59	9.59	9.59
WCGF	18.34	18.34	18.34
Whole cottonseed	8.65	8.65	8.65
Corn grain	28.50	28.50	28.50
Soy Best ¹	7.41	-	-
BGF ²	-	-	7.41
NCKP ³	-	7.41	-
Wet molasses	0.94	0.94	0.94
Fish meal	1.38	1.38	1.38
Limestone	0.75	0.75	0.75
Sodium bicarb	0.34	0.34	0.34
Trace mineral salt	0.23	0.23	0.23
Magnesium oxide	0.79	0.79	0.79
Vitamin ADE premix	0.12	0.12	0.12
Vit E premix	0.02	0.02	0.02
Sodium selenite	0.01	0.01	0.01
Zinpro 4-plex ^{TM 4}	0.06	0.06	0.06
Nutrient*			
CP	17.0	16.9	16.8
NDF	26.3	26	26.0
ADF	14.6	14.5	14.6
NFC	47.7	48.1	48.2
Ether extract	3.5	3.5	3.5
Calcium	0.8	0.8	0.9
Phosphorus	0.4	0.4	0.4
NE _L , Mcal/lb	0.71	0.71	0.71

*Calculated values based on Dairy NRC 2001 computer program.

¹Grain States Soya, Inc., West Point, NE.

²Bruning Grain and Feed, Bruning, NE.

³NCKP, LLC., Washington, KS.

⁴Zinpro 4-plexTM – Zinpro Inc., Eden Prairie, MN.

Table 2. Production Responses of Cows to Diets

Parameters	Diets		
	Soy Best	NCKP	BGF
DMI, lb/day	55.94	55.24	55.28
DMI, % of body wt.	3.93	3.89	3.89
Milk, lb/day	77.9	76.8	76.9
ECM, lb/day	80.8	80.2	80.2
Milk fat, %	3.73	3.77	3.77
Milk fat, lb/day	2.86	2.88	2.86
Protein ¹ , %	3.27	3.24	3.25
Protein, lb/day	2.53	2.49	2.49
Lactose, %	5.34	5.41	5.41
Lactose, lb/day	4.25	4.18	4.18
SNF ² , %	10.10	10.05	10.07
Initial wt., lb	1411	1407	1406
Final wt., lb	1436	1434	1439
Body wt. change, lb	+25.6	+26.6	+33.2
Initial BCS	3.15	3.18	3.10
Final BCS	3.24	3.34	3.30
BCS change	+0.09	+0.16	+0.20

¹Milk true protein.

²Solids-not-fat.