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High inclusion rate of wet corn gluten feed on performance of late-lactation holstein cows: preliminary results

Abstract

A novel diet formulation strategy incorporating wet corn gluten feed at 47% of diet dry matter was evaluated in late-lactation cows. Diets were formulated for similar protein and energy concentrations with dramatic differences in forage sources. Milk fat and protein concentrations increased with the high wet corn gluten feed inclusion rate, and this diet tended to increase milk fat yield. The preliminary work indicates that very low cost rations incorporating wet corn gluten feed may be formulated to maintain milk production, at least in late-lactation cows.; Dairy Day, 2008, Kansas State University, Manhattan, KS, 2008; Dairy Research, 2008 is known as Dairy Day, 2008

Keywords

Dairy Day, 2008; Kansas Agricultural Experiment Station contribution; no. 09-134-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 1002; Inclusion rate; Wet corn; Gluten feed; Performance; Lactation; Holstein

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HIGH INCLUSION RATE OF WET CORN GLUTEN FEED ON PERFORMANCE OF LATE-LACTATION HOLSTEIN COWS: PRELIMINARY RESULTS

D. J. Rezac, K. N. Grigsby, and B. J. Bradford

SUMMARY

A novel diet formulation strategy incorporating wet corn gluten feed at 47% of diet dry matter was evaluated in late-lactation cows. Diets were formulated for similar protein and energy concentrations with dramatic differences in forage sources. Milk fat and protein concentrations increased with the high wet corn gluten feed inclusion rate, and this diet tended to increase milk fat yield. The preliminary work indicates that very low cost rations incorporating wet corn gluten feed may be formulated to maintain milk production, at least in late-lactation cows.

INTRODUCTION

In recent years, use of fermentation coproducts as an alternative energy source for animal feed has increased. The primary coproduct of the wet milling industry is wet corn gluten feed (WCGF). Traditionally, most dairy nutritionists have been hesitant to include WCGF at more than 25% of diet dry matter (DM); however, previous research at Kansas State University has demonstrated that incorporation of WCGF at up to 36% of DM increased milk production. Wet corn gluten feed is a relatively energy-dense feed that does not promote ruminal acidosis, suggesting that WCGF could replace an even greater combination of forage and concentrate, thus decreasing ration costs. The aim of this preliminary study was to determine the effects of a high inclusion rate of WCGF (47% of DM) on milk and milk component yield.

EXPERIMENTAL PROCEDURES

Twenty open, multiparous, late-lactation Holstein cows (374 days in milk) were randomly allocated to 2 pens of 10 cows each for a 2-period crossover design study. Periods were 21 days, with 17 days for diet adaptation and 4 days for data and sample collection. Cows were housed in adjacent freestall pens, fed once daily, and milked 3 times daily (0400, 1200, and 2000 hours). One diet was formulated to incorporate a high concentration of WCGF while meeting all nutrient requirements. The second diet was the normal high group ration fed at the Kansas State University Dairy Unit (Manhattan, KS); this ration includes 34% WCGF. Composition of the experimental diets is shown in Table 1.

Milk yield was recorded at each milking for the final 4 days of each period. Milk samples were collected on the final day of each period for analyses of fat, true protein, lactose, urea nitrogen, and somatic cells (Heart of America DHIA laboratory, Manhattan, KS). Data were analyzed by mixed model analysis including fixed effects of pen and treatment and the random effects of milking time within period and cow within pen.

RESULTS AND DISCUSSION

Milk yield was not significantly affected by treatment, nor were energy- or fat-corrected milk yield (Table 2). Differences were noted, however, for fat and protein concentrations ($P = 0.006$ and $P = 0.004$, respectively) in favor of the WCGF treatment. The WCGF treatment tended

($P = 0.09$) to increase milk fat production and increased milk urea nitrogen ($P = 0.03$) relative to the control treatment.

Incorporating a large amount of prairie hay in the WCGF diet provided more than enough effective fiber, evidenced by the fact that milk fat concentration increased to 4.14% when cows were fed this diet. In addition, cows seemed to sort against the prairie hay in this diet, suggesting that the diet consumed actually contained even less forage fiber. These results indicate that WCGF fiber can contribute substantially to the fiber requirement of lactating cows and encourage further investigation of diets incorporating large amounts of non-forage fiber sources.

Table 1. Ingredient composition of diets

Ingredient, % dry matter	Treatment	
	Control	WCGF ¹
Alfalfa hay	13.9	—
Prairie hay	—	20.9
Corn silage	21.8	—
WCGF ¹	33.8	47.1
Cottonseed	5.0	7.4
Dry-rolled corn	17.1	16.8
Expeller soybean meal	4.9	3.8
Menhaden fish meal	0.4	—
Micronutrient premix	3.1	4.0

¹Wet corn gluten feed (Sweet Bran, Cargill, Inc., Blair, NE).

Table 2. Effect of treatment on performance of late-lactation Holsteins

	Treatment		SEM	<i>P</i>
	Control	WCGF ¹		
Milk yield, lb/day	42.3	41.0	3.7	0.59
Energy-corrected milk, lb/day	43.9	45.9	4.4	0.45
Fat-corrected milk, lb/day	42.8	45.4	4.4	0.32
Fat %	3.70	4.14	0.2	0.006
Fat yield, lb/day	1.52	1.72	0.02	0.09
Protein %	3.37	3.43	0.6	0.004
Protein yield, lb/day	1.46	1.39	0.01	0.72
Lactose %	4.61	4.57	0.1	0.29
Lactose yield, lb/day	1.98	1.92	0.02	0.44
Milk urea nitrogen, mg/dL	14.0	14.5	0.4	0.03
Somatic cell count	198	239	75	0.13

¹Wet corn gluten feed (Sweet Bran, Cargill, Inc., Blair, NE).