Production Response to Feed Supplementation of Dairy Cows in a Seasonal Calving and Grazing System

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Introduction

Providing supplemental feed under grazing conditions usually supports higher milk production. The objective of this study was to measure the impact of feed supplementation on milk yield, milk composition and reproductive performance of Holstein dairy cows in a spring calving and grazing system.

Materials and Methods

A two-year grazing study was conducted with Holstein dairy cows at the U.S. Dairy Forage Research Center, Prairie du Sac, WI. In 1994 and 1995, 50 to 54 cows were randomly assigned before calving to one of three treatment groups. The three treatment groups were all pasture (P), 2/3 pasture (2/3P), and 1/3 pasture (1/3P). Cows calved between March and June each year. Cows in P, 2/3P and 1/3P groups were fed diets containing forage and grain in a ratio of about 100:0, 75:25 and 50:50 (% DM basis) until pasture was ready. In 1994, alfalfa silage was the sole forage source during the pre-grazing period, whereas in 1995 alfalfa silage and corn silage were used in a 2:1 ratio. During the grazing season, cows were slowly changed (over a period of 5 days) from the indoor diets to pasture. Most of the cows (90%) were on pasture by May 16. During the grazing season, cows in P, 2/3P and 1/3P groups consumed all, 2/3 and 1/3 of their daily feed from the pasture, respectively. The balance of feed for the 2/3P and 1/3P groups was supplied by a supplement.

Ingredient composition of the supplements is in Table 1. Cows grazed permanent pasture containing primarily a mixture of *Poa pratensis* L. (Kentucky bluegrass), *Elytrigia repens* (L.) Nevski (quackgrass), *Bromus inermis* Leyss (smooth bromegrass), and *Trifolium repens* L. (white clover). Cows in the three treatment groups were grazed as a single group. Pasture was managed under an intensive rotational grazing system. Cows were offered a new paddock daily after the morning milking. The amounts of supplement fed to the 2/3P and 1/3P groups during 1994 were adjusted weekly according to milk yield of the previous week and averaged 5.6 and 10.5 kg/cow/d, respectively. In 1995, cows were fed a constant amount of supplement (6.0 and 11.6 kg/cow/d for the 2/3P and 1/3P groups, respectively) throughout the grazing season. Supplement was fed after each milking. Cows grazed from May 16 to October 21, 1994 and from May 16 to September 30, 1995. Total grazing area varied between 30 to 50 acres over the grazing season. During each grazing cycle, forage samples were collected from three paddocks before grazing to monitor quality. Forage samples were dried and analyzed for crude protein (CP) and fiber. After the grazing season was over, cows were housed in a freestall barn and were fed diets containing forage to grain in ratios similar to those used before grazing. Cows were synchronized for breeding using GnRH and PGF2a. Cows were dried off on January 30, 1994 and on January 15, 1995. Some cows were dried off before these dates to give 53 days before the expected calving date. Daily milk yield was recorded. Milk samples were analyzed weekly for composition.

Results and Discussion

Botanical composition of the pasture clipped to within 3 cm above the ground was (DM basis): grasses, 55%; white clover, 12%; weeds, 8%; and dead matter, 25%. Forage from the pasture contained an average CP, 14.7% ± 3.7 SD; NDF, 58.7% ± 4.0 SD and ADF, 36.8% ± 4.7 SD in 1994, and CP, 19.0% ± 3.9 SD; NDF, 50.6% ± 7.5 SD and ADF, 25.8% ± 4.6 SD in 1995. The number of cows used in each treatment and

experimental results are summarized in Table 2. Average days in milk were 275. Total milk yield increased with increasing amounts of supplement. Cows in P, 2/3P and 1/3P treatment groups produced an average 17.3, 21.2 and 26.3 kg of milk/d, respectively. Milk fat content was reduced in the 1/3P treatment during 1994. This decrease probably was due to the presence of corn silage and fine ground corn in the supplement. During 1995, alfalfa hay was used instead of corn silage, and milk fat content was not different among treatments. Milk protein contents were similar among treatments. Cows in the P group had lower body condition score and more reproductive failure than cows fed supplement.

Conclusion

Providing supplemental feed in a seasonal calving and intensive rotational grazing system increased milk yield and improved the reproductive performance of dairy cows. The highest level of supplementation in this experiment would be justified with North American feed and milk prices.

Table 1. Ingredient and chemical composition of the supplements (% DM basis).

	Treatment groups			
	2/3P	1/3P	2/3P	1/3P
Ingredient	1994		1995	
Alfalfa hay	-	-	50.0	25.0
Corn silage	33.3	25.0	-	-
High moisture ear corn	30.1[1]	42.0[1]	28.4[2]	48.3[2]
Soybean meal	-	3.0	-	6.0
Roasted soybean	24.0	18.0	18.0	18.0
Linted cottonseed	8.0	9.0	-	-
Sodium bicarbonate	-	.45	-	-
Minerals and vitamins	4.6	2.5	3.6	2.7
Crude protein, % of DM	15.7	15.2	19.5	19.6

[1]Fine ground
[2]Coarse ground

Table 2. Influence of grain supplementation on lactation performance of dairy cows in a seasonal calving/grazing system.

	Treatment groups[1]					
	P	2/3P	1/3P	P	2/3P	1/3P
Item	1994			1995		
Number of cows	17	18	15	17	17	20
Supplement intake, kg/d	-	5.6	10.5	-	6.0	11.6
Average days in milk	265	272	265	286	282	281
Total milk yield, kg	4437[c]	5649[b]	6884[a]	5075[c]	6023[b]	7344[a]
Milk yield, kg/d	16.8[c]	20.8[b]	26.0[a]	17.7[c]	21.5[b]	26.5[a]
Milk fat, %	3.80[a]	3.63[a]	3.30[b]	3.60	3.50	3.40
Milk protein, %	3.00	3.02	3.06	3.01	2.92	3.01
Cows pregnant by 100d, %	41	56	53	18	41	45
Cows pregnant with first two services	8	11	9	5	7	12

Means in the same row with different superscripts within year differ ($P < .01$).
[1]Cows consumed all (P), 2/3 (2/3P) and 1/3 (1/3P) of their daily feed from pasture. Balance of feed for 2/3P and 1/3P groups was supplied by a supplement containing grain.