

Effect of Prepartum Crude Protein Level on Performance of Primiparous Holstein Cows

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Introduction, Materials and Methods

Studies have shown that primiparous cows may require a higher level of crude protein (CP) prepartum than recommended by National Research Council (NRC) (1989). To evaluate the effect of prepartum dietary CP level on performance, 42 primiparous Holstein cows were utilized in a randomized complete block design. Cows were blocked according to age and expected calving date and randomly assigned to 1 of 2 treatments. Treatments were initiated 30 days prior to expected calving date and continued throughout parturition. Diets were categorized as moderate CP (12.7% CP, 36% UIP) or high CP (14.7% CP, 40% UIP). Dietary ingredients were the same, with exception of the addition of an animal-marine protein blend (Prolak[®]) in the high-protein diet. Following parturition, all animals were subjected to the same management and dietary treatments. Production was followed to 120 days in lactation. Blood samples, collected on days -30, -15, -10, -5, 2, 5, 15 and 30 relative to calving, were measured for plasma glucose, NEFA, and BHBA. On the day of calving, a colostrum sample was collected for analysis of nutrient content and IgG concentration. Starting

on day 10 postpartum, uteri and ovaries were scanned by ultrasound twice weekly to evaluate presence and number of follicles, presence and size of corpus luteum (CL), and presence of cystic structures.

Results and Conclusion

Increasing CP content of prepartum diet increased yields of FCM ($P < .04$) and milk fat ($P < .04$). Higher CP prepartum had a tendency to elevate production of milk ($P < .11$), production of milk protein ($P < .13$), and percentage of milk fat ($P < .11$). No effects were observed for yield of milk protein or for concentration of somatic cell count (SCC) in milk ($P > .15$). Prepartum CP had no influence on pre and postpartum plasma glucose. No treatment effects were observed for colostrum content of CP, total solids, ash, and IgG. Days to complete uterine involution and to the first postpartum CL were not influenced by prepartum diet. Results from this study suggest that primiparous cows producing 70 lb/d (32 kg) benefit from a higher dietary CP prepartum than currently recommended by the NRC (1989).

Table 1. Effect of prepartum dietary protein on performance of primiparous cows

Item	Treatment		SEM	P <
	Moderate	High		
Milk, kg/d	30.2	32.2	0.85	0.11
FCM, kg/d	29.5	32.5	1.00	0.04
Fat, %	3.35	3.59	0.10	0.11
Fat, kg/d	1.01	1.15	0.05	0.04
Protein, %	3.04	3.04	0.03	0.96
Protein, kg/d	0.92	0.98	0.03	0.13
SCC, x 1,000/ml	52.19	90.19	31.21	0.40
Plasma glucose				
Prepartum, mg/dl	66.66	67.69	1.67	0.68
Postpartum, mg/dl	67.53	69.52	2.23	0.55
Colostrum				
CP, %	16.25	15.91	0.70	0.74
Total Solids, %	26.43	27.96	2.12	0.65
IgG, mg/dl	6,264	5,264	751	0.37