



Milk Production of Dairy Cows Fed Differing Concentrations of Rumen-Degraded Protein

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In feeding dairy cows, much of the attention has focused upon the rumen undegraded protein (RUP). However, microbial protein supplies over half of the total protein required by a milk cow – even a high-producing cow. Rumen degradable protein (RDP) consisting of feed proteins and NPN become available (degraded) to rumen bacteria mainly as ammonia. The bacteria then use the RDP to build their mass.

Maryland researchers studied the effect of varying rumen degraded protein levels on milk production and nitrogen efficiency. Thirty-two multiparous and 16 primiparous Holstein cows averaging 126 days in milk were used in a Latin Square trial with 3 week periods. Rations were formulated to provide 4 concentrations of RDP (6.8, 8.2, 9.6 or 11.0%), while RUP was held constant at 5.8% of dry matter. The rations were similar except for varying amounts of ground corn, soybean meal, and heat-processed soybean meal to obtain the RDP levels. Basically 1.54 lbs of corn and 1.03 lbs of heat processed soybean meal were replaced by 2.57 lbs of soybean meal for each step up in RDP treatments. There were no differences in treatment responses between first lactation and older cows and data were pooled. The results are shown in Figure 1 below.

Fiber digestion mainly depends upon rumen fermentation. A deficiency of RDP would lower microbial mass and thus fiber digestion and probably explains the difference in total dry matter intake. As fiber is a primary source of milk fat precursors, a lack of RDP would also explain the differences in milk fat percent. Microbial protein is a high quality source of amino acids to the cow, and the lack of RDP and lower production of microbial protein would also explain the milk protein output differences.

The increased costs for each soybean substitution would be about \$0.072. The milk and component yield differences would be about \$0.32 for each step up in RDP levels. Thus, the return of feeding adequate RDP was 4.4:1. The benefit of reducing N excretion (lower MUN) was far outweighed by the loss in production with underfeeding RDP.

Vigortone recommends that at least 60% of the ration protein be RDP. This trial supports that recommendation.

Figure 1

<u>Measurement</u>	<u>RDP Treatments (%)</u>			
	<u>6.8</u>	<u>8.2</u>	<u>9.6</u>	<u>11.0</u>
DMI (lbs)	45.1	46.2	46.4	47.1
RDP intake (lbs)	3.1	3.8	4.5	5.2
Total crude protein (% of ration)	12.2	13.9	15.6	17.0
Milk (lbs)	69.7	70.4	72.8	74.4
Milk fat %	3.70	3.74	3.82	3.86
Milk protein yield (lbs)	2.95	3.06	3.09	3.11
Milk urea nitrogen (mg/dL)	9.5	11.6	14.1	16.4