

in situ Rumen Undegraded Protein (RUP) and Dry Matter Digestion (DMD) Guidelines for Commercial Feeds

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Feed Type	RUP, % of CP			DMD, % of DM		
	Goal*	Average	Minimum*	85th %	Average	15th %
Canola Meal	46.0	33.5	20.0	79.2	63.9	47.0
Soybean Meal	37.5	23.6	12.5			
Roasted Soybeans	46.9	35.8	23.5			
Extruded/Expelled Soybean Meal	62.8	49.0	34.7			
Corn Gluten Meal	45.6	32.9	20.6			
Corn Gluten Feed	22.0	16.3	10.2			
Brewers Grains	67.8	52.1	30.4			
Corn DDGS	68.8	51.7	41.9			

Feed Type	RUP Intestinal Digestibility, % of RUP		
	Goal	Average	Minimum
Protein Feed	> 90%	70 - 80 %	< 50%

*Rock River Laboratory guidelines were determined using our database statistics and references listed below. Goals and Minimums correspond to 85th and 15th percentiles.

Note:

These benchmarks are appropriate for lactating cows. Rock River Laboratory utilizes a 16h *in situ* rumen digestion procedure in lactating dairy cows, further described by Goeser et al. (2013), an *in vitro* intestinal digestion procedure based upon the technique described by Gargallo et al. (2006) and later modified by Boucher et al. (2009).

References

Boucher, S. E., S. Calsamiglia, C. M. Parsons, M. D. Stern, M. Ruiz Moreno, M. Vázquez-Añón, and C. G. Schwab. 2009. In vitro digestibility of individual amino acids in rumen-undegraded protein: The modified three-step procedure and the immobilized digestive enzyme assay. *J. Dairy Sci.* 92:3939-3950.

Faldet, M.A. and L.D. Satter. 1991. Feeding heat treated full fat soybeans to cows in early lactation. *J Dairy Sci.* 74:3047.

National Research Council. 2001. *Nutrient Requirements of Dairy Cattle*. 7th Revised Ed. National Academies Press.

Gargallo et al. (2006). Technical note: A modified three-step in vitro procedure to determine intestinal digestion of proteins. *JAS* 84:2163-2167.

Goeser, J.P., Heuer, C.R. and L. Meyer. 2013. Midwestern US byproduct feedstuffs vary in ruminal nutrient digestion. *ADSA Annual Meeting Abstract* TH112.