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

Summarized by Jacob Karlen and Dr. John Goeser, PAS & Dipl. ACAN
Revised March 2020

	RUP, % of CP			DMD, % of DM
Feed Type	**Goal***	**Average**	**Minimum***	**Average**
Blood Meal	91.2	81.9	67.8	17.0
Canola Meal	34.8	29.2	22.5	66.7
Corn Gluten	37.5	23.0	12.0	64.5
Dry Distillers	68.8	41.5	31.1	65.2
Extruded/Expelled Soybean Meal	60.1	52.6	29.3	66.6
Meat and Bone Meal	43.0	39.2	28.1	65.9
Roasted Soybean	62.1	43.0	28.1	65.9
Soybean Meal	59.1	27.2	9.9	80.5
Wet Distillers	53.0	47.6	29.3	60.9

	Intestinal Digestibility, % of RUP		
Feed Type	**Goal***	**Average**	**Minimum***
Blood Meal	99.5	96.8	74.4
Canola Meal	95.6	79.8	68.8
Dry Distillers	96.0	84.4	56.3
Extruded/Expelled Soybean Meal	98.1	96.8	90.2
Meat and Bone Meal	87.1	82.0	67.4
Roasted Soybean	97.7	88.7	57.0
Soybean Meal	98.7	96.0	81.0
Wet Distillers	93.3	87.6	85.6

*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.

ROCK RIVER LABORATORY, INC.
AGRICULTURAL ANALYSIS

710 COMMERCE DRIVE
PO BOX 169
WATERTOWN, WI 53094

920-261-0446
OFFICE@ROCKRIVERLAB.COM
WWW.ROCKRIVERLAB.COM