

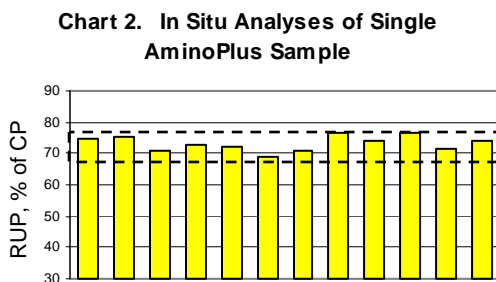
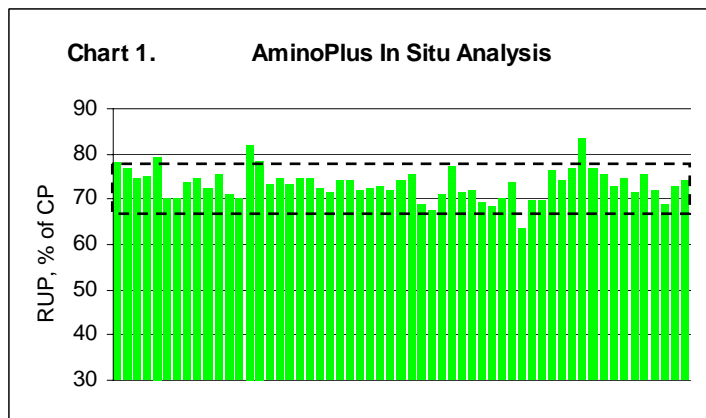
AminoPlus® Delivers High Quality Intestinally Digestible Rumen Bypass Protein

High quality intestinally digestible rumen bypass protein is critical to maintaining the high levels of milk production achieved in dairy herds today. Ag Processing Inc. (AGP) developed AminoPlus with this need in mind. For this reason AGP developed the process and the quality control program to assure a high quality bypass protein source that is digestible in the small intestine.

Many procedures have been proposed to estimate rumen un-degradable protein (RUP) of ingredients which utilize solutions and/or enzymes to simulate ruminal protein digestion. The RUP content of AminoPlus is determined by *in situ* procedures, which measures protein degradation of samples placed in the rumen of a dairy cow.

RUP

Recent *in situ* RUP AminoPlus analysis (Chart 1), conducted by an independent research laboratory, are consistently within the recognized variability of this biological procedure (dashed line, $\pm 5\%$ of average value of 73.3% RUP). *In situ* RUP results of 12 separate analyses of a single AminoPlus sample conducted over a 3 month time period are provided in Chart 2. RUP level of this AminoPlus sample averaged 73.2%, similar to the average of the data in Chart 1, however individual results of



this single sample ranged from 69.2 to 76.6% RUP. This indicates the variability possible when utilizing a biological system; such as the rumen of a lactating dairy cow. Changes in environment, feeding and consumption patterns, and other husbandry practices can change the digestive conditions within the rumen and influence the observed analytical results. Therefore, results should be evaluated based on multiple rather than single assays to

avoid misleading or erroneous conclusions.

Protein sources fed to livestock must be digestible to have value in supporting maintenance and the production of muscle, milk, or eggs. To provide the needed amino acids for milk production RUP sources must be digestible in the small intestine of the dairy cow. A chick bioassay was used to evaluate the quantity and quality of amino acids in AminoPlus. Two hundred eighty Ross X Ross day old male chicks were assigned to 7

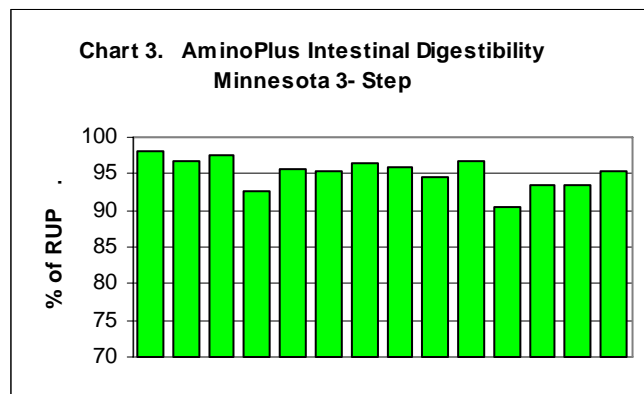
SBM %	AminoPlus %	Gain gm/day	F/G	gm Gain/ gm Lysine	Livability %
100	0	28.2	1.90	50.3	94.9
67	33	28.8	1.87	51.1	100.0
33	67	30.4	1.78	53.6	95.9
0	100	28.9	1.85	51.8	95.5
67	33	29.0	1.86	51.5	96.7
33	67	29.2	1.84	52.4	96.8
0	100	28.6	1.90	50.2	98.3

treatments (8 pen replicates/treatment, 8 birds/ pen) for the 21 day trial. Lysine was formulated to 92% of requirement to evaluate lysine bioavailability of the AminoPlus diets compared to the soybean control. Total sulfur amino acids, calcium, phosphorus and energy were similar for all diets. All measures of performance (average daily gain, feed/gain, gain/unit lysine consumed and livability) were

equal or numerically superior for chicks fed the AminoPlus diets compared to the soybean control (Table 1). This data indicates lysine availability of AminoPlus was at least equal to soybean meal and suggests the RUP fraction of AminoPlus is available in the small intestine of the ruminant.

Intestinal Digestibility

Intestinal digestibility of AminoPlus was estimated by an independent research laboratory using the Minnesota 3-Step procedure (Chart 3). Variation between individual samples is minimal when considering the impact of procedure variation. Intestinal digestibility was greater than 90% for all 14 samples of AminoPlus and averaged 95.1 percent.



The Mobile Bag Technique (MBT) estimates intestinal protein digestion by placing bags, containing a known quantity of sample, into the small intestine and collecting the bags after passage through the small intestine. Protein digestibility is calculated from the

European Trails	Independent Laboratory AminoPlus	Expeller
99.0	96.4	94.2
91.8	98.0	96.3
	94.4	92.5

difference between protein content of the bag before and after intestinal digestion. European trials (De Schothorst, Danish Institute of Agricultural Sciences) using MBT reported intestinal digestibility of the AminoPlus RUP fraction at 99.0 and 91.8%, respectively (Table 2). A comparison of three AminoPlus and three expeller soybean meal samples indicates high intestinal digestibility for both protein sources

with intestinal digestibility averaging 96.3 and 94.3% for AminoPlus and expeller soybean meal, respectively.

The AminoPlus Quality Control helps assure you a high quality, high intestinally digestibility bypass protein source – **AminoPlus®**