

Variability leads to inconsistent performance

Elliot Block for *Progressive Dairyman*

Cows are creatures of habit. They expect to get milked and fed at the same time every day, to have the same amount of time to rest and remain in the same pens with the same cows. This consistency in their day-to-day lives is critical for peak performance.

Much like the routine that helps cows thrive, feed quality and consistency is what your herd craves. Day-to-day variability in feed quality and digestibility can negatively impact performance, resulting in reduced production.

For example, commodity feeds rich in lysine are generally extremely variable in quality and digestibility, but they are often fed to meet amino acid requirements. Amino acids are the building blocks of protein. Limiting amino acids, like lysine, are so named because protein synthesis is limited when they are not available and they cannot be synthesized in the body from other amino acids. Cows must be supplemented with limiting amino acids through the diet.

The commodity lysine source of choice

Commodity blood meal continues to be fed to supply lysine to the dairy cow's diet. Research completed by Dr. Marshall Stern at the University of Minnesota uncovered just how variable blood meal quality could be across multiple industry samples.

The study looked at variability of multiple protein and amino acid sources, comparing ingredients based on crude protein digestion, percent rumen undegradable protein (RUP) and intestinal protein digestion. The study also looked at intestinally absorbable dietary protein (IADP), which multiplies RUP by intestinal protein digestibility to estimate the percentage of protein that can actually be absorbed in the small intestine for use by the cow.

The study found blood meal samples to be extremely variable across all fields. Intestinal protein digestion for batch-dried blood meal was recorded at 63 percent, which was low in comparison to other protein sources. The average IADP of blood meal was 55 percent. Because of this variability, the cost of batch-dried blood meal ranged from \$0.73 to \$2.20 per kilogram while the cost of available lysine in the batch-dried blood meal ranged from \$0.86 to \$2.56 per gram. This variability makes it especially difficult to consistently balance rations for amino acids using commodity blood meal.

New research confirms variability

More recent research completed by Dr. Normand St-Pierre at Ohio State University, and quoted in Boucher 2009, continues to show that blood meal variability is very real. St-Pierre decided to complete the study after seeing significant differences in performance when cows were fed blood meal of different origin. Based on the original research completed by Stern, St-Pierre asked, "How much blood meal variability is experienced by the dairy industry?"

St-Pierre answered his question by collecting 265 blood meal samples that represented a variety of blood meal – different species, origins and regions of the country. These samples were each tested for percent crude protein, RUP, percent of RUP digestibility and percent lysine as a percentage of crude protein as well as lysine digestibility. **Table 1** reflects his findings, showing extreme variability, as evidenced by the ranges between the fifth and the 95th percentiles. While the average blood meal quality was arguably acceptable – although of a lower digestibility than feed tables such as those of the National Research Council show – the range showed

marked inconsistency.

Following the study's completion, St-Pierre says he was surprised by the range of blood meal digestibility. There are many reasons for the variability, he shares, citing the following as potential causes:

- **Duration and extent of heating**

Lysine is the amino acid most vulnerable to excessive heat during drying. When blood meal is overcooked, less lysine is delivered to the small intestine for use by the cow.

- **Byproduct quality**

By definition blood meal is a byproduct, a leftover from the meat production process. Maintaining blood meal integrity and quality is not the most important goal at the slaughterhouse.

- **No difference without testing**

At producer meetings St-Pierre has displayed multiple blood meal samples and asked attendees to rank them by digestibility based only on visual inspection. It's impossible, he says, since visible characteristics like color and coarseness cannot help identify blood meal quality. Since blood meal is often fed out before it can be tested, tracking variability is almost impossible.

- **Low amounts fed**

Dairies are feeding a very small amount of blood meal to protect against variability, but the full benefits of feeding rumen bypass lysine cannot be realized at such low levels. As long as producers continue to purchase blood meal without concern for its quality, the sale of this byproduct will continue, says St-Pierre.

Minimizing variability for peak performance

For nutritionists, the range in blood meal quality is especially alarming because cows depend on consistent levels of lysine to maintain high production levels. From a diet formulation perspective, if the amino acids provided by blood meal are different every day, or in every load delivered, it's nearly impossible to properly balance the ration.

St-Pierre uses the following

example to best summarize the quality of blood meal: "Imagine the best hay and imagine the worse hay that you have ever seen in your lifetime. The variability from the best to worst hay is not as great as the variability from the best to worst blood meal. When you are purchasing hay, do you just say, 'Bring me whatever hay you have?' No! You want to purchase high-quality hay. Why would you expect any different with blood meal?"

New bypass lysine sources are now allowing nutritionists to balance rations for optimal levels of amino acids. More consistent lysine delivery to the small intestine improves milking string performance, nutrient utilization and, ultimately, income over feed cost.

St-Pierre's recommendation is simple: Avoid commodity blood meal. Since the variability is so great from one batch to the next, it's not worth the risk that blood meal poses for the dairy industry, he explains. By paying more upfront for higher-quality, more consistent protein and lysine sources, you will reap greater benefits because cows can reach their production potential.

As you strive to provide a consistent routine for your herd, its diet is no exception. By consistently supplying high-quality feed ingredients, you can ensure cows reach and maintain peak performance throughout the lactation. **PD**

References omitted due to space but are available upon request.

 **PROGRESSIVE DAIRYMAN**

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Table 1

Composition and variability of blood meal samples (N=265)

	Average	5th Percentile	95th Percentile	Standard Deviation
Crude Protein (CP), % DM	90.1	84.4	96.0	3.68
RUP, % CP	76.8	50.4	96.6	14.80
RUP digestibility, % of RUP	64.6	19.9	97.6	23.06
Lysine, % CP	9.12	7.44	10.31	0.79