

A New Rapid Method to Determine "True Metabolic Availability" of Lysine in Feeds

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Because lysine is the first limiting amino acid in feeds, synthetic lysine is usually supplemented into pig diets. Accurate determination of lysine availability in feeds is therefore necessary to maximize performance and reduce feed costs. Lysine digestibilities in feeds have been reported (NRC 1998). However, it is known that not all of the lysine that is digestible is "metabolically" available for protein synthesis (i.e. muscle growth), especially in heat-treated feeds. The objective was to develop a rapid method to determine the true metabolically available (TMA) lysine content of pig feeds.

Study Design and Results: We chose to measure phenylalanine (PHE) oxidation as an indicator of the change in protein synthesis that occurs in response to a change in TMA lysine intake. We found that as TMA lysine intake increases, PHE oxidation decreased linearly. With the linear equation, we could then predict TMA lysine based on PHE oxidation during feeding of a test feed. Catheterized barrows were fed a base diet for 7 d. Test diets were then fed for 1.5 d after which PHE oxidation was determined twice on subsequent days. The 5 test diets were: low lysine (56% of requirement), high lysine (90% of requirement), raw peas, heated peas, and heated peas + lysine. The first 2 diets provided the linear equation for prediction of TMA lysine in the other 3 diets. In raw peas, TMA lysine was 65.3% of total, while in heated peas, TMA lysine was -2.9%; these data indicate that extended heating rendered the lysine in peas totally unavailable. When free lysine was added to the heated pea diet to the level in raw pea diet, TMA lysine was 64.9%, similar to raw pea diet. These data indicate that the change in PHE oxidation due to heating was entirely due to the change in true metabolically available lysine intake.

Implications: This new method can be used to determine true metabolic availability of lysine in feeds. This information could be used to formulate pig diets much more accurately, resulting in more consistent performance, more cost-efficient production, less excess dietary protein and lower nitrogen excretion in manure. (Supported by Alberta Pork, AARI and Ontario Pork).