Evaluation of Reactive Lysine (Homoarginine) as an In-vitro Procedure to Predict Lysine Digestibility of Distillers Dried Grains with Solubles by Growing Pigs.

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Abstract:

Two experiments were conducted to evaluate the reactive lysine (Lys_R) procedure to predict in-vivo Lys digestibility in distiller's dried grains with solubles (DDGS) by pigs. In this procedure, the conversion of lysine to homoarginine (Ha) is measured in a sample that has been incubated with methylisourea solution (MIU). In Exp. 1, the optimum guanidination in DDGS and in ileal digesta from pigs fed DDGS-containing diets was determined by varying the d of guanidination (1, 3, 6 and 9 d for DDGS and 1 and 3 d for ileal digesta) in 0.6 *M* MIU. For DDGS, there was a linear increase in Lys to Ha conversion (78.3, 81.0, 83.4, 82.9 %) for 1, 3, 6 and 9 d ($P < 0.01$). There was no difference in the average recovery of other AA among d of DDGS guanidination. For ileal digesta, there was no difference in the Ha conversion (72.7 and 74.9%) at 1 d and 3 d, respectively or for the recovery of other AA. It was concluded from Exp. 1 that samples of DDGS and ileal digesta need to be guanidinated for 3 d in a 0.6 *M* MIU solution. In Exp. 2, 13 DDGS samples from selected Midwest ethanol plants with previously determined standardized ileal digestibility (SID) of AA in growing pigs were guanidinated to determine the correlation of Lys_R content with the in-vivo Lys digestibility. The samples were guanidinated for 3 d at pH 11.4 using 0.6 *M* MIU solution. The results showed that the Lys_R content of samples ranged from 5.2 to 10.2 g kg^{-1} (average 7.1 ± 1.3 g kg^{-1}). The Lys to HA conversion rate ranged from 72.6 to

85.4% (average 78.1 ± 3.8%). The average total Lys content of the DDGS samples obtained using acid hydrolysis (Lys_{AH}) was 8.2 ± 0.8 g kg^{-1}, which means that the difference between Lys_{AH} and Lys_R is equivalent to 15%. This difference represents the unreactive Lys that may have been damaged because of Maillard reaction during the production of DDGS. The residual Lys in the sample after guanidination is considered unreactive, and the sum of unreactive and reactive Lys (8.5 g kg^{-1}) was almost identical to LYS_{AH} (8.2 g kg^{-1}) indicating that the Lys components found during guanidination were fully accounted for. The Lys_R content (g kg^{-1}) in the DDGS samples was highly correlated with SID Lys content (g kg^{-1}) (R^2 = 0.87) in DDGS. In conclusion, the reactive lysine procedure may be used as an in-vitro method to predict the SID Lys content of DDGS.

Keywords: Amino acids, DDGS, Homoarginine, Pigs, Reactive lysine