ILEAL AMINO ACID DIGESTIBILITY FOR BROILERS OF WHEAT GROWN IN AUSTRALIA

W.L. BRYDEN, L.I. HEW, V. RAVINDRAN and G. RAVINDRAN

Wheat is an economically important feed ingredient in poultry diets in Australia. Although wheat is used primarily as an energy source, its high level of incorporation in poultry diets means that it also supplies a major portion of dietary protein. Consequently, the quality of wheat protein for supporting broiler growth becomes an additional point of importance. While the variability in apparent metabolisable energy (AME) of wheat grown in Australia is well documented, limited published data are available on the amino acid availability of wheat for poultry. The present study was carried out to obtain data on variations in ileal amino acid digestibility and AME of 16 samples of Australian wheat. Correlations between the different nutritional parameters were also computed.

The AME values were determined with 5-week old male broilers (Cobb) using a classical total collection procedure described by Mollah et al. (1983). Following the completion of excreta collection, the same birds were used for amino acid digestibility assays. Assay diets contained wheat (918 g/kg) as the only source of protein. Diets were fortified with minerals and vitamins and contained celite (20 g/kg) as an indigestible marker. The diets were fed ad libitum to three pens (4 birds/pen) of broilers from 35 to 42 days of age. On day 42, digesta contents from the terminal ileum were collected and processed. Samples of diets and digesta were analysed for amino acids and acid-insoluble ash, and the apparent ileal amino acid digestibility values were calculated.

The crude protein content (N x 6.25) of wheat samples varied widely ranging from 9.30 to 17.21 g/kg. Ileal nitrogen digestibility varied from 0.72 to 0.85 and the mean ileal digestibility of the 15 amino acids from 0.70 to 0.84. In general, differences between wheat samples in digestibility of individual amino acids paralleled those in nitrogen digestibility. Lysine and threonine were the least digestible essential amino acids in wheat. A positive relationship was found between grain protein content and protein digestibility (r=0.77, P<0.001). The amino acids in high-protein wheat samples were found to be more digestible than those in low protein cultivars. In studies with pigs, Wiseman et al. (1994) also reported a positive correlation between protein content and protein digestibility in wheat. A significant positive correlation (P<0.001) between digestibilities of nitrogen and amino acids was also noted in this study. Nitrogen digestibility estimates were closely related to the mean digestibility of the 15 amino acids (r=0.93; P<0.001) and lysine digestibility (r=0.82; P<0.001).

The AME values of wheat samples for broilers varied from 11.4 to 13.5 MJ/kg DM. Interestingly, no relationship was evident between AME and nitrogen digestibility (r=0.08, P>0.05) or grain protein content (r= 0.06, P>0.05).


Department of Animal Science, The University of Sydney, Camden, NSW 2570.