APPARENT ILEAL AMINO ACID DIGESTIBILITY OF AUSTRALIAN SORGHUM

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Sorghum is one of the most common cereal grains used by the Australian poultry industry. It can be included up to 60-70% of a broiler diet and may contribute most of the energy and a great portion of amino acids in the diet. Small differences in nutrient content or digestibility can affect the bird performance. Considerable research has been reported on the apparent metabolisable energy (AME) values of Australian sorghum and the values have been found to vary from 15.3 to 16.7 MJ/kg DM (Black et al., 2005). However, data on the amino acid digestibility of Australian sorghum are limited. The objective of the present study was to determine the apparent ileal amino acid digestibility of locally grown sorghums and to examine the relationship between crude protein and amino acid contents in sorghum.

Male broiler chickens, that had been fed commercial broiler diets were individually weighed at day 34 post-hatching and the birds with bird weights closest to the mean were selected and randomly allocated into pens (7 birds/pen). Seven locally grown sorghum samples were obtained from commercial sources and included in experimental diets (918 g sorghum/kg) as the only source of protein. Celite (20 g/kg) was added to all diets as a source of acid-insoluble ash (AIA) which was used as an indigestible marker. Diets were provided ad libitum and water was available at all times. Each assay diet was fed in a mash form to three pens from 34 to 41 days of age. On day 41, the contents of the lower half of the ileum were collected following a lethal injection of sodium pentobarbitone. Ileal digesta from birds within a pen were pooled, immediately frozen, freeze-dried and ground prior to chemical analysis. Amino acids and AIA were analysed as described by Li et al. (2005).

The crude protein content of sorghum samples varied from 80.2 to 117.5 g/kg. The concentrations of amino acids were in the ranges which were reported by Ravindran et al. (1998). The correlation coefficient between crude protein and amino acid contents were positive. With increasing protein levels, the concentrations of all amino acids increased significantly (r>0.90, P<0.01) except for lysine (r=0.743, P=0.056). The average ileal digestibility coefficients of amino acids in different sorghums varied from 0.73 to 0.82. The differences in digestibility of crude protein and lysine between sorghum samples were approximately 11 percentage units. There were significant positive correlations between crude protein content and digestible amino acid content in sorghum. The amino acids in higher protein sorghums were more digestible than those in lower protein sorghums (P<0.01) except for methionine (P=0.02). Similarly significant positive correlations (r>0.85, P<0.014) between digestible crude protein and digestible amino acid concentrations have been found in sorghums. The digestibility of lysine varied among sorghum samples and was generally lower than other essential amino acids (except for threonine and histidine). However, digestibility of lysine tended to be higher in high protein cultivars compared to low protein cultivars.

The present results show that the concentrations of individual amino acids in sorghum are influenced by grain protein content. Amino acid concentrations in sorghum increased linearly with increasing levels of crude protein. The highly significant positive correlations indicate that it is possible to predict the total and digestible amino acid contents from the crude protein content of sorghum samples.


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