

The Influence of Dietary Crude Protein Level on Apparent Amino Acid Digestibility in Poultry

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Values reported in the literature for the apparent amino acid digestibility of feedstuffs vary considerably. Several dietary, animal and experimental factors are responsible for the observed variations in amino acid digestibility within a feedstuff. The major dietary factors include level of feed intake, level and composition of fibre, and anti-nutritional factors. In theory, the apparent amino acid digestibility is also dependent on the protein content of the assay diet. In studies with rats, Donkoh and Moughan (1994) found that the apparent ileal amino acid digestibility in meat and bone meal increased with increasing dietary protein contents. Limited studies have been carried out with poultry to investigate this aspect. The objectives of the present study were to determine the effects of increasing dietary crude protein levels on the apparent excreta amino acid digestibilities in caecectomised cockerels fed diets that contained soyabean meal or cottonseed meal.

Ten caecectomised cockerels, approximately 75 wk of age, were used in the study. The assay was arranged in the form of two 5 x 5 Latin Squares, and each square received semi-purified diets containing either soyabean meal or cottonseed meal as the sole protein source. Each diet type was formulated to contain five crude protein levels (50, 100, 150, 200 and 250 g/kg). Celite was included in the diets as source of acid-insoluble ash. All diets contained similar crude fibre contents. Within each experimental period, the birds fed the respective diets for seven days and total excreta was collected during the last four days for analysis. This procedure was repeated a further five

times so that each bird received all diets. Diet and excreta samples were analysed for amino acids and digestibility values were calculated using acid-insoluble ash as the marker.

Apparent digestibility of amino acids in soyabean meal and cottonseed meal increased ($P < 0.05$ to 0.001) with increasing dietary protein levels. The magnitude of response however, was reduced as the dietary protein contents increased; the response was greatest up to 150 g crude protein/kg and then reached a plateau. In soyabean meal diets, the increases for all amino acids were generally in the range of 3-6 percentage units. In cottonseed meal diets, the increases were in the range of 4-6 percentage units except for threonine, serine, isoleucine, tyrosine, histidine and lysine where greater increases (8-12 percentage units) were observed. These results suggest that the protein level in assay diets could strongly influence apparent amino acid digestibility values in poultry and that values determined at low dietary protein levels (less than 150 g crude protein/kg) may not be applicable in practical diets with higher contents of protein. These findings have relevance to amino acid digestibility measurements of cereals which are usually carried out with the direct method where the cereal grain (SO-120 g protein/kg) is the sole source of protein.

References

- DONKOH, A. & MOUGHAN, P.J. (1994) The effect of crude protein content on apparent and true ileal nitrogen and amino acid digestibilities. *British Journal of Nutrition*, 72: 59-68.