Guanidination has no influence on amino acid digestibility of proteins for broiler chickens

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A novel technique based on the guanidination of dietary proteins, to distinguish between endogenous secretions and exogenous or dietary sources of amino acids in intestinal digesta, has been applied to the measurement of ileal endogenous amino acid losses in poultry (1). Guanidination is the chemical process wherein the lysine moieties in dietary proteins are transformed to homoarginine (2-amino-6-guanidino-hexanoic acid) by reaction with *o*-methylisourea under alkaline conditions. Implicit in the use of guanidinated proteins to measure endogenous amino acid secretions is that guanidinating reaction has little or no effect on the amino acid profile of the protein and on its susceptibility to proteolysis. However, the potential racemisation of amino acid residues to D-forms during guanidination is a concern associated with the alkaline pH (10.5) employed. Proteins containing D-amino acids have been reported to show decreased digestibility in vitro (2). In the present study, the influence guanidination on the amino acid digestibility of casein, soyabean meal, cottonseed meal and canola meal for broiler chickens was examined.

The proteins were guanidinated according to the procedures described elsewhere (1) with the modification that incubation was carried out at 4 ^{0} C. The digestibility assay diets contained the test ingredient (guanidinated or unreacted forms) as the only source of protein. The proportions of dextrose and the test ingredient were varied in each diet to obtain 200 g/kg crude protein. Celite (20 g/kg) was added to all diets as a source of acid-insoluble ash which was used as an indigestible marker in the calculation of digestibility coefficients. The assay methodology has been described previously (3). The amino acid digestibility values of guanidinated and unreacted ingredients were compared using the t test.

Digestibility of amino acids in guanidinated and unreacted proteins were remarkably similar, with the exception of serine and isoleucine in casein and, glutamic acid, isoleucine and leucine in soyabean meal where small, but significant ($P < 0.05$) differences were noted. The present results confirm the assumption that guanidination has little effect on the susceptibility of guanidinated proteins to proteolysis. The possibility of some degree of destruction of amino acids in another concern associated with guanidination. Calculation of recovery of the amino acids, however, showed that guanidination does not cause significant changes in the concentrations of the acid-stable amino acids (except lysine). The recoveries of amino acids were close to 100% in the four protein sources.

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2. Bunjapamai S, Mahoney RR, Fagerson IS. Determination of D-amino acids in some processed foods and effect of racemisation on in vitro digestibility of casein. J Food Sci 1982; 47: 1229-1234.
3. Ravindran V, Hew LI, Ravindran G, Bryden WL. Amino acid digestibilities of plant protein supplements for broilers. Proc Aust Poult Symp 1997; 9: 227.