

## EFFECTS OF DIETARY PROTEIN ON PLASMA AMINO ACIDS IN YOUNG CHICKS

M. JOIS, Y. MOLLAH and W.L. BRYDEN

Free amino acids constitute only 0.5% of the total pool of amino acids in the body and plasma free amino acids represent a trivial portion of the pool of free amino acids in mammals (Munro 1970). In view of this, the validity of assessing the quality/adequacy of dietary protein by measuring plasma free amino acids may be questioned. There is evidence for absorption of intact peptides from the gut in non-ruminants (Gardner 1983) and Jois et al. (1984) have suggested that peptide amino acids may be important for tissue metabolism in ruminants. We report here measurements of plasma free (PFAA) and peptide (PPAA) amino acids in broiler chickens fed a range of dietary proteins.

Groups of chickens (5 w old) were fed the diets listed in the Table. Cereal diets were fed as such, protein meals were added to a basal ration of glucose and the complete diet contained all protein sources. Each diet contained 250 g/kg DM crude protein plus added vitamins and minerals. Blood collected by cardiac puncture from chicks fed each diet after 4 d of feeding the diet, was pooled prior to analyses for PFAA and PPAA (Jois et al. 1984). Apparent absorption of amino acids (ABS) was measured as the difference between intake and ileal flow of amino acids. Results are presented below.

	indispensable amino acids			dispensable amino acids		
	ABS (mmoles/d)	PFAA (mM)	PPAA (mM)	ABS (mmoles/d)	PFAA (mM)	PPAA (mM)
complete diet	43	4.1	2.1	71	6.0	1.9
casein	104	7.1	2.0	105	4.9	2.7
soyabean meal	117	5.0	1.5	149	4.5	2.2
sunflower meal	72	3.6	2.4	96	3.8	3.2
cottonseed meal	93	3.9	2.3	123	4.0	3.6
wheat grain	33	3.0	1.8	55	4.2	2.8
maize grain	29	2.9	1.8	38	5.6	3.5
sorghum grain	28	2.6	1.3	41	5.4	2.2

Total indispensable PFAA (Y) and ABS (X) were significantly correlated ( $Y = 1.997 + 0.03 X$ ,  $r^2 = 0.78$ ,  $P < 0.02$ ). There were significant positive correlations between PFAA and ABS for the individual PFAA asp/asn, thr, gly, val, ile and lys. Total PPAA comprised from 40% (complete diet, soyabean and casein diets) to 75% (sunflower and cotton seed diets) of total PFAA, but no correlations between PPAA and ABS were observed. In spite of the latter, analyses of the profiles of PFAA and PPAA for indispensable amino acids suggested the PPAA act to balance dietary deficiencies of amino acids. When the molar ratio of an essential amino acid in PFAA was lower than that in chick muscle tissue the concentration of the corresponding PPAA was high. The data raise the possibility that PPAA have a role in meeting the amino acid requirements of chicken tissues.

GARDNER, M.L.G. (1983). *Biochem. Soc. Trans.* 11: 810.

JOIS, M., ANNISON, E.F., GOODEN, J.M. and McDOWELL, G.H. (1984). *Proc. Nutr. Soc. Aust.* 9: 162.

MUNRO, H.N. (1970). In 'Mammalian Protein Metabolism', Vol.4, p.299. (Academic Press : New York).

Department of Animal Husbandry, University of Sydney, Camden, New South Wales 2570