URINARY EXCRETION OF HOMOARGININE IN CHICKENS

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Guanidinated proteins, in which lysine has been converted to homoarginine ((S)-2-amino-6-guanidino-hexanoic acid) have been used as a marker for determining endogenous amino acid losses in chickens (Siriwan et al. 1994), and to derive true amino acid digestibility at the terminal ileum. In poultry it would be advantageous to make digestibility measurements in the excreta of caecectomised cockerels. When this was attempted, high concentrations of homoarginine were observed in excreta as compared to ileal digesta (Angkanaporn et al. 1994) indicating the unreliability of endogenous amino acid values in excreta. The excreta comprise faeces and urine. The excreted homoarginine could be of faecal and/or urinary origin. The sources of excreted homoarginine were examined in this study.

Six-week-old broilers were fed semipurified diets containing either casein or guanidinated-casein (G-casein) (200 g/kg) as the sole source of protein. Two feeding regimens were employed: ad libitum for four days or precision-feeding following an overnight fast, with a single meal and sampling three hours later. Urine samples were collected using a non-surgical technique (Benoff and Buss 1976). After urine collection, blood samples were collected, birds euthanased and lower ileal digesta collected. Plasma, urine and ileal samples were analysed for amino acids. Concentrations of homoarginine (μmole. litre^{-1}) in plasma and urine are shown in the table.

	Casein		G-Casein	
	Ad libitum	Precision-fed	Ad libitum	Precision-fed
Plasma	10.1±3.2	not detected	553.0± 86.6	185.9± 34.0
Urine	27.6±4.8	8.0±1.6	6114.5±985.4	391.5±113.7

The digestibility of homoarginine was 98% indicating essentially complete absorption of this amino acid from G-casein. This was reflected in circulating levels of homoarginine in both ad libitum-fed and precision-fed birds. Urinary concentrations of homoarginine indicate that a considerable portion of absorbed homoarginine was excreted via this route. Interestingly, homoarginine, though at very low concentrations, was found in the plasma of birds fed no dietary homoarginine (casein-fed), but not in ileal digesta of these birds. It appears that birds can synthesize homoarginine de novo. The significance and efficiency of this pathway including the transformation of homoarginine to lysine is worthy of further investigation as it is assumed (Prior et al. 1975) that homoarginine is rapidly converted to lysine in vivo.

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