AMINO ACID REQUIREMENTS OF HORSES ESTIMATED FROM TISSUE COMPOSITION

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There have been few studies of equine amino acid requirements, largely because the most widely used approach to determining amino acid requirements, the empirical dose-response assay, is extremely costly and time consuming. An alternative approach stems from the observation that proteins of high nutritional value for the gowing animal resemble in their amino acid composition the body proteins of the animal consuming them (Mitchell 1950). This has led to the concept that the amino acid requirements of an animal are determined by the composition and amount of protein being synthesized. As studies with chickens, pigs and rats (Fisher and Scott 1954; Williams et al. 1954; Fuller et al. 1979) have demonstrated a high correlation (0.94 to 0.99) between empirically derived estimates of amino acid requirement and those based on amino acid analysis of the carcass, this approach was followed in the present study.

Samples of gluteal (G), longissimus dorsi (LD) and extensor carpi radialis (ECR) muscles were obtained from horses euthanased at the University's Rural Veterinary Centre. Tissues were minced, homogenised, sampled, ether extracted and hydrolysed prior to amino acid analysis by ion-exchange chromatography. The values obtained are listed below relative to lysine along with the relative amino composition of mare's milk (Doreau and Boulot 1989).

	Horse Tissue			Mare's
	G	LD	ECR	Milk
Lysine	100	100	100	100
Methionine	29	27	28	30
Methionine + cystine	40	38	39	49
Threonine	62	61	61	53
Tryptophan	-	-	-	19
Isoleucine	56	54	54	64
Leucine	109	107	106	129
Histidine	65	58	58	36
Phenylalanine	60	61	59	56
Phenylalanine + tyrosine	108	108	106	113
Valine	63	61	62	77
Arginine	74	72	76	79

The balance of essential amino acids in the different horse muscles are in close agreement and are in general agreement with the milk profile. It is to be expected that milk would contain an amino acid profile that would reflect muscle, the major tissue of protein accretion in the growing animal. The ideal balance of amino acids is likely to vary from that of muscle tissue when the amino acids in viscera, bone and hide are taken into account. Nevertheless, the amino acid profile of muscle will be a good first approximation when determining the amino acid balance of equine diets.

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