K. J. Carpenter & J. Atkinson (personal communication) with diets based on oxidized casein was brought to our knowledge.

Combinations of casein, gelatin, zein and maize gave unsatisfactory assays with non-linear response. The diet given in Table 1 has proved a satisfactory basal diet for assay of vegetable and animal proteins when the amounts added provide not more than 0·03% of tryptophan.

The slope–ratio design consists of a zero dose, single and double doses of each substance and of the standard, and a 'supplemented' dose of each substance. The latter consists of a single dose of the substance plus a single dose of the standard, and is used to test for the presence of an inhibitor or for stimulatory action as proposed by Kodicek & Pepper (1948). Four replicates of four chicks are used for each dose level, the assay period being from 10 to 18 days of age.

Table 1. *Percentage composition of basal diet for chick biological assay of available tryptophan*

Maize gluten feed (29% crude protein)	58·3
Gelatin	8·5
Dried whey	2·5
Maize oil	2·0
Mineral mixture (Dean & Scott, 1965)	4·6
Vitamin mixture (Dean & Scott, 1965)	2·0
Choline chloride	0·2
L-lysine hydrochloride	0·36
DL-methionine	0·29
Procaine penicillin	0·01

Made to 100% with test material and a filler consisting of a mixture of fine sawdust, kaolin and maize oil. The sawdust and kaolin were present in 2:1 ratio and the amount of maize oil adjusted so that the filler and test material have the same metabolizable energy content.

The mean values for total and available tryptophan in five samples of groundnut meal and four samples of Norwegian herring meal were respectively 0·98 and 0·97, and 1·15 and 0·76 g/16 g nitrogen. The standard errors of the biological determinations were 0·03 and 0·01 for the groundnut and herring meals respectively.

The authors are grateful to their colleagues Mr M. T. Friend, for total tryptophan analysis and Mr J. Taylor, for statistical advice.

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A chick biological assay for available methionine. By E. J. Harwood and D. H. Shrimpton,* *Unilever Research Laboratory, Colworth/Welwyn, Sharnbrook, Bedford*

The method of Miller, Carpenter, Morgan & Boyne (1965) could not be reproduced satisfactorily by us to give a linear response curve. The deviation from linearity was

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greatest when vegetable proteins were assayed and we concluded that this was because the imbalance of amino acids in the basal diet was accentuated when vegetable, as compared with animal, proteins were assayed. The basal diet of Guttridge & Lewis (1964) is more satisfactory for balance of amino acids but has the disadvantage that a low 'blank' (apparent low methionine) is achieved by using underheated soya meal with a high antitrypsin activity, the presence of which may influence the efficiency of utilization of a test protein added to the basal diet.

To overcome these problems a basal diet (Table 1) of groundnut meal, to achieve a low level of methionine, supplemented with gelatin and pure amino acids, to redress the amino acid imbalance, has been used. The assay was designed and carried out as

Table 1. *Percentage composition of basal diet for chick biological assay of available methionine*

Extracted decorticated groundnut meal (49% crude protein)	26·6
Gelatin	6·16
Dried whey	5·0
Maize oil	5·0
Fine sawdust	5·0
Mineral mixture (Dean & Scott, 1965)	4·6
Vitamin mixture (Dean & Scott, 1965)	2·0
Procaine penicillin	0·01
L-lysine hydrochloride	0·420
L-cystine	0·267
L-tryptophan	0·063
L-valine	0·126
L-leucine	0·364
L-isoleucine	0·163
L-threonine	0·131

Made to 100% with test material and maize starch.

described by Harwood & Shrimpton (1969). Under these conditions a linear response was obtained when DL-methionine was added up to 0·05% and when soya-bean meal was added up to 7·5%. To prevent amino acid imbalance when groundnut meal was included as the test meal the pure amino acids added to the basal diet were increased in proportion to the added groundnut protein.

The mean values for available methionine in five samples of groundnut meal and four samples of Norwegian herring meal were respectively 0·64 and 2·56 g/16 g nitrogen. The standard errors of the biological determinations were 0·03 and 0·36 respectively.

The authors are grateful to their colleague Mr J. Taylor for statistical advice.

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