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LYSINE SUPPLEMENTATION OF TURKEY GROWER DIETS

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Summary

Commercial Australian White turkey poults, kept in small pens, were fed commercial diets until 8 weeks. Poults were then fed either 20 per cent dietary protein, with or without added lysine, or 24 per cent dietary protein, each with a metabolizable energy content of either 11.5 or 12.75 MJ/kg.

The poults fed on the 24 per cent protein diet were heavier than those on the 20 per cent protein diets. Addition of lysine had no significant effect on liveweight, and tended to depress growth of birds fed the higher energy diets. Feed conversion ratio was not significantly affected by treatment.

I. INTRODUCTION

The protein content of diets fed to turkeys from 8 weeks is usually 20 per cent (N.R.C. 1970). The dietary protein content for maximum growth from 6 to 12 weeks was 23 per cent for males and 2 1 per cent for females and, with lysine supplementation, the corresponding values were 2 1 per cent and 19 per cent (Balloun and Phillips 1957). Kratzer, Davis, and Marshall (1956) stated that the lysine requirement was 4.4 per cent of the protein from 4 to 14 weeks. Added lysine improved growth only when dietary lysine was less than or equal to 5 per cent of the protein at any age (Balloun 1962). The discrepancy between these two recommendations suggests that either some other amino acid affects lysine utilization, or that the energy content, fat, or some other factor in the diet is involved. The protein requirements were higher on high energy diets, but the lysine response was not influenced by the dietary energy content (Balloun 1962).

The present experiment was aimed at evaluating lysine supplementation, at two energy concentrations, of a diet containing 20 per cent crude protein, and comparing the results with that obtained by providing additional lysine by increasing protein content to 24 per cent.

II. MATERIALS AND METHODS

Day-old Australian White turkey pouts, from a commercial hatchery, were sexed, wingbanded, and weighed to the nearest gram. Thirteen females and 12 males were allocated to each of 24 pens. At 8 weeks, obvious runts were removed from the experiment. Additional poults were randomly selected for removal to reduce bird numbers in the pens to 20. Feed and water were available at all times. Poults were weighed each fortnight and debeaked when 5 weeks old.

Poults were fed commercial pre-starter from day old to three and a half

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weeks, and then commercial starter up to 8 weeks. Empty body-weight was recorded on a sample (12½ per cent) of the birds processed at 14 weeks.

Pens, with fresh soft wood shavings as litter, were each 8.7 m^2 in area. For the first 4 weeks, poults were under continuous light. During this period, brooding was confined to an area of 3.02 m? Heat was supplied by one 275 W infra-red lamp per pen, 0.6 m from the floor.

Composition of pelleted grower diets is shown in Table 1. Diets were analysed for crude protein, ether extract and calcium by the A.O.A.C. (1960) methods. The experiment was designed as a 3 x 2 factorial in four replications. There were two metabolizable energy (M.E.) contents, 11.5 and 12.75 MJ/kg, and three protein treatments, 20 per cent, 20 per cent protein with 0.1 per cent extra lysine, and 24 per cent crude protein. Groups contained ten birds of each sex but results were analysed separately.

TABLE 1

Percentage composition of experimental diets from 8-14 weeks

Ingredient*	Crude protein / M.E. (MJ/kg)	20%		24%	
		11.5†	12.75†	11.5	12.75
Wheat		58	63	51	52
Bran		7	2	6	2
Pollard		10	4	8	5
Soybean meal (45%)		4	4	9	10
Fish meal (62%)		4	5	6	7
Meat meal (50%)		9	9	12	12
Tallow		2	5	2	6
Rock phosphate		0.5	0.5	Nil	Nil
Limestone		1	1	Nil	Nil
Vitamin: mineral premix‡		0.5	0.6	0.5	0.6
Actual crude protein		20.8	21.2	24.2	24.4

* Each diet also contained 3% dehydrated lycerne, 2% milk powder, 0.2% salt, 0.1% choline chloride and 0.1% added methionine.

† These two diets, each with 0.1% added lysine hydrochloride formed a further two treatments.

‡ Premix supplied vitamins A (5×10^5 I.U./g) 2.6, D_3 (4×10^5 I.U./g) 0.6, and E (25%) 4.4; menadione sodium bisulphate 0.4, vitamin B_{12} (500 mg/kg) 2.6, riboflavin 0.7, niacin 6.6, d-calcium pantothenate 1.8, pyridoxine 0.4, folic acid 0.1, ferrous sulphate 4.8, zinc oxide 4.9, manganese sulphate 14.6, ethoxyquin 18.5, carbarsone (Carb-O-Sep) 100 g and biotin 0.005 g/100 kg of the low energy diets. The premix supplied 20% more than these figures for the high energy diets.

III. RESULTS

Table 2 shows mean 14-week liveweights taken from a combined analysis of the data and adjusted for 8-week weights. Growth of birds fed on 24 per cent protein in their diet was more rapid than those fed 20 per cent dietary protein with or without 0.1 per cent added lysine. Males grew more quickly than females but there were no other significant treatment effects. Dietary treatments were applied from 8 to 14 weeks of age, and adjustment of 14-week live weight for 8-week live weight was necessary due to the non-uniformity of the 8-week live weights. Birds fed low energy diets tended to be heavier than those on the high energy diets and this barely reached significance in the females only.

TABLE 2

*Mean liveweight (kg) of males and females at 14 weeks adjusted for 8-week weight**

M.E. MJ/kg of diet	Protein 20%	Protein 20% + Lysine	Protein 24%	Energy means
Male				
11.5	4.70	4.75	4.93	4.80 c
12.75	4.75	4.64	4.94	4.77 c
Protein means	4.73 a	4.70 a	4.94 b	
Female				
11.5	3.75	3.84	3.95	3.85 c
12.75	3.77	3.70	3.82	3.76 d
Protein means	3.76 a	3.77 a	3.89 b	
Combined sexes				
Protein means	4.24 a	4.23 a	4.41 b	

* Row or column means with the same adjacent letter are not significantly different at the 5% level.

Feed conversion ratio averaged 2.21 and was not significantly influenced by treatment. Mean empty body-weight of males was 4.2 kg and of females, 3.2 kg. Dressing percentages were 88 per cent and 84 per cent respectively. Carcass quality, subjectively assessed at the processing plant, was satisfactory.

TABLE 3

Expected gross profit

	Diet	Feed cost c/kg	Income over feed and poult cost c/poult/batch
A	24% protein, low energy	10.5	35.18
B	24% protein, high energy	11.2	35.37
D	20% protein + lysine, low energy	9.8	35.64
F	20% protein + lysine, high energy	10.6	25.29
C	20% protein, no added lysine, low energy	9.5	37.74
E	20% protein, no added lysine, high energy	10.3	30.41

Income over feed and poult cost, based on the estimated cost of producing the diets, is shown in Table 3. There were no marked differences except for the low incomes from birds on the high energy-low protein diets.

IV. DISCUSSION

A combined analysis of the male and female data showed that growth of birds, fed 24 per cent protein, was more rapid than of those fed 20 per cent protein in their diet. There was a non-significant trend for more rapid growth on the low energy diet and this trend was just significant at the 5 per cent significance level for the females only. Pellets were so soft, due to the high fat content of the high energy diet and the lack of steam conditioning in the pelleting process, that they rapidly deteriorated to a fine powder which was observed to be relatively unpalatable to the birds. In contrast to the beneficial effect of increased protein, addition of lysine to the low protein diet had no significant effect on growth or feed efficiency. Carcass quality was not noticeably affected by treatments.

Lysine was not the first limiting amino acid in these diets. Increased dietary protein content, with consequent increased content of essential amino acids,

increased growth of turkeys. Wheat and wheat by-products constitute a large proportion of the diet, and wheat contains considerably less leucine (N.R.C. 1970) than maize or sorghum. The calculated leucine content of the low protein diets was 1.32 per cent or 85 per cent of the N.R.C. (1970) requirements for turkeys from 8 to 11 weeks of age (when adjusted for the high energy treatments). Concent-rations of isoleucine, threonine, arginine and lysine (before addition of lysine) were also less than N.R.C. (1970) requirements. However, D'Mello and Lewis (1970) showed that the requirement of chicks for any amino acid depends on the relative concentrations of other amino acids in the diet. In our experiment, increased lysine may have increased the apparent requirement for arginine. Growth would then be limited by this increased requirement.

The interaction between dietary energy content and lysine addition, although not statistically significant, could be important. Lysine depression was more severe with the high dietary energy content because of the decreased daily intake of diet, and hence of the essential amino acids.

There was apparently no economic advantage with the 24 per cent protein diet in spite of the marked beneficial effect on growth. However, as the diets were not least-cost for nutrients, the income over feed and poult cost is only a guide to likely commercial results.

V. REFERENCES

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