1970

Amino Acid and Protein Requirements of Layers

E. J. Novacek
South Dakota State University

R. D. Muller

C. W. Carlson

South Dakota State University
Brookings, South Dakota
Department of Animal Science
Poultry Section

A.S. Series 70-10

AMINO ACID AND PROTEIN REQUIREMENTS OF LAYERS

E. J. Novacek[1], R. D. Muller[1] and C. W. Carlson[2]

Studies on this problem have taken two approaches, one using a 9.4% protein basal diet supplemented with 0.19% lysine, 0.25% DL-methionine and 0.04% DL-tryptophane and the other comparing a 14% protein plus methionine diet with a typical 16% protein diet.

The 9.4% protein diet was obtained by diluting a typical corn-soybean 16% protein diet with glucose. When supplemented with the amino acids, this diet had supported about 60% hen-day egg production over a 9-month period. Further improvements had not been obtained with single or combined supplements of other essential amino acids designed to supply 125% of the requirements whereas responses were obtained from 3% protein equivalent from fish meal, wheat, corn, barley and soybean meal.

DeKalb 131 pullets, two to an 8 inch cage, were used in the study here described. Using a factorial experimental design, which permits the determination of the effects of supplementation of individual amino acids even when given in combinations, no indications of responses were obtained from 0.05% more lysine or methionine or from the addition of 0.1% inositol to the 9.4% protein diet. The basal diet had contained lysine, methionine and tryptophane at 125% of the requirements. When the data were considered as factorial effects, only valine and the combination of valine and inositol

---

[1]Former Graduate Assistants, Station Biochemistry and Animal Science, respectively

[2]Professor and Leader, Poultry Research and Extension

resulted in a numerical improvement in production. Analyses for lipids in blood and liver showed wide individual variation and no relationship could be detected for the effects of dietary treatment. Similar variations were observed for hens on 16% protein diets and one could not conclude that protein level, amino acid treatment or inositol supplementation had any effect on incidence of fatty livers in this work.

A further study involving threonine supplementation of this 9.4% protein diet is in progress. For this work DeKalb 151 pullets were used.

The results of four year's work in the old facilities had shown that a 14% protein diet with 0.05% or 0.10% methionine supported egg production equal to or better than that obtained with a 16% protein diet with or without methionine additions. In two year's work with the new facilities, no production differences were observed for hens in floor pens for the two types of diets. However, production was poor because of the slat floor conditions (see Plumart et al., this monograph) and so it was not really a fair comparison. For the two month period that hens were on litter floor with each diet being fed to 140 hens in each of the three sections of the environmental house (1 sq. ft./bird), production averaged 64.2% for each diet.

However, for the hens in cages, the two years results differed. The diets and other conditions were as identical as possible. However, the DeKalb 131 strain was used the first year and the 151 strain the second year. Each diet was fed to layers in 3 replicates of 6 cages per replicate with 4 birds in each 16 inch cage. For an eight-month period of the first year, egg production averaged 70.4% for the hens on the 16% protein diet versus 59.6% for the hens on the 14% protein diet plus methionine, a highly significant difference. However, for a four-month period of the second year, egg production averaged 66.0% for the 14% protein plus methionine diet and 65.4% for the 16%

protein diet. No differences in either study were noted for feed efficiency, egg weight, shell thickness, Haugh unit valve, liveability or body weight maintenance.

Is it possible that the 131 strain has a greater requirement for protein than the 151 strain? This suggests that further studies on protein requirements with various stocks are in order.