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Feeding Value to Poultry of Grass Leaf Protein

Great Britain is short of protein-rich feeding-stuffs; also they are expensive. Laboratory-extracted leaf protein has been shown to contain a useful content of the essential amino-acids[1,2]. The largest immediate source of leaf in Great Britain is the grasslands. Grass leaf when eaten by ruminants is converted into animal products; but this process is slow and very wasteful. Pigs and poultry make only limited use of grass-leaf protein because of their inability to digest the fibre in grass.

Work is in progress at the Grassland Research Station to develop a large-scale method of extraction of leaf protein and make a product free from fibre[3]. The process involves the precipitation of the heat-coagulable proteins from the juice squeezed from the macerated herbage. The precipitate is separated by filtration and then dried and ground to a powder. The dried material used in the experiments described here contained 5–8 per cent nitrogen, 1–2 per cent crude fibre and 5–10 per cent ash. The feeding trials (unpublished) compared a mash composed of a basic cereal mixture supplemented with leaf protein, with a mash containing the same cereal mixture plus fish meal. The two mashes were made as similar as possible with regard to minerals, vitamins and other factors.

Table 1. Egg-laying Trial of 10 Weeks Duration

Feed treatment	% Crude protein in mash	Average number of eggs per bird	Average weight of eggs per bird (in oz.)
'Leaf protein' mash	16·9	38·8	86·2
'Fish meal' mash	19·4	37·7	87·4

When fed on the two mashes, two groups of six pullets showed no difference in either egg-production or in body-weight. Eggs from the birds fed on the leaf-protein mash had greenish albumen, and if stored these eggs would have developed green yolks[4].

At four weeks of age the live-weight gain of sixty chicks fed from one day old on the 'leaf protein' mash was significantly lower than the gain of sixty similar chicks fed on the 'fish meal' mash. From four weeks, all the chicks were fed on a commercial 'grower's' ration, and the 'fish meal' reared chicks came into lay one to two weeks earlier.

Table 2. Chick Trial 1. (Pullets and Cockerels)

Feed treatment	% Crude protein in mash	Mean live-weight (gm.) at age 3 days	31 days	Mean live-weight gain (gm.) per 100 gm. crude protein eaten
'Leaf protein' mash	16·0	36·1	163	2·11
'Fish meal' mash	20·2	38·6	207	1·95

Table 3. Chick Trial 2. (Cockerels)

Feed treatment	% Crude protein in mash	Mean live-weight (gm.) at age 1 day	28 days	70 days	Mean live-weight gain (gm.) per 100 gm. crude protein eaten
'Leaf protein' mash	16·8	39·0	165	575	1·28
'Fish meal' mash	20·2	38·5	230	704	1·63

In a second chick trial, each ration was fed to three groups of twenty-five 'day-old cockerels'. At four weeks the mean difference of gain in weight was significant (Table 3) and confirmed the earlier trial. When adjustment is made for the difference in the mean weights at the start of the experiments and for the difference in the crude protein percentage in the two rations, all the live-weight gains are of the same order as those reported for other chick mashes[5].

However, at the end of the second chick trial, when the chicks were ten weeks old, the difference in the gain in weight was not significant. The early advantage of the fish meal mash was not being maintained[6]. Work is now in progress feeding pullets from one day old to the end of their first laying period on the two rations.

The results suggest that grass leaf protein can be a useful protein concentrate in poultry feeding, if the mash is supplemented with vitamin B_{12} and balanced for minerals. It may be found necessary to add an essential amino-acid to improve the biological value. There is evidence[7] suggesting that grass protein may be deficient in methionine. The chlorophyll could be extracted, as it has commercial uses. The feeding of the extracted leaf protein should then not produce eggs with green yolks.

Work is in progress in the agronomic and biological fields on problems requiring further investigation. For example, the dried protein may have a digestibility and feeding value lower than that of the freshly precipitated material. Improved methods of cutting and collection of herbage to reduce soil contamination, and hence the ash content of the product, are being developed. A study is being made of the leys and other forage crops which will produce the highest yields of extractable protein.

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