FURTHER INVESTIGATIONS INTO THE FACTORS THAT CONTRIBUTE TO POOR GROWTH PERFORMANCE IN CHICKENS FED RATIONS CONTAINING CERTAIN FISH MEALS.

J.P.H. Wessels and B.J. Post

INTRODUCTION

From time to time feed compounders receive fish meals that fail to maintain the good reputation that fish meals generally have as a main source of dietary protein for chickens. The aim of this project is to investigate the quality factors that cause fish meals to give poorer growth performance; also to obtain a better understanding of the production and compositional variables that make one fish meal perform better than another. It is anticipated that a thorough knowledge of the chemistry of fish meal could lead to an improvement in the product, and to greater uniformity in quality.

DESIGN OF EXPERIMENT

When the broiler grower becomes aware of the poor performance of a diet, the fish meal used in that particular diet will probably have been used up by the feed compounder. It is therefore difficult to obtain samples of these atypical fish meals. Even if such fish meals could be obtained, it is unlikely that information regarding the production variables prevailing at the time of manufacture of the meal could be obtained retrospectively from the fish meal producer.

To overcome the problems the following experimental procedure was followed: The first step was to draw fairly substantial samples of fish meal from as many fish meal plants as practicable. Care was taken to record all data relevant to the production process. The meals were then tested for chicken growth by incorporating them into standard growing rations and analysed in the laboratory. The chemical and biological properties of the meals were then correlated with chicken growth and the known production variables.

METHODS AND RESULTS

At the time of writing six fish meals have been sampled. These six meals were obtained from factories on the South African West Coast. The species of fish, the delay before processing and the production conditions were recorded; also the processing equipment used and the drying times and temperatures where possible. In addition, information regarding the levels at which formalin, stickwater and ethoxyquin were added were obtained. This information is summarised in Table I.

It should be recognised that it is extremely difficult to quantify the fish meal production process in all its complexity. The inlet and outlet temperatures of dryers, and the levels of formalin, stickwater concentrate and ethoxyquin that are added are particularly difficult to determine accurately. Parts of the plant are often inaccessible, and sampling points for potential measurements may be high off the ground or difficult to reach for other reasons; also very hot surfaces and escaping steam make measurement-taking uncomfortable. At some factories but not at others there are pressure and temperature gauges positioned in strategic places. The figures that are presented here are therefore the best obtainable estimates.

The six fish meals cover a wide spectrum of production variables and include fish meal made from both fresh and very stale fish, meal dried by at least three different methods and meal with variations in the levels of formalin, stickwater and ethoxyquin addition.

It may be seen from Table I that there are substantial differences between the meals. Attention is drawn to the following points:

The most modern drying equipment was used during the manufacture of meal A: This meal was made using a steam tube dryer followed by an afterdryer.

Meal B was made from very putrid fish: Plant malfunction had necessitated delays, and the fish could only be processed with the addition of abnormally high levels of formalin.

No antioxidant (ethoxyquin) was added to meals C and D: In the case of meal C, this was also due to plant malfunction, but the meal D sample was deliberately drawn before the dosing point to introduce this as the only difference between this and meal E.

The meals D and E were made at the highest cooker and dryer temperatures measured. It must be pointed out, however, that this factory operates waste heat dryers. A feature of such dryers is that the gases passing through are at a high temperature, but contain little heat to pass to the wet meal because these are dry gases.

None of the present samples contain offal material from the canning process. Under certain circumstances the inclusion of offal appears to strongly affect meal quality. During the 1989 fishing season a production run was witnessed where meal made from offal was accidentally subjected to abnormally high temperatures sufficient to cause gizzard erosion in chickens (Post and Wessels 1989).

Meal evaluation: Chicken growth test

The meals were tested in a chicken growth experiment, the crucial test for fish meal quality. The method used in this biological test was as follows:

Day-old broiler chickens were obtained from a local hatchery, weighed and placed in heated brooder cages. There were five groups of chickens per ration and eight chickens per group. A basal feed was made up consisting of:

Yellow maize meal	74,6%
Non-test fish meal	12,0%
Sunflower meal	10,0%
Calcium carbonate	1,43%
Mono-calcium phosphate	1,0%
Choline chloride	0,8%
Vitamin mixture	0,175%
Manganese sulphate	0,003%

Each ration contained 85% of this basal feed. About 15% of a test fish meal was added to make the rations up to a constant protein level of 24%. Small amounts of sugar were used to correct for the variation in the crude protein content of the fish meal. The chickens were given these rations for three weeks. During this time they were weighed three times. The final mass for each cage was used in the calculation of chicken growth. The results of the growth test are shown in Table I.