COMMERCIAL FISHERIES REVIEW

May 1957-Supplement Washington 25, D.C. Vol. 19, No.5a

DETERMINATION OF UNKNOWN GROWTH FACTORS IN FISH MEALS BY CHICK-GROWTH TESTS

By H. R. Bird* and N. L. Karrick**

ABSTRACT

COMMERCIAL AND EXPERIMENTAL MEALS FROM FISHERY BYPRODUCTS WERE ASSAYED BY CHICK-FEEDING TESTS FOR UNKNOWN GROWTH FACTORS. IN THESE ASSAYS, THE SAMPLES WERE COMPARED WITH THE UNKNOWN GROWTH FACTORS IN A REFERENCE SAMPLE FOR FISH SOLUBLES THAT HAD BEEN ASSIGNED A VALUE OF 10 UNITS. THE RESULTING DATA INDICATED THAT THE COMMERCIAL AND EXPERIMENTAL MEALS HAD POTENCIES THAT RANGED FROM 2.5 TO 13.8 UNITS.

INTRODUCTION

Fish meals are believed to contain factors other than the known nutrients that are important in the diets of poultry. The present project was started (1) to determine the amounts of these factors in different fish meals and (2) to investigate what variables might affect the amounts of these factors.

ASSAY PROCEDURE

The assay procedure and some of the difficulties encountered in the assays were discussed in a report by Barnett and Bird (1956). The purified basal diet used in the present work is given in their article. In the present experiments, soybean protein was used as the source of protein, and sucrose was used as the source of carbohydrate. Supplements were added at the expense of the sucrose. Chicks were fed the diet with or without supplement from the time that they were 1-day old to the time that they were 4-weeks old. The chicks used were obtained from hens that were kept in wire cages and artificially inseminated. The diet of the hens was a good complete breeder mash. In these assays, the growth effect of fish meals was compared to that of a standard sample of fish

Fig. 1 - Battery room in the Poultry Husbandry Department of the University of Wisconsin where fish meal assays are conducted.

*DEPARTMENT OF POULTRY HUSBANDRY, UNIVERSITY OF WISCONSIN, MADISON, WISC.
** CHEMIST, FISHERY TECHNOLOGICAL LABORATORY, BRANCH OF COMMERCIAL FISHERIES, U. S. FISH AND WILDLIFE SERVICE, SEATTLE, WASH.

solubles. The standard solubles was included in each series of assays and was assigned a potency of 10 units per gram.

SAMPLES

Both commercial fish meals and experimental fish meals were tested. The commercial meals were processed from menhaden, tuna, and salmon waste. The experimental meals were prepared either in the Fishery Products Laboratory at Ketchikan, Alaska, or in the Service's Fishery Technological Laboratory at Seattle. The raw materials used in the preparation of the experimental meals were pink salmon eggs, whole herring, pink shrimp waste, Dungeness crab waste, tuna waste, both with and without red meat, and sea-lion liver and viscera. These materials were processed by mild methods, such as freeze-drying, enzyme digestion, or minimum cooking followed by air-drying. The experimental meals were included in the study in an attempt to find a product that might be exceptionally high in the unknown growth factors.

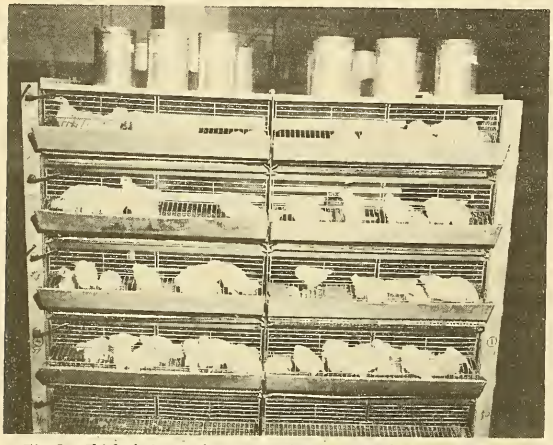

Fig. 2 - Chicks being used to assay unknown growth factors in fish meal.

RESULTS

The samples analyzed to date have had potencies from 2.5 to 13.8 units. Eight commercial menhaden meals gave results that fell within this entire range. The values in descending order were 13.8, 11.8, 9.5, 5.4, 5.3, 3.0, 2.7, and 2.7 units. Two commercial tuna meals had 6.7 and 5.6 units, and a commercial salmon meal had 2.5 units.

The experimental samples gave results that varied from 2.9 to 8.7 units.

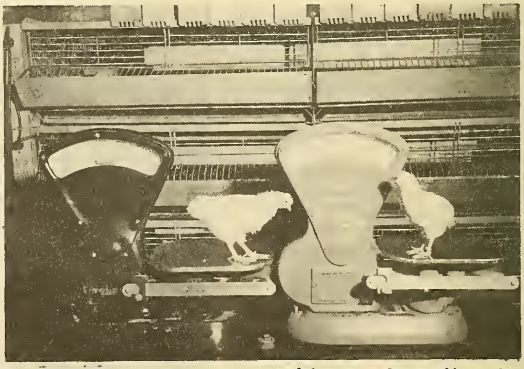

Fig. 3 - The chicken on the right had been fed an unsupplemented basal diet. It weighed 200 grams. The chicken on the left had been fed the same diet plus 2 percent menhaden meal. It weighed 260 grams.

DISCUSSION

The unknown growth factors in the commercial fish meals varied from sample to sample. The meal containing the highest concentration of growth factors had more than 5 times the amount found in the one containing the least. The differences that occurred among the meals could not be traced to any information known about the meals.

None of the experimental samples proved to be equal in unknown growth factors to the solubles being used as a standard. Since the experimental samples were prepared under mild conditions, the variations found probably were due to differences in the raw materials.

No studies were made on the effect of storage on the unknown factors in fish meals, although the age of the commercial meals varied considerably. Systematic studies now are being made, however, on the effects of storage and of storage conditions.

LITERATURE CITED

BARNETT, B. D., AND BIRD, H. R.
1956. STANDARDIZATION OF ASSAY FOR UNKNOWN GROWTH FACTORS. POULTRY SCIENCE, VOL. 35, NO. 3 (MAY), PP. 705-710.

STUDY OF THE SPAWNING HABITS OF FISHES NECESSARY TO DETERMINE ABUNDANCE

In most species a successful spawning occurring almost every year is necessary in order that the number of fishes be maintained at a high level. If for any reason the spawning is restricted, numbers in future years may be reduced. The success of spawning and the subsequent survival of the eggs and larvae changes markedly from year to year and these changes are normally the main causes of changes in the abundance of adult fish.

Under natural conditions, when subjected to little or no fishing, fish fluctuate in abundance about an average level. When the number reaches a low level. due to natural fluctuations, conservation restrictions may not increase the abundance and may even be harmful. Fishing and other activities, such as dredging, filling, pollution, etc., also cause fish stocks to be reduced or dispersed.

When a decline in the abundance of any species of fish is noticed, it is necessary to determine whether natural fluctuations or man's activities are the main cause. A detailed knowledge of spawning habits and the factors which affect spawning is important in this connection.

While it is known that man's activities usually affect the spawning and egg survival of offshore fishes only to a limited extent, little is known about the effect of such activities on the spawning habits of coastal fishes. Studies made so far show that many such species spawn and spend their larval life in waters adjacent to shorelines which are increasingly being subjected to land development schemes. Before the effect on the spawning habits of fishes can be ascertained, it is necessary to determine the "optimum" conditions (most desirable from the point of view of the fishes) of, for example, water temperature, salinity, etc., for spawning and the range of tolerance of the fish. If land development causes changes beyond the limits of tolerance, the spawning activity may be adversely affected.

--"Sea Secrets," December 4, 1956,
The Marine Laboratory,
University of Miami, Coral Gables, Fla