

STUDIES ON EFFECT OF PROCESSING AND STORAGE ON THE CONTENT OF UNKNOWN GROWTH FACTORS IN FISH MEAL^{1/}

By H. R. Bird*

ABSTRACT

Within the limits of precision of the assay, the methods of processing and of storage used in the present study had no measurable effect on the relative content of growth factors in fish meal.

BACKGROUND

During 1955 and 1956, more than 20 samples of commercial and experimental fish meals, including 8 commercial menhaden meals, were assayed for unknown growth factors by feeding the meals to chicks according to the procedure of Barnett and Bird (1956). In each assay, a standard sample of fish solubles was fed at several levels. The standard sample was assigned a potency of ten. The potencies of all of the fish-meal samples, when compared with the standard sample of fish solubles, ranged from 2.5 to 13.8. The comparative potencies of the eight commercial menhaden meals were 13.8, 11.8, 9.5, 5.4, 5.3, 3.0, 2.7, and 2.7. Attempts to relate this wide variation to known differences in origin, processing, or storage of the meals were unsuccessful.

The variation in growth-factor content of the meals was great enough to be of practical importance, so it was desirable to study systematically the variables that might influence growth-factor content.

EXPERIMENTAL AND RESULTS

Two special samples of menhaden meal were set aside for storage studies. Results obtained thus far are given in table 1.

Meal Sample	Storage Conditions			Relative Unknown-Growth-Factor Potency
	Kind of Atmosphere	Temperature	Time	
Number		Degrees F.	Days	Units Per Gram
GF 600	Air	Room	0	6.2-14.7
	Air	Room	44	5.5- 7.0
	Air	Room	210	5.1- 6.4
	Nitrogen	Room	210	8.7-13.6
	Air	-20	210	4.3- 8.1
	Nitrogen	-20	210	8.1- 8.4
GF 601	Air	Room	0	5
	Air	Room	20	6.7- 8.2
	Air	Room	42	5.8- 7.1

A series of tuna meals was processed experimentally, and the individual meals were exposed to different temperatures for different times during cooking and drying. The results are given in table 2.

DISCUSSION

Storage up to 7 months did not cause measurable variations in the experimental meals (table 1) and thus did not help to explain the previously observed variations

^{1/}This research was performed under a collaborative agreement between the University of Wisconsin and the U. S. Fish and Wildlife Service, Bureau of Commercial Fisheries.

* Chairman, Department of Poultry Husbandry, University of Wisconsin, Madison, Wis.

in commercial meals. Unfortunately, the initial assay of sample G. F. 600 yielded a wide range of values, including some that were questionably high. The relatively consistent values obtained in subsequent assays, for example, cast doubt on the value of 14.7 obtained in the first assay.

A real decrease in potency during the first 44 days of storage is unlikely, especially since no such decrease was measurable in the case of sample G. F. 601. Likewise, it cannot be said that temperature or exposure to air influenced potency during storage of G. F. 600 for 7 months. The sample kept under nitrogen at -20°F . showed slightly greater potency than did the one stored in air at room temperature, but no importance can be attached to such small differences in an assay as variable as this one.

Unfortunately, the assays of the meals subjected to different processing conditions also showed considerable variability from one test to another. It does not appear that any of the treatments caused a measurable decrease in growth-factor potency.

Table 2 - Effect of Processing Conditions on the Relative Unknown-Growth-Factor Potency of Several Tuna Meals Prepared from the Same Raw Material

Meal Sample	Processing Conditions			Relative Unknown-Growth-Factor Potency		
	Cooking	Drying		Test 1	Test 2	Test 3
	Time ^{1/}	Time	Temperature			
Number	Hours	Hours	Degrees F.	Units/g.	Units/g.	Units/g.
628	0.5	0.5	270	9.1-13.3	4.5- 4.6	4.2-5.2
629	0.5	0.25	390	8.3-17.8	8.4-11.3	3.4-7.8
630	0.5	5	105	10.2-17.0	4.2- 6.9	7.0
631	0.5	3	390	2.4- 9.1	5.4-16.5	3.5-4.9
632	3	0.5	270	-	14.4	7.5-7.6

^{1/}A batch process at 8 pounds pressure.

If variability of growth-factor potency is not related to storage time or temperature and time of processing, one must next consider variations in raw material before processing. Meals made from a number of species of fish have already been tested without showing any marked or consistent variation due to species. There remains the possibility that holding time and conditions before processing might be important.

Although the method of assay used is as precise as present knowledge will permit, the method obviously will not reveal small differences in potency. In fact, with results as variable as those obtained in the processing study, the growth-factor potency would have to be almost completely destroyed before the assay would reveal, with certainty, a decrease in potency. It might be pointed out that the development of a precise method of assay for unknown growth factors is difficult. The experience gained in the present studies may eventually contribute to the design of an assay with greater precision.

SUMMARY

Growth-factor potency of menhaden meals was not measurably decreased by storage for 7 months in air at room temperature. The potency of tuna meals was not measurably decreased by any of the heat treatments tried during cooking and drying. The assay for growth factors, being quite variable, does not reveal small differences in potency, however, so we cannot say that these factors had no effect.

LITERATURE CITED

- BARNETT, B. D., and BIRD, H. R.
1956. Standardization of Assay for Unidentified Growth Factors. *Poultry Science*, vol. 35, no. 3 (May), pp. 705-710.

□ □ □ □ □ □ □ □