COMMERCIAL FISHERIES REVIEW

March 1963 Washington 25, D. C. Vol. 25, No. 3

PRESENT AND FUTURE FACTORS THAT MAY INFLUENCE FISH MEAL DEMAND

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INTRODUCTION

Our fisheries constitute one of our most important sources of high-quality animal protein concentrate. Without relatively inexpensive sources of such proteins, there is doubt that the poultry and swine industries could have attained their present levels of efficiency.

Of the factors that influence the demand for fish meal, a few that seem particularly worthy of consideration give rise to the following questions: (1) How does the potential demand compare with domestic production plus imports? (2) How does the quantity of imports compare with United States production of fish meal, and what changes have occurred in available supply during the past two decades? (3) What effects are the relatively new poultry by-product meals (including feather meal) having on the demand for fish meal, and how are both classes of products related to the byproducts of the meat-packing industry? (4) What will happen if the fish growth factors are identified and manufactured cheaply? (5) What can we do to increase the buyers' satisfaction with fish meal?

If we can find answers to those questions, we can form a good picture of the future demand for fish meal.

PRODUCTION AND IMPORTATION OF FISH MEAL COMPARED WITH POTENTIAL DEMAND

To determine the relationship between the amount of fish meal presently available in this country and the potential demand, we have assembled pertinent information from a number of sources. The total domestic production plus imports of fish meal and solubles in 1961 give the available supply of those products (table 1).

Table 1 - United States Production and Imports of Fish Meal and Solubles[1/], 1961

Product	U. S. Production		Imports		Total
	Actual	As 60% Protein	Actual	As 60% Protein	(Converted to 60% Protein)
	(Tons)				
Fish meal and scrap	299,000	299,000	218,000	218,000	517,000
Solubles	110,000	58,000	6,700	3,600	61,600
Total					578,600

1/U. S. Bureau of Commercial Fisheries, 1962.

To compare that quantity of fish meal with the amount of feed consumed by poultry and swine, we have assembled the information given in table 2 on feed intake of those animals.

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1/This paper is based upon a talk presented to the Virginia Fishermen's Association, February 13, 1962, Old Point Comfort, Va.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 669

Table 2 - Feed[1] Consumption of Poultry and Swine

Type of Poultry or Swine	Individuals	Feed Per Individual	Feed For Population	
	Millions	Pounds	Million Pounds	Tons
Poultry[3]:				
Chickens (except broilers)	369.4	4/100	36,948	18.5
Broilers	1,730.5	5/ 9	15,574	7.8
Turkey (breeders)	3.7	4/144	527	0.3
Turkey, poults (first 8 weeks)	81.9	6/ 9	736	0.4
Total			53,787	26.9
Swine[7]:				
Breeders	8.4	8/2,555	21,421	10.7
Market animals	75.0	8/ 600	45,000	22.5
Total			66,421	33.2
Poultry plus swine, total				60.0

1/Air-dry basis.
2/Feed: per year for breeder, per individual for market poultry and swine.
3/United States Department of Agriculture, 1960.
4/National Research Council, 1960.
5/Reference No. 4, Table 7.
6/Reference No. 4, Table 8. By interpolation, small-type female and male poults weigh respectively 2.5 and 3.1 pounds and have consumed 6.3 and 7.3 pounds of feed by the end of the eighth week; large-type weigh 4.2 and 4.8 and have consumed 8.9 and 10.6 pounds of feed. By representing distribution as 15 percent small-type and 85 percent large, the present mean size of turkeys at slaughter, slightly under 18 pounds, is approximated (United States Department of Agriculture, 1962a).
7/United States Department of Agriculture, 1961.
8/National Research Council, 1959.

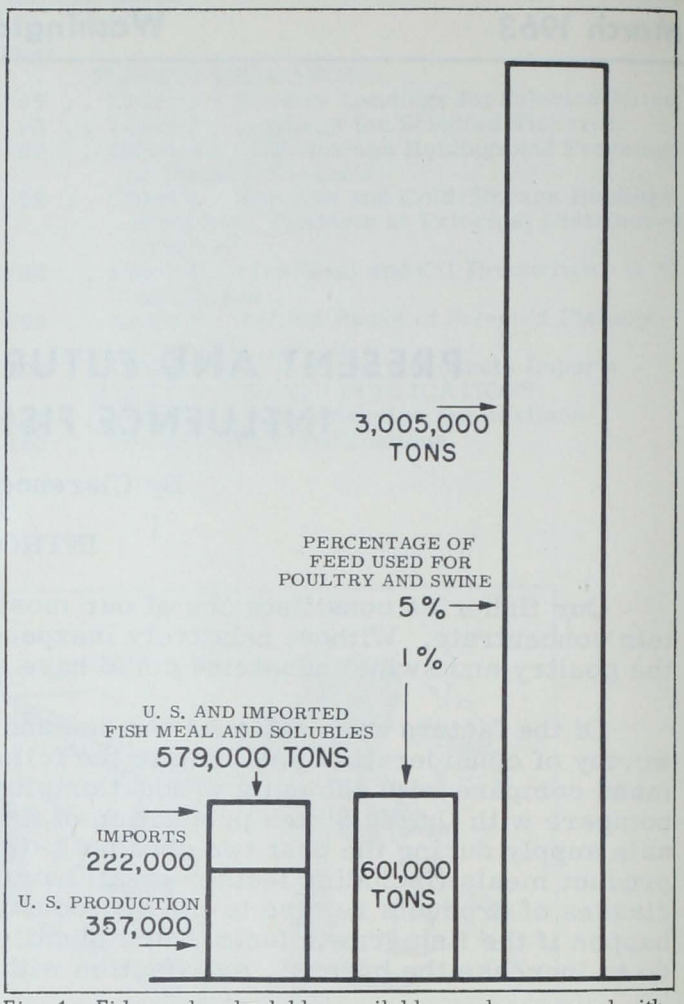

Fig. 1 - Fish meal and solubles available supply compared with possible demand. (Data are from tables 1 and 2.)

The amount of fish meal and solubles available in 1961 was about 579,000 tons (solubles converted to a 60-percent protein basis). This level of production, though seemingly large, is dwarfed when compared to the feed intake of poultry and swine. One percent of the total feed consumption given in table 2 is shown in figure 1 together with the present level of production of fish meal and solubles plus imports. This figure demonstrates that our production and imports are equal to only about 1 percent of the feed consumed by those animals. A 5-percent level, however, would not be excessive for any of the animals shown in table 2; actually, many broiler rations contain 10 percent of fish meal, or slightly more. The limiting factor is the oil content of the meal because a mixed feed that contains over 1 percent of fish oil can impart a flavor to poultry meat detectable by some individuals. Fish meal that contains 10 percent of oil or less can be used safely at the 10-percent level in a mixed poultry feed. Obviously, the possible consumption of fish meal and solubles is several times greater than the present domestic production plus imports.

IMPORTED FISH MEAL COMPARED WITH DOMESTIC PRODUCTION

Imports accounted for 38 percent of the fish meal and solubles consumed in the United States in 1961, whereas for the years 1960, 1959, and 1958, the percentages were 28, 27, and 25, respectively. It may be concluded that imports are increasing rapidly and that they may soon exceed domestic production. Because this short-time comparison may distort the picture, however, we have represented graphically both the United States production and imports during the past 21 years in figure 2. The figure shows that although both domestic production and imports have increased during the period in question, imports have tended to increase faster than has domestic production. Nevertheless, the increase of imports in comparison with United States production viewed over a two-decade period has not been as rapid as is suggested by the data for the past four years. Although South American production has

undoubtedly influenced recent imports, figure 2 shows that in 1950, and in some prior years, imports represented a considerable share of the total consumption, amounting at times to as much as 19 percent. It would be unwise to use the imports of the past four years as a basis for predicting future imports, yet at the same time we are not justified in extrapolating the data for the past one or two decades.

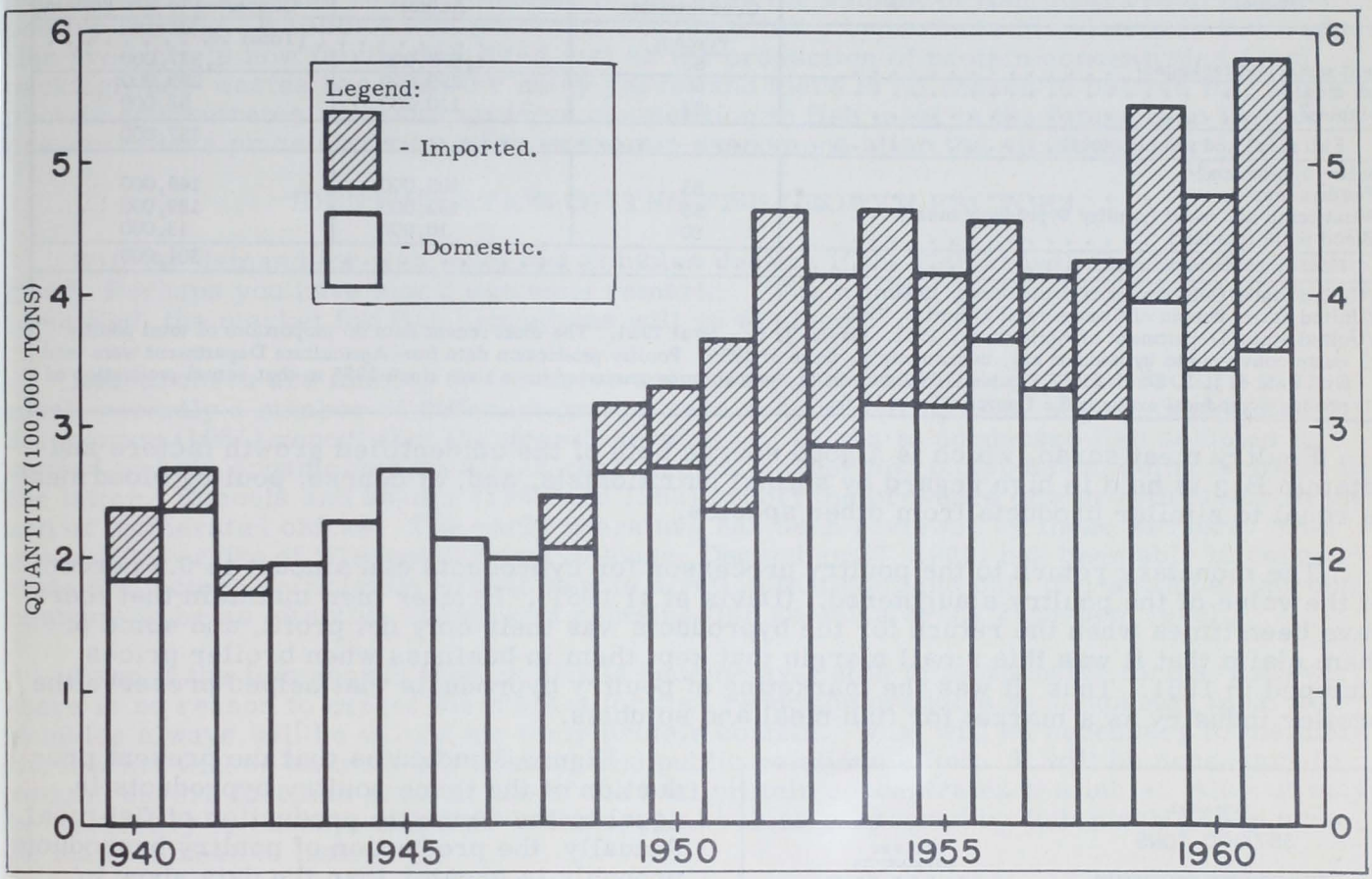

Fig. 2 - Domestic production and imported fish meal and solubles. (Tonnages of solubles converted to represent 60-percent protein. U. S. Bureau of Commercial Fisheries Statistical Digests, 1959 and earlier; and U. S. Supply of Fish Meal and Solubles, 1951-1961 and 1962.)

It appears safe to assume that United States production and imports will both continue to increase, but it is not possible to predict whether domestic production and imports will follow the trends of the past two decades, those of the past few years, or some other trend.

MEAT SCRAP AND POULTRY BYPRODUCTS IN RELATION TO FISH MEAL

The largest source of animal protein concentrate is meat scrap and tankage, by products of the meat packing industry of which roughly 1½ million tons are sold annually. The production of those concentrates about doubled during the past 20 years. The magnitude of meat scrap and tankage production in comparison with other protein concentrates is given in table 3.

Poultry byproducts--feather meal, poultry meat scrap, and blood meal--however, have appeared on the market only within the last decade.

When feather meal first appeared, there was some question as to whether it would prove to be a suitable feed ingredient. Unprocessed feathers are, of course, practically undigestible, and many poultry producers doubted that cooking feathers about half an hour at 35-pound pressure would render them fit for use as feed. Actually, such treatment produces a concentrate that is 70 percent digestible. It has been demonstrated that feather meal protein is well utilized by chicks in proportions up to almost two-thirds of the dietary protein intake when

properly supplemented with lysine, methionine, and tryptophan--amino acids that occur in relatively limited amounts in feather meal (Davis et al 1961).

Table 3 - United States Production of Animal Protein Concentrates

Product	Protein Concentration	Production	
		Actual	Converted to 60% Protein
	Percent	(Tons)	
Meat scrap and tankage[1/]	55	1,677,000	1,537,000
Fish meal[2/]	60	299,000	299,000
Solubles[2/]	32	110,000	58,000
Fish meal and solubles total			357,000
Poultry byproducts[3/]:			
Feather meal	85	105,000	149,000
Meat scrap and meal (poultry byproducts meal)	55	152,000	139,000
Blood meal (poultry)	80	10,000	13,000
Poultry byproducts total			301,000

1/United States Department of Agriculture, 1962b.
2/United States Bureau of Commercial Fisheries, 1962.
3/United States Department of Agriculture, 1961. Davis, J. G., et al 1961. The most recent data on proportions of total poultry waste converted to byproducts are, unfortunately, those of 1955. Poultry production data from Agriculture Department were used with data of J. S. Davis (1955 figures). Without doubt, percentages converted have risen since 1955 so that actual production of poultry byproducts exceeds the figures offered by us.

Poultry meat scrap, which is a good source both of the unidentified growth factors and vitamin B_{12} is held in high regard by animal nutritionists, and, of course, poultry blood meal is equal to similar products from other species.

The monetary return to the poultry processor for byproducts can amount to 0.5 percent of the value of the poultry slaughtered. (Davis et al 1961). Broiler men maintain that there have been times when the return for the byproducts was their only net profit, and some of them claim that it was this small margin that kept them in business when broiler prices slumped in 1961. Thus, it was the marketing of poultry byproducts that helped preserve the broiler industry as a market for fish meal and solubles.

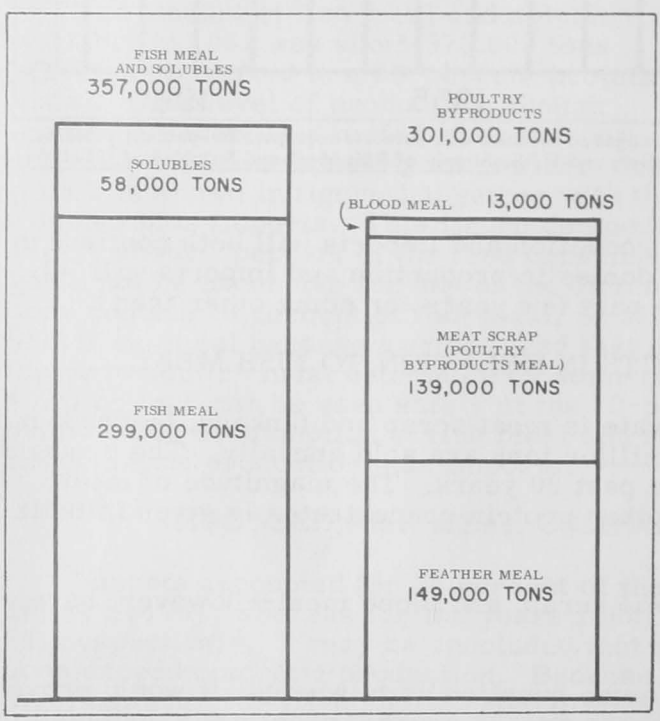

Fig. 3 - United States production of fish meal and solubles, and poultry byproducts. (Quantity modified to represent 60-percent protein for all products. Data are from table 3.)

Figure 3 indicates that the present production of the three poultry byproducts is equal to the domestic production of fish meal. Actually, the production of poultry byproducts probably is greater than the data show in view of the fact that the most recent available data on the proportions of poultry wastes converted to byproducts are those compiled in 1955 (Davis et al 1961). These conversion rates with the most recent poultry production data available (United States Department of Agriculture 1961) were utilized in arriving at the poultry byproducts output levels given in table 3.

How great a share of the market will be taken by poultry byproducts in the future? To get an approximate answer, we have to glance at the history of the poultry byproducts industry. Feather meal was virtually unheard of prior to 1950, but by 1955, 46 percent of the output of poultry feathers was being converted into feather meal; this means that together with those feathers utilized by farmers and dealers, 76 percent actually was utilized. Almost without doubt, the proportion converted to feather meal has increased since

1955. Recovery rate of offal was already 90 percent and of blood 44 percent in 1955, and it is not unlikely that those rates also have increased. It seems reasonable to assume that a large part of all the poultry waste now available is being converted into protein concentrates.

While an increase in poultry production doubtless will result in an increased output of byproducts, it likewise can be expected to increase the amount of fish meal required for poultry feeding. It follows that production of the poultry byproducts in relation to fish reduction products is now fairly stabilized just as the production of protein concentrates from packinghouse wastes has been for many years, and there is no reason to believe that those protein concentrates will offer greater competition to fish meal in the future than they do at present unless price shifts or other economic phenomena alter the situation.

IDENTIFICATION OF THE FISH GROWTH FACTORS

Will the demand for fish meal and solubles decline if the fish growth factors are identified? Perhaps you have heard someone remark: "The minute the fish growth factors are identified, the market for fish byproducts will go to pieces."

Researchers are making an intensive search for the unidentified growth factors of fish meal; recently a number of different groups have reported progress. Mason, Sacks, and Stephenson (1961) report that the growth response of chicks to condensed fish solubles is caused by both organic and inorganic constituents, copper and molybdenum being included in the latter. Runnels and Snyder (1960 and 1962) report the presence of a growth factor in the ash of incinerated chicks. The early literature has been reviewed by those workers. One group (University of Wisconsin News Release, December 27, 1961) has been able to concentrate the factors sufficiently well to enable a ration that contains only one-sixth percent concentrate to be as effective as one that contains fish solubles at the 2-percent level.

Even if the fish growth factors should become available in inexpensive forms, however, there is no reason to expect the market for fish reduction products to disappear; meal and solubles always will be valued for their protein content. What will be necessary to maintain the market will be an increase in sales and public relations effort. It will be necessary to remind buyers that fish meal is one of the best protein concentrates available. Also, it may be necessary to educate users as to the special values possessed by fish meal. They must be made to realize that:

1. Fish meal is made up of proteins of high quality with (a) a favorable distribution of amino acids and (b) a high nutritional availability of those amino acids.

2. Fish meal incorporates high levels of methionine and lysine, amino acids that are valuable in corn-soy and other feed mixtures in which levels of those amino acids are low.

3. Fish meal contains valuable B-complex vitamins.

4. Fish meal contains liberal amounts of phosphorus and calcium plus other needed elements, including essential trace elements.

5. Fish meal helps maintain rapid growth of young swine and poultry despite stress factors.

6. Fish meal, in correctly formulated rations, helps keep hens laying and is believed to assist in maintaining fertility of hatchery eggs.

Just as it will become increasingly necessary for fish meal producers to inform consumers of the values inherent in fish meal, it will also become increasingly important to guard against dissatisfaction on the part of fish meal users. The best way to satisfy the users is to provide a uniform product of the highest quality possible.

MAINTAINING AND INCREASING THE DEMAND FOR FISH MEAL

Fish meal producers in various countries (IAFMM Record of Proceedings 1961) agree that more emphasis must be placed upon quality of the product. However, an improvement in average quality will necessitate industry-wide agreement on a number of points such as minimal and maximal permissible levels of oil and moisture in fish meal, maximal allowable temperatures of scrap during curing, and methods of analysis; and until such agreement is reached, the achievement of uniform quality cannot be expected to materialize.

Manufacturers of mixed feed, while discussing the problem of standardization of fish meal with personnel of the Technical Advisory Unit, have offered what may be an interim, partial solution. The feed producers suggested that it is important to have quality information, in advance, on each shipment of meal. Some stated that if they knew what to expect, they could plan accordingly, and quality of the meal would not then be such a crucial matter. One feed producer offered the following example: "We received a shipment of fish meal that was 20-percent oil, but we had been told of this fact in advance and were able to plan accordingly. We used that batch of meal without delay and everything worked out fine."

Several feed producers spoke of receiving fish meal containing a high percentage of bones ranging up to 2 inches in length and meals containing excessively high levels of oil and moisture, or with a scorched odor. Those men pointed out that they know how to utilize fish meal that falls short of perfection provided they have advance information as to the characteristics of a given shipment.

If uniform trade descriptions could be adopted, they would facilitate use of the product at the feedmill. For instance, the degree to which an unwanted odor is present in meal could be described in a standardized manner according to prior agreement. The presence of large particles in meal and their frequency, as well as percentages of moisture and oil, could also be mentioned. These simple statements of fact would go a long way toward increasing consumer acceptance of fish meals that vary in degree of excellence.

The idea that uniform trade descriptions be adopted was put forth by conscientious businessmen who sincerely believe that the eventual benefits to fish meal producers will far outweigh the immediate disadvantage. Producers of fish meal therefore may wish to give the idea serious consideration with a view to securing industry-wide cooperation to achieve the goal. Merchandising of fish reduction products may require more public relations work and plain salesmanship in the future than it did in the past, and accurate trade descriptions on an industry-wide basis will constitute an excellent starting point toward improved relations with consumers.

SUMMARY

Knowledge of past and present production levels of fish meal, solubles, and other protein concentrates was extrapolated to suggest future trends of the industry. On this basis, it may be concluded that:

1. Potential use of fish meal in this country is much greater than present consumption.

2. Although imports of fish meal have increased rapidly during the past few years in proportion to domestic production, viewed over a period of the past 21 years, both domestic production and imports have in general increased gradually. It would be unwise to extrapolate data from import data during the recent past in order to predict future imports.

3. Production of meat scrap and tankage, which constitute the largest output of animal protein concentrate, has doubled in two decades. Production of poultry byproducts--including feather meal, poultry meat scrap, and blood meal--has grown from nothing 12 years ago to tonnages comparable with the domestic production of fish meal during the past few years. It is impossible for production of protein concentrates of the latter varieties to increase appreciably, unless poultry production also increases, if most of the poultry waste that can be

converted economically to concentrates is already being utilized; and there is good evidence that the major portion is being so converted.

4. Owing to the intrinsic values of fish meal as an animal protein concentrate, there is no reason to expect a rapid decline in its use even if the growth factors should be identified and manufactured cheaply, provided that improved merchandising techniques, more public relations effort, and greater salesmanship are employed.

5. To maintain the demand for fish meal, representatives of the industry should consider adoption of uniform standards of quality. In the meantime, the industry can maintain excellent relations by supplying buyers with accurate information concerning the quality of each shipment. In the face of impending changes, the industry may find that it will be good business to adopt this policy soon.

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CERTAIN CANNED FISHERY PRODUCTS HEATED MAINLY BY CONVECTION

"Convection may be defined as the transfer of heat by currents. A pail of water heats mainly through convection, since water or other liquids tend to expand when they are heated, which decreases the density. The greater density of the colder liquid causes the heated liquid to rise and set up a circulation, thus distributing the heat throughout the mass. Transfer of heat by convection is very much faster than transfer of heat by conduction. Wet-pack shrimp, oysters, and "ready-to-serve" soups and chowders are products heated mainly by convection. Products in which convection currents are sluggish or absent due to a semisolid nature of the product, such as salmon, require much longer processing at a given temperature than products in brine or liquid in which convection currents are unhindered."

--Principles and Methods in the Canning of Fishery Products, Research Report No. 7 (page 24), U. S. Fish and Wildlife Service.