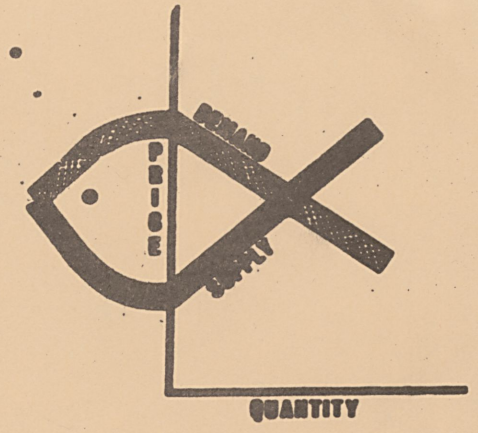

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Implications of the Peruvian Anchoveta Situation

by

Market Research and Services Division

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U.S. NATIONAL MARINE FISHERIES SERVICE
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IMPLICATIONS OF THE PERUVIAN ANCHOVETA SITUATION

SUMMARY

1. U.S. faces curtailment of shipments of fish meal from Peru, due to possible resource disaster in Peruvian anchoveta fishery.

2. U.S. is one of the world's major users of fish meal, with annual requirements approaching 600 thousand tons -- which is twice or more the quantity produced in the U.S.

3. Peru is major foreign supplier of fish meal to U.S. and accounts for about 70% of U.S. imports of fish meal. Thus, a cut-off of Peruvian meal could reduce U.S. supplies by more than one-third.

4. Anchoveta fishing is closed in Peru and based on poor recruitment -- estimated one-seventh of normal -- decision is difficult on when or if fishing should be resumed in 1973. Problem is that poor recruitment led to fishing of older stocks -- hence, an overall low stocks level exists which will take time to replenish.

5. Inventories of meal in Peru dwindling and Peru is certain to default on existing future commitments.

6. Peru supplies 58% of world fish meal and prospective shortages are creating substantial price pressures -- on world market and in U.S. September menhaden meal price in U.S. was $194 (per short ton) compared with $160 a year ago. In Europe, September price was $250, compared with $142 in same month last year.

7. Prices of fish meal are likely to continue to rise--UP TO A POINT. Price of fish meal relative to other ingredients in broiler or other rations is a controlling factor. At current price of soybean meal, domestic fish meal will trade at something above $200 per ton--perhaps 10% higher. Prices of soybean and other ingredients are rising, enabling fish meal prices to climb, but fish meal prices above $250 per ton are not foreseeable. Where the climb stops will also depend on Price Commission which is approving price hikes only where cost increases can be demonstrated.

8. Even with price constraints for fish meal, immediate effect may be exerted on menhaden resource which supplies 80% of U.S. fish meal raw material. It is estimated that menhaden fleet can increase effort 10-20 percent without new fleet additions. This means an increase in meal output up to 35,000 tons. If landings near MSY, this could precipitate resource problem. Without added effort, menhaden catch this year will be down about 16% from 1971.

9. There will likely be increased effort in other fisheries that can supply raw mat erial for fish meal but this will not add substantially to supplies in short run. Thread herring fishery, for example, has not developed. Anchovy stocks are under State regulation, although quota set for commercial landings is not being met. Some question exists about expansion of reduction plant output even if larger quotas were set.

10. Under best possible conditions, a normal return of Peruvian anchoveta fishery is not foreseen for 1973. A realistic assumption is 50% level of fish meal production in Peru. This would mean severe world shortage of fish meal at least through the middle of 1974. Pressures on U.S. menhaden likely will last at least through this period. Beyond this, in U.S. improved production of other ration ingredients will temper demand for fish meal, and tend to dampen prices independent of the Peruvian situation. Nevertheless, demand for fish meal is increasing world wide constantly, and any decline in production -- or stable production -- will contribute to increasing prices, thus contributing to conditions that can place pressure on the resource.

11. Overall, conditions in the fish meal industry lasting well into 1974 will encourage increased production in the U.S. The menhaden resource will therefore be exposed to added pressure, as will the California anchovy. The menhaden resource is the more vulnerable, because it is non-regulated and the industry has some capacity to increase effort. Therefore, a hard, immediate look at the alternative regulatory schemes is required, by State, federal and industry managers.

IMPLICATIONS OF THE PERUVIAN ANCHOVETA SITUATION

Atlantic and Gulf menhaden fisheries, principally, and West Coast anchovy, mackerel and tuna fisheries, constitute the resource base for the U.S. fish meal industry which presently supplies about half the U.S. fish meal requirements. The bulk of fish meal imports comes from Peru -- which supplies the U.S. with over one-third of its requirement. Future shipments from Peru are threatened, however, due to an apparent resource failure, and there is no likelihood that an alternative foreign source can be used -- at least in the short run.

Thus, the stage has been set for possible pressure on the Gulf/Atlantic menhaden resources and on the California anchovy resource. This paper discusses how the Peruvian situation may ultimately affect resources in the U.S. fisheries which supply the domestic fish meal industry, and the impact of developments on commerce in fish meal in the U.S. and world wide.

The Near Term Situation

In the U.S.

The U.S. is one of the world's major users of fish meal. In the U.S. fish meal is used principally as an ingredient in broiler rations, and continued growth in the broiler industry has been reflected in parallel growth in demand for fish meal. Domestic producers of fish meal supply about half the fish meal requirement. The remainder is imported mostly from Peru, which accounted for 70% of U.S. fish meal imports in 1971.

Canada and Norway also supply the U.S. with fish meal. The two accounted, respectively, for 20% and 8% of U.S. fish meal imports in 1971.

Total supplies of fish meal in the U.S. in recent periods, break down as follows:

	Production	Imports	Total
	Thousands - short tons		
1970	257.0	251.5	508.5
1971	282.5	283.2	565.7
% change	+ 9.9%	+ 12.7%	+ 11.2%
January-July			
1971	167.1	140.7	307.8
1972	147.2	305.9	453.1
% change	- 11.9%	+ 117.4%	+ 47.2%

Close to 80% of the fish meal produced in the U.S. is manufactured from menhaden. The menhaden fisheries are located in the Gulf area (75% of catch in 1971) and in the Atlantic (25% of catch in 1971.) Anchovy, tuna and mackerel contribute a small, although not insignificant raw material source for U.S. fish meal. These latter are taken in West Coast fisheries. Production of fish meal by raw material source for recent periods is as follows:

	Year			January - July		
	1970	1971	% change	1971	1972	% change
	(000 short tons)		(1%)	(000 short tons		(%)
Menhaden	188.6	221.0	+ 17.2	132.7	103.2	- 23.2
Anchovy, mackerel, tuna	42.9	37.0	- 13.8	21.1	30.7	+ 45.4
Thread herring	-	1.1	-	0.4	-	-
Unclassified	25.6	23.4	- 8.6	12.9	13.4	+ 3.9
Total	257.0	282.5	+ 9.9	167.1	147.2	- 11.9

In Peru

The Peruvian anchoveta fishery, which is the resource base for Peru's fish meal industry is in trouble. The fishery has been under management but this year an oceanographic phenomenon associated with water temperature, termed "El Nino," has apparently contributed to a serious recruitment failure and what has been taken this year has been from older stock. Thus, the entire stock of Peruvian anchoveta is at a low level. Total shipments of Peruvian meal are up considerably compared with a year ago, and there has been a considerable drain on existing inventories. The Peruvian government has banned exports of fish meal and oil from October 1, 1972, until further notice. Not filled are orders for 400,000 tons which, the government announced, would be shipped "on a pro rata basis as supplies become available." The 1972 statistics are as follows, for Peruvian fish meal:

	January - July		
	1971	1972	% change
	(1,000 metric tons)		
Production	945	845	- 10.6%
Exports	808	1,257	+ 55.6%
Home Consumption	24	51	+ 112.5%
End of Period Stocks	769	327	- 57.5%

Peru has historically supplied 58 percent of the world's fish meal. However, because of the appearance of "El Nino" during this year (1972), Peru's share is expected to decline substantially and world production as a result, will be down more than 20 percent for the year.

Fishmeal prices on rise--supplies short

The situation has been reflected in rising fish meal prices, both in the United States and the rest of the world. For example, the price of menhaden meal in Atlanta during the week of October 2 was quoted at $204 a short ton, which can be compared to an average price of $157.50 for 1971. Similarly, the price in Western Europe nations is up from an average $146 for 1971 to $250 per short ton in September. In the United States domestically produced fish meal is likely to remain at or above $200 per short ton for at least a year. The level will depend on how the Price Commission acts to restrain fish meal prices. An allowed increase would not be surprising since menhaden fishery may experience cost increases (as a result of added pressure on stocks) and thus justify an ease on price ceilings. 2/ Industry sources report that present supplies will last for less than 90 days. After that it is expected that all domestic production and any imports will be utilized as soon as they become available.

Fish meal prices are determined by domestic and foreign supplies as well as by the interaction of prices of several poultry and hog feed

ingredients including corn, soybeans, fat, and more recently, synthetic amino acids. Various alternative rations are used. Possibilities are (1) corn and fish meal; (2) corn, soybean and fat; and (3) corn, soybeans and synthetic amino acids. Thus, changes in prices of one component of a ration may set off a substantial change in the use of all ingredients.

In the past resistance to rising fish meal prices has been tempered by the preference for a minimum of 2% of the ration being fish meal. But, if fish meal prices rise at a faster rate than other ingredients, this preference may be relaxed. The reverse is true at present. That is, soybean meal prices are now moving up more rapidly than fish meal prices. The change is from $89 in January to $118 in September, 1972--about 32%. Corn and other feed grains are also experiencing price rises. Fish meal prices during January-September rose 18%. Under these conditions, and given the Peruvian fish meal supply situation, domestic fish meal is trading at a fraction above $200 per short ton, and is likely to remain at or above this level for probably a year at least.

There is still the question of how high prices can go. We find the protein meal market operating under higher prices for all products. Past experience may not be particularly helpful. Thus, all projections are subject to considerable error. At this time it is inconceivable that fish meal prices will rise above $250 per ton. Supplies of other ingredients can be increased--none very substantially in the short run--but taken together they could be enough to substitute for fish meal.

There is the further fact that broiler producers operate on low margins. An overall increase in price ration ingredients may trigger a cutback in broiler production, and thus reduce demand for fish meal, in any case. For these reasons there are fairly definite upper limits to fish meal price increases. The precise level is not known at this time, although increases of more than 20-25 percent over current levels are highly unlikely through 1974. Information obtained via phone contact with a major feed producer in early October indicated that this firm, at least, would pay up to $220 per ton of fish meal at current prices for other grains. Beyond this price, the 2% minimum for fish meal would be applied only to starter rations, and even this requirement would be relaxed if fish meal prices continued to climb.

U.S. menhaden fishing effort to increase

Obviously, in a rising price situation, there will be an incentive for domestic fleets supplying raw material for fish meal to increase their fishing effort relative to previous years. For individual fisheries the impact will probably be greatest on the Gulf and Atlantic menhaden resources. With a normal fishing effort for the balance of 1972, menhaden production is projected at 84 percent of 1971. However, increased fishing pressure the rest of this year may bring 1972 landings up to 1971 landings. Assuming that normal landings are at or near the MSY already, the projected increase in fishing pressure during the first 9 months of 1973 could be regarded as overfishing. An increase in effort in the range of 10-20 percent is possible without an increase in the number of vessels because the menhaden fleet can fish on more marginal weather days. However, our knowledge of the MSY for the menhaden fishery is not perfect, so that although there will definitely be an increase in fishing effort for 1973, we cannot predict with certainty whether or not the increased effort will actually result in overfishing.

No significant impact on other U.S. resources

It is unlikely that the California anchovy resource will be much affected. For various reasons, the State of California follows a conservative management program for the anchovy fishery.

Presently, the quota on commercial landings for reduction to meal is 110,000 m. t. of anchovies in California. The catch has been below the quota for economic reasons. The fishery probably could support a catch in the order of 500,000 tons. Nevertheless, improved economic incentive would not likely increase production in the short run. There is a real question of capacity sufficient to harvest and reduce anything above the present quota. Another constraining factor on expanded production of fish meal--at least in the area surrounding Los Angeles--is that the affluent must be substantially improved in terms of BOD requirements. This requires installation of a fish soluble processing capability, a requirement the processors have heretofore not found profitable.

The large thread herring resource in the Gulf (and to some extent in the Atlantic) will probably receive increased fishing pressure, but here too, there are short term constraints. Better techniques for harvesting need to be developed to achieve larger scale production. Also, there is a strong incentive toward conservative prosecution of this fishery because of its importance to mackerel, which in turn is important to commercial and sports interests.

There also will be an increased production from other resources (tuna and mackerel scraps in the Pacific, alewives in the Atlantic and numerous other species now classified as "trash") but the total production from these additional resources will not be great enough to relieve fishing pressure on the menhaden resource.

For example, substantial increase in supplies of fish meal from the New England trash fisheries are not likely. Fish meal plants in New Bedford, Massachusetts and Point Judith, R.I. are not operating. The catch of trash fish from January through September this year was 49.7 million lbs. compared to 71.0 million pounds landed in 1971 in the same period. Current high prices for food fish attracted fishermen away from the tras h fisheries. Also, continued heavy foreign fishing on the grounds has adversely affected the supplies of fish available for reduction into meal.

Nor are prospects bright for increasing fish meal supplies via Alaskan production. In years immediately after World War II and up to the 1960's Alaskan herring supported a substantial fish meal industry. Unfavorable prices relative to costs caused this fishery to decline. The last reduction plant closed in 1967. A new industry would involve completely reconstructing the plants. Salmon trollers, a strong political force, are opposed to substantial increases in herring catch, due to the belief that a larger herring stock is necessary to attract king salmon into the fishing areas in substantial quantities., All these factors argue against a significant increase in fish meal supplies from Alaska through the foreseeable period.

Outside the U.S. other nations will begin to exploit their existing fisheries to a greater extent and will begin a search for additional resources for fish meal production. However, in the period of one year from today being discussed, it is not expected that they will be able to provide the U.S. and the rest of the world with enough product to relieve the situation.

Situation after September 1973

Even if the Peruvian fishery returns to normal by the end of 1973, the fish meal situation could not completely return to normal by the end of 1973 because of the pipeline effects. It is important to recognize that world production for 1973 must be greater than average to effect a normal supply situation because we have to account for a normal ending stock and product in pipelines (on ships, at docks, at central warehousing facilities and at individual

feed-mixing firms.) Therefore, even under the best possible conditions we do not expect a completely normal situation before 1974. The following discussion of what the situation might be is based on assumed future production levels.

(1) Assuming Zero Production in Peru, 1973.

The absence of Peru would curtail world production of fish meal by more than a third. Based on observed price/supply relationships this could result in a world market price of about $300 per short ton (see text table following this discussion.) In the U.S., at least, there are constraints that would rule out such an increase. Price controls would disallow increases beyond what could be demonstrated as related to cost increases. Also, fish meal would begin to disappear from broiler rations as prices moved upward from $200 per ton (at the current price of soybean meal.) Nevertheless, without Peruvian production, price pressures on domestic meal will be great and incentives will be created for some added pressure particularly on the manhaden resource. If the price of other broiler ration ingredients continue to climb, fish meal prices in the U.S. conceivably could rise to $250 per ton, assuming that the increase was allowed by the Price Commission.

(2) Assuming that Peru Produces at a 50 Percent Level in 1973.

A more realistic assumption is that the Peruvian anchoveta fishery may produce at a 50 percent of normal level in 1973, while other nations are able to provide moderate increases relative to their normal levels during 1967-71. In this event, the world shortage of fish meal will continue until at least the middle of 1974.

There may appear to be an incentive for domestic producers to export fish meal. However, industry sources indicate that due to institutional constraints and customer goodwill, the possibility

of the U.S. becoming a net exporter is very slight. The impact on the U.S. will be for sustained increased fishing pressure on the menhaden resource until the middle of 1974 because fish meal prices will likely remain at or above the $200 per ton level. Industry sources indicate that by this time more substantial volume of other lysine sources may be available so that the demand for fish meal at the $200 plus per ton level would begin to decline resulting in a fall in the fish meal price back toward more normal levels.

Any reduction in world prices should occur after price declines in the U.S. because of two major factors. First, other nations have historically relied more heavily on fish meal than has the U.S., so that substituting other products for fish meal should tend to proceed at a slower rate thereby keeping an upward pressure on fish meal prices in Europe for a longer period. Second, the price spread between soybean meal (a major constituent in rations) and fish meal is less than the U.S. spread since we are able to produce our own soybean meal, while other countries depend on us for their meal and have to incur a substantial transportation cost.

Then if Peruvian production continues at a 50 percent level for the next few years, world fish meal prices should stabilize at a level somewhat higher than the level of the past few years. This will result in a gradual increase in fish meal production by countries other than Peru and will also result in an increase in the world's capacity to produce lysine from sources other than fish meal.

(3) Assuming Full Recovery of the Peruvian Resource by 1974

If the Peruvian resource is fully recovered by 1974, the world production of fish meal should be somewhat higher than the 1967-71 average because of the concurrent increase in production by other fishing nations. Under this assumption prices in 1974 should stabilize at levels somewhat in excess of 1967-71 average prices due to demand increases during the interim.

CONCLUSION

Price incentives will encourage greater production of fish meal in the U.S. at least through mid 1974. Regardless of constraints that limit how high fish meal prices can go in the U.S. there is enough room for a substantial rise. The menhaden resources are the most vulnerable to these conditions, given the assumption that they are being fished close to MSY. These are non-regulated fisheries, which apparently have the present capacity to increase effort in a significant amount. The stage is set for a condition of overfishing--and permanent resource damage. This makes it imperative that government and industry be prepared to take action to preserve the menhaden resource. Policy alternatives should be explored so that an acceptable management plan can be instituted if necessary.

The situation with California anchovy is quite different. The resource is now under conservative management and could sustain added catch effort. Pressures to increase the commercial catch quota will likely build up, but restraining short run factors, associated with production capacity rule out substantial increases in effort and catch.

TEXT TABLE

Fish Meal: Historic and Projected World Production and Prices, 1967-1964

	World Production		Prices	
	Million metric tons	Percent change from 1967-71	U.S. $/short ton	Europe $/short ton
Average 1967-71	4.9	0	162.40	146.44
1972 [a]	3.8	-22	178.00	195.00
1973 Peru at 0 % of normal	3.1	-37	260,00 [b]	300.00
1973 Peru at 50% of normal	4.2	-14	210.00 [b]	220.00
1974 Peru at 50% of normal	4.3	-12	200.00	210.00
1974 Peru at 100% of normal	5.2	+ 6	170.00 [c]	180.00 [c]

[a] Estimated, based on January-July production

[b] Judgmental estimate, based on observed inelastic price elasticity (in short run), that is change in price is greater proportionally than change in quantity made available for consumption. This assumes a market without institutional price controls, such as imposed by the Price Commission

[c] Reflects a long-range increase in demand.

Note: The relative price between U.S. and Europe is reversing.

APPENDIX

Historical Perspective of the Fish Meal Industry

The Peruvian Industry

Peru's fish meal industry is based on the anchoveta (Engraulis ringens) which covers the area from Antofagasta, Chile to Punta Aguja, Peru, approximately 1,200 (nautical) miles and seaward from the beach to 70 n. miles. These boundaries are very flexible, however, as the fish respond to changes in Humboldt current conditions, and food availability. The fish are rarely found below 30 meters.

Seasonality of catch

In general, the anchoveta spawn thoughout the year, but with a peak from July through September. During this period, the fish become very dispersed over the fishery area, and are unavailable to the fleet. This has been observed from low July to September catch-per-unit-effort figures during the pre-regulatory period. Closures, generally June through August, protect the adult fish during spawning. Also, by June the season catch quota has normally been reached, and the fishery would be closed at any rate. The fishing season, for regulatory and statistical purposes, is considered as from the beginning of September until June. Recruit fish from the June-August spawning begin to appear in landings in late December or early January. A high percentage of these small fish in the catches leads to lower yields of both oil and meal.

Historic fishing experience

Scientific monitoring of the fishery began in 1960 with the formation of the Marine Resources Research Institute. Under the guidance of FAO, the Instituto del Mar del Peru (IMARPE) was created, and is carrying the work forward.

Poor fishing in 1963 resulted in the first drop in export volume. In the beginning of 1964 Peru's consortium of fish meal manufacturers (later expanded to form the government marketing organization, EPCHAP) experienced difficulty meeting its forward committments and was forced to purchase fish meal on the world market at high prices, causing losses to its members.

Although fishing improved in 1964 and landings of 9 million tons made Peru the leading fishing nation in the world, IMARPE called attention to the possibility that the limits of the anchovy population had been reached. Fears increased when production fell from 1.55 million tons in 1964 to 1.28 million tons in 1965. In August of 1965, the govern-

ment prohibited fishing for one-month, the first such "veda" (closure) in the history of the industry. This marked the beginning of the government's attempt to conserve the fishery. The regular imposition of a six-week "veda" during the height of the fishing season in February and March in 1967 and subsequent years established an official limit of about 9.5 million tons of anchoveta landings each year.

The imposition of a fishing limit caught the industry just at the end of its great expansion. By 1965, the industry had developed enough capacity to process 7,000 metric tons of fish per hour, which means that, working two ten-hour shifts for 250 days per year, it could theoretically handle 3.8 times the allowable catch. Allowing for seasonal fishing, which may make it difficult to utilize more than 50 percent of capacity in the long run, the existing plants could still handle almost twice the allowable limit. 1/

FAO 1965 survey and recommendations

FAO in 1965, attempted the first appraisal of the extent of Peru's anchovy stock and the effects of fishing on this stock. In its report, FAO expressed the view that if the fleet maintained its present size, the annual catches of anchoveta per ship would decrease. FAO however could not recommend a closed season nor a substantial catch limitation as clearcut solutions.

FAO's recommendations would essentially: (1) limit the present fishing capacity of the fleet to its present level; (2) keep the production capacity of the fish meal plants in a "reasonable" relationship to the availability of the new material. 2/

Annual quotas set

In an effort to reach a proper balance between the maximum sustainable yield and the productive capacity of the industry, the Peruvian Government has relied on annual quota and closure of the fishery. In 1968, for the first time, only ports with high percentages of recruits in their landings were closed, although no significant attempt has been made to reduce the productive capacity of the industry. A complicated licensing system has been unsuccessfully employed to reduce plant processing capacity. Since 1966, vessel construction has been able to replace at an equal rate tonnage leaving the fleet. However, construction in 1969-70 was considerably above mere replacement.

1/ Roemer, Michael, "Fishing for Growth", Harvard University Press, Cambridge, Mass., 1970.

2/ Excerpt from FAO, Technical Paper No. 55, December 1965.

As a result of industry's failure to reduce its plant and vessel capacity, the fishing season (days permitted to fish) has gradually declined from 289 days in 1963-64 to 166 days in 1966-67 and 155 days in 1969-70.

The pressure of an excessive fleet poses the danger of pressure on government to keep the season open longer than what is recommended by stock assessment exports. From 1967 to 1971, the 9.5 million ton quota was consistently exceeded and it is believed that even the official figure for production and landings are understated.

Anchovy Caught by Season (Sept. 1 to May-June)

	Gross Metric Tons
1965/66	8,096,000
1966/67	8,242,000
1967/68	9,819,000
1968/69	10,066,000
1969/70	10,851,000
1970/71	9,953,000

Source: IMARPE.

"El Nino," 1972

The present disappearance of anchoveta off Peru has been reported to be a result of the "El Nino," the oceanographic phenomenon which is characterized by the failure of the Humboldt current to follow a seasonal decline in temperature. This phenomenon causes massive fish kills and drives the fish into deeper waters. 1959-60 and 1965-66 were the last two occasions when "El Nino" briefly appeared and recovery of the fishery has always been quick. The present warmer-than-normal surface condition of the water has intensified since May and the effect has never been so prolonged or devastating.

The FAO report states that the 1971-72 spawn of anchoveta was only one-seventh normal size. The Instituto del Mar del Peru (IMARPE), working closely with FAO, illustrated the present recruit situation as follows:

Average Number of recruits (peladilla) per catch in March over past 11 years

1962	258
1963	178
1964	397
1965	170
1966	365
1967	300
1968	252
1969	285
1970	390
1971	335
*1972	54

(March is used as an example, since this is generally the month which has the highest number of recruits).

Source: IMARPE.

Peruvian and World Production of Fish Meal

Total world production of fish meal averaged around 4.9 million metric tons from 1967 to 1971; total world exports averaged about 3.1 million tons during this period. Peru produced an average of 1.9 million tons of fish meal and exported an average of about 1.8 million tons during the years 1967 to 1971. From January to July of 1972, Peru produced 844,000 tons, and exported 1.3 million tons of fish meal. Peru produced and exported 944,000 and 806,000 tons, respectively, of fish meal during the same period in 1971.

Peru: Fish Meal Production, 1951-1971

Year	Anchovy landings (calendar year)	Production	Exports	Stock at Year-end
	(1,000 metric tons)			
1951	-	7.2	6.0	-
1955	58.8	20.0	18.7	-
1956	118.9	30.6	27.8	-
1957	325.9	64.5	61.6	-
1958	739.1	126.9	105.8	-
1959	1,946.8	332.4	277.6	45.9
1960	3,313.1	558.3	507.0	77.0
1961	5,010.9	835.1	708.3	156.7
1962	6,691.5	1,112.6	1,055.8	192.9
1963	6,634.8	1,129.4	1,038.3	156.4
1964	8,863.4	1,547.9	1,426.1	260.5
1965	7,242.4	1,282.0	1,413.0	237.4
1966	8,529.8	1,466.4	1,301.8	375.2
1967	9,824.6	1,804.7	1,594.7	600.3
1968	10,262.7	1,922.4	2,083.2	391.7
1969	8,960.5	1,610.8	1,655.6	306.9
1970	12,276.9	2,253.4	1,872.8	655.5
1971		1,934.6 1/	1,740.6 1/	786.0
1972				

1/ Preliminary.

Major Consumers of Fish Meal

The major users of fish meal are West Germany, the United States, and the United Kingdom. West Germany imported an average of about 520,000 tons of fish meal, of which about 350,000 were from Peru, from 1969 to 1971. The United States imported about 257,000 tons of fish meal in 1971 of which about 70 percent came from Peru. United Kingdom imported 190,000 tons of fish meal in 1971.

Approximately two-thirds of the fish meal supplies in the United States are used in broiler feed. Total annual broiler chick placements in the United States, which is a commonly used indicator of demand for fish meal, increased 50 percent from 1961 to 1970. The growth in broiler chick placements was promoted by the application of low cost mass productio techniques.

Competing Products

Fish meal constitutes about 5% of broiler rations, under normal price conditions, and competes with other high-protein feedstuffs, notably soybean meal and other oilseed meals. Meat meal and poultry byproducts meal also compete with fish meal, principally on the basis of their relative prices. Feed mixers and broiler producers believe that fish meal possesses an unidentified growth factor which promotes rapid growth.

Synthetic amino acids, especially lysine, when combined with corn and soybean meal, are used to at least partially replace fish meal in broiler feed. The cost of production of these synthetic amino acids, since they have become commercially available, has historically been relatively high with respect to fish meal prices. According to available sources of information, world production of synthetic methionine was 30,000 tons in 1970; France and Japan are major producers of synthetic methionine and lysine, respectively. In 1971, a French firm decided not to build a second factory for producing methionine and Japanese producers of lysine halted production of lysine due to large stocks held by brokers and unacceptable prices. Japan hopes to promote lysine in the United States and in socialist countries.

Protein which is manufactured from yeast extracted from petroleum or natural gas is expected to provide some competition to fish meal after 1975. It is expected that Japan will have a capacity of over 200,000 tons in 1975. France, Russia, the United Kingdom, and the United States, are also countries which plan to produce protein from petroleum. Protein from various organic substances will probably replace powdered skim milk in feed rations for calves. It is not expected to replace fish meal in broiler, turkey, or hog rations, until its cost of production can be lowered through economies of scale or changes in technology.

Another feed ingredient which may replace or supplement the use of fish meal in broiler and/or other rations is corn with a high lysine content. High-lysine corn is not expected to compete with fish meal until after further research leads to higher yielding/better quality hybrid seeds. It is expected that high-lysine corn will compete in the long-run with fish meal for use as a protein supplement to food for human consumption. However, further research is needed to develop methods of producing flour from fish on a large-scale and low cost basis.

STATISTICAL APPENDIX

TABLE A 1

Production of fish meal in eight major exporting countries, 1966-70 average, 1970, and 1971

Country	1966-70 average	1970	1971 1/	Percent of total production: 1966-70 average	1970	1971
	Thousand metric tons			Percent		
Angola	60.5	59.9	2/55.0	1.9	1.7	1.7
Canada	118.6	123.8	100.8	3.7	3.5	3.1
Chile	161.1	162.7	243.3	5.1	4.6	7.4
Denmark	172.6	195.6	235.2	5.4	5.6	7.1
Iceland	96.0	68.3	63.9	3.0	1.9	1.9
Norway	395.0	350.8	384.4	12.5	10.0	11.7
Peru	1,814.6	2,253.4	1,934.6	57.2	64.1	58.8
South Africa	356.3	303.2	272.7	11.2	8.6	8.3
Total	3,174.7	3,517.7	2/3,289.9	100.0	100.0	100.0

1/ Preliminary.
2/ Estimated.

Sources: Fishmeal Exporters Organization, International Association of Fish Meal Manufacturers, and Monthly Review of Canadian Fisheries Statistics, Dominion Bureau of Statistics.

TABLE A 2

Table • Supplies, production, and imports of fish meal in the United States, by month, 1970-72 1/

Month	Supplies			Production			Imports		
	1970 2/	1971 2/	1972 2/	1970 2/	1971 2/	1972 2/	1970	1971 2/	1972 2/
	Thousand short tons								
January	24.0	37.9	24.6	3.9	4.6	6.3	20.1	33.3	18.3
February	26.2	19.0	52.6	4.8	3.2	4.4	21.4	15.8	48.1
March	25.4	17.2	51.0	5.9	3.9	5.4	19.5	13.3	45.6
April	62.9	44.1		8.0	12.3		54.9	31.8	
May	61.2	40.0		26.5	29.4		34.7	10.5	
June	80.1	87.2		46.5	57.0		33.5	30.2	
July	61.0	58.3		50.7	52.5		10.2	5.8	
August	49.7	65.3		39.4	50.7		10.3	14.7	
September	39.6	94.0		28.7	31.2		10.9	62.9	
October	30.1	56.2		22.4	19.1		7.8	37.1	
November	18.3	16.4		12.3	11.9		6.0	4.5	
December	30.0	28.2		7.7	4.9		22.3	23.3	
Total 3/	508.5	565.7		257.0	282.5		251.5	283.2	

1/ Excludes meal made from shellfish.
2/ Preliminary.
3/ Figures may not add to total because of rounding.

TABLE A 3

Quantity and value of U.S. fish meal production by raw material source, 1966-70 average, 1970, and 1971

Source	Production			Percent of total production		
	1966-70 average	1970 1/	1971 1/	1966-70 average	1970	1971
	Thousand short tons			Percent		
Menhaden 2/	149.1	188.6	221.0	65.3	73.4	78.3
Tuna, mackerel, and anchovy	34.7	42.9	37.0	15.2	16.7	13.1
Unclassified	44.6	25.6	24.5	19.5	9.9	8.6
Total 3/	228.4	257.0	282.5	100.0	100.0	100.0

Source	Value			Percent of total value		
	Million dollars			Percent		
Menhaden 2/	28.4	34.7	35.0	68.0	75.8	79.6
Tuna, mackerel, and anchovy	4.4	6.5	4.9	12.9	14.3	11.2
Unclassified	6.6	4.5	4.1	19.1	9.9	9.2
Total 3/	34.5	45.7	43.9	100.0	100.0	100.0

1/ Preliminary.
2/ Includes a small quantity of other species.
3/ Figures may not add to total because of rounding.

TABLE A 4

Fish Meal Prices in the United States, and Europe, by month, 1971 and 1972

	United States 1/	Europe 2/
	(Dollars per short ton)	
1971		
January	186	178
February	184	174
March	180	168
April	174	156
May	169	155
June	154	145
July	150	142
August	159	144
September	160	144
October	160	149
November	162	146
December	163	142
1972		
January	165	140
February	165	142
March	165	145
April	168	156
May	181	177
June	175	184
July	178	184
August	190	207
September	194	250 3/

1/ Menhaden meal (60%), East Coast and Gulf points.
2/ Peruvian fish meal (65%), spot prices at Hamburg, nearest forward shipment, CIF European ports.
3/ First three weeks.

TABLE A 5

Average Monthly Price of Soybean Meal 1/ at Decatur, Illinois, 1970, 1971, 1972.

	1970	1971	1972
January	98	86	89
February	96	82	92
March	80	82	99
April	83	81	102
May	79	85	103
June	83	88	105
July	93	90	112
August	93	84	111
September	88	80	118
October	84	81	
November	83	79	
December	88	89	

1/ 50% protein, milk
Source: Feed Market News, USDA

Sources of information (some confidential)

1. Dr. James Marion - Gold Kist Inc., Atlanta, Georgia
2. Carl Voslo - Economic Research Service, USDA
3. Clark Burbee - Economic Research Service, USDA
4. Lee Boyd - American Feed Manufacturers Association, Rosslyn, Md. (Confidential)
5. Exteen Corbett - Nassau Fertilizer and Oil Company, Fernandia Beach, Fla. (Confidential)
6. Dr. Jack Greenfield - NMFS, St. Petersburg, Fla.
7. Jack Brawner - NMFS, St. Petersburg, Fla.
8. Industrial Fishery Products: Situation and Outlook, NMFS, various issues
9. Current data from NMFS.