Surimi Production in Alaska

By Kathy Thomas

An odorless, tasteless, gelatinous product is generating a lot of excitement in the fishing industry lately. A previously underutilized bottomfish is being harvested for production. The product is low in calories, 80 per 100 gram portion, low in fat, and high in protein. From this basic product innumerable different food commodities are being produced such as imitation king crab, other imitation seafood, and the potential for red meat substitutes. This product has been produced in Japan for hundreds of years and is called surimi.

Pollock is the primary fish used in production of surimi though other types of bottomfish can be used. Pollock is the preferred species because of its gelling property which is essential in high quality surimi. The fish is deboned and skinned, minced, and washed several times in pH adjusted water. It is then placed in a screwpress to remove the water. After the dewatering process it is strained to provide a uniform consistency. This product is either directly converted to a final product or a paste is made where salt, sugar, and sorbitol are added to preserve the gel strength during freezing. This final paste is formed into blocks and frozen.

To be converted into additional products the surimi is thawed and further processed. In the creation of simulated shellfish real shellfish flavoring or chemical flavorings are added. Occasionally real shellfish meat is added to enhance the product. These simulated products are called analogs in the industry. The shellfish analogs currently being produced are shrimp, crab, scallops, and lobster though crab is the most popular. Analogs of hot dogs and other meats are being experimentally produced though they are not currently commercial due to their high cost of production. Another potential use of surimi is as a high protein additive to regular foods. If surimi is substituted for ten percent of the beef in a pork-beef hot dog, the amount of fat and water lost during cooking is reduced by two-thirds. At present though the majority of the market is in seafood analogs.

The consumption of surimi in the U.S. has skyrocketed. In 1979 the U.S. consumed less than a thousand tons. By 1984, consumption increased to 30,000 tons. According to the Alaska Fisheries Development Foundation (AFDF), if surimi does not remain limited to seafood analogs consumption of surimi could increase to one billion pounds by 1990.

America is not the only country attracted to the low calorie, low fat

fish product. England has increased consumption of crab analogs by several hundred percent. Factors limiting the market at this time include confusion over labelling and, for consumers, confusion about what the product actually is. The Food and Drug Administration says that surimi based analogs must be labelled as imitation since they are nutritionally inferior while similar in appearance to real products. U.S. Customs has recategorized shellfish blended surimi thereby upping the import tariff to ten percent. Obviously there is resistance to convert to new labelling since consumers might be reluctant to purchase an 'imitation' product, but the price advantage of surimi and consumer acceptance on the basis of taste as should eventually allow consumers to overlook the word imitation.

Ninety-nine percent of the world's pollock stock is in the cold North Pacific waters of Alaska, Japan, and the U.S.S.R. Before the U.S. became interested in surimi, the Japanese caught and processed pollock aboard huge factory trawlers. With the increased interest in the bottomfishery by the domestic fishing industry, joint ventures were entered into whereby domestic trawlers sold their bottomfish catch directly to the foreign factory ships. As interest further increased in the commercial potential for this abundant bottomfish, there was a move for domestication of the industry. In response new U.S. factory trawlers are on line or are being built.

Most of the bottomfish used in surimi production is caught by trawlers. A trawler drags a net that is held open by a beam or doors. The fish are collected in an enclosed end piece of the net called the cod end. A factory trawler is generally a larger trawler that also has surimi or fillet production facilities on board.

The main resistance to developing U.S. factory trawlers is capital cost and lack of convertibility. A trawler without a surimi factory costs about $5 million. A trawler with a surimi factory can cost $8-$20 million depending on size. Once a vessel is manufactured as a factory trawler it is too difficult to transform the vessel for another type of fishing. Limitations such as these leave the domestic fishing industry hesitant to jump into the surimi business.

Another possibility being explored is shore-based processing of surimi. A prototype facility was initiated by AFDF on a grant of Saltonstall-Kennedy (federal) funds. The facility owned by Alaska Pacific Seafoods began operations January 1985 in Kodiak. The location is convenient to major bottomfish harvesting activity. The facility is capable of producing 860,000 pounds of surimi of which a portion is used for market development. By having a shore-based surimi processor, existing trawlers can be used permitting more flexibility for the fish harvesters.

It was originally thought that shore-based facilities could not produce high quality surimi and the only way to obtain high quality was with factory trawlers on the fishing grounds. This concept originated before the U.S. knew what surimi was and while the Japanese were producing surimi. Japanese trawlers caught fish in the Bering Sea and put them in refrigerated holds. A number of days elapsed before the fish were delivered to Japanese shore-based processors resulting in a deterioration of fish quality. Processing of this lower quality fish resulted in lower quality surimi. Consumers preferred fish from factory trawlers where the fish was processed shortly after being caught resulting in a higher quality product.

It was a gamble when Alaska developed a shore-based processor because of the possibility that the surimi produced would be of an inferior quality. The first batch passed all grading standards except for color. Once adjustments were made subsequent batches have been of sufficient quality to rival the factory trawlers. Because of its proximity to the fishing grounds and an existing fleet of fish trawlers freshly caught fish are delivered in matter of hours rather than in a matter of days.

The Market for Bottomfish

The development of a U.S. surimi processor is the beginning of the U.S. entry into what has previously been an exclusively foreign market. When domestic versus foreign fishing is considered this is especially important. The 1985 groundfish apportionments for the Bering Sea/Aleutian Islands include a total allowable catch (TAC) of 1,300,000 metric tons (mt) of pollock. Of that allocation 28,220 mt are for domestic production and 407,550 mt are for joint venture production, 34% of TAC. Meanwhile, total allowable level for foreign fishing is 864,230 mt, 65% of TAC. Domestic production alone with no foreign intermediary comprises only 2% of TAC. That leaves 98% for domestic catch expansion. But the potential domestic catch cannot be realized without processors or markets to accept it. The new facility in Kodiak leads the way for further expansion of a U.S. based bottomfish industry.

If the market continues to be strong for bottomfish it would be in the U.S. interest to expand domestic production capability. Presently American pollock provides a large portion of Japan's surimi production. The present market structure involves Japanese catching and processing of pollock in the U.S. fishery conservation zone. The processed surimi is then sent back to Japan for conversion to finished products. These finished products are then exported back into the U.S. Considering the potential domestic harvest of pollock and increased U.S. market for surimi the future expansion of the seafood industry is significant.

Another possibility for expansion of the bottomfish industry is increasing interest in pollock fillets. The Alaska Seafood Marketing Institute (ASMI) recently received a grant for promotion of pollock fillets. Rather than a competition to surimi, pollock fillets are viewed by ASMI as a complement to the bottomfish industry with each item targeting a different market. Price will determine which product the processors will manufacture. Product yield (the amount of usable fish after it has been cleaned and filleted) on a pollock is about 20% for both surimi and fillets so the raw material cost is the same whichever is produced. Surimi would have a cost disadvantage to fillets because of additional processing required. If surimi costs more to produce than fillets yet the wholesale price is the same, then the more profitable venture would be fillets. Since initial processing, heading and filleting, are the same, a surimi plant should be able to make the conversion between fillets and surimi easily as wholesale prices change.

Depending on the timing and assuming the possibility of a growth in production of king crab and tanner crab harvests, surimi can affect the industry in several ways. The fish harvesting fleet would benefit from greater fishing opportunities. The seasons for crab will continue to remain short, especially in the near future while the season for pollock will continue to be extended. Even if fish harvesters break off bottomfishing for the crab season, they will likely return to bottomfishing to fully utilize their boats and other resources.

A problem emerges when evaluating the retail market. Surimi is entering the market as shellfish analogs mainly for use in salads, casseroles, and in other dishes where shellfish is used as an additive rather than by itself. Surimi's importance is also growing at a time when real crab harvest and use is declining thereby filling the niche left by nonexistent crab. The possibility exists that once crab stocks rebound, surimi will decline in importance as consumers revert back to 'real' product and away from 'imitation' product.

The other possibility is that surimi will maintain its dominance in home use in salads and casseroles and in fast food restaurants that need a large, inexpensive supply of seafood analogs. Also surimi is being tested for conversion to other foods and as an additive to meat products, expanding the market beyond analogs. Real crab will reopen its markets in white tablecloth restaurants as whole and split legs. The rate and nature of the market changes will be affected by how fast crab stocks recover and the level of surimi intrusion into the market when crab is again viable.

Alaska Pacific Seafoods is currently the only domestic producer of surimi. Two other surimi producers will begin operations in Dutch Harbor sometime in 1986. Both of these new facilities are joint ventures

with Japanese companies. Ward's Cove Packing Company of Seattle is partners with Taiyo Fishery Company and Marubeni Corporation. Universal Seafoods of Seattle is partners with Nippon Suisan Kaisha of Japan. *Pacific Fishing* (August 1985 and September 1985) reports that each facility will require $10 million investment and will produce 25,000 tons of surimi a year.

According to *Seafood Business Report* (May/June 1985) a lot of the new facilities that convert surimi to finished analogs are either wholly owned subsidiaries or divisions of Japanese companies. A new facility in Seattle, Trans-Ocean Products, Inc., is the result of a joint venture between Western Alaska Fisheries, Inc., a subsidiary of Taiyo Fishing Co., Ltd. of Tokyo, and Steuart Investment Company of Washington, D.C. Another facility that will soon be producing analogs is Universal Seafoods, a division of Nippon-Suisan. Taiyo, Nippon Suisan, and Kyokuyo are responsible for the majority of Japan's surimi business. Even with the establishment of U.S. conversion plants, the Japanese still possess the lion's share of surimi and analog production. U.S. shore-based surimi factories will have to fight to get their product accepted. As it is, analog production facilities would be reluctant to relinquish firm, established, foreign suppliers for shaky, new, domestic suppliers of surimi.

The previous situation outlines the potential for vertical integration in surimi and analog production, even with a shore-based processor. One company owning a factory trawler and a conversion plant would be integrated from the point of catching the fish to producing a final retail product. A similar but slightly more complicated situation exists with a shore-based surimi factory. A company would need to own the trawlers, factory, and a conversion plant. From the previous paragraph it is seen that at least two Japanese surimi firms are vertically integrated from the factory trawler to conversion plant. The high level of Japanese integration could be disrupted with the expansion of the domestic fishing fleet and resulting increases in the U.S. share of the bottomfish allocation. As domestic pollock fishing increases and more domestic processors are brought on-line, there would be a shift to increased domestic vertical integration. The change would be gradual and could end up with various stages of interdependence between Japan and the U.S.

Employment Opportunities

As the domestic bottomfish industry expands, domestic employment in the bottomfish industry also expands. Trawlers supplying joint ventures or floating processors should not affect the employment situation. Most of these trawlers are converted king crab vessels seeking to utilize their investment. Also, an established pool of trawlers is de-

veloping in response to joint ventures. These crew members will mostly result in a shift of employment from one fishery to another.

A shore-based surimi producer employs about 24 production employees on a given day, 12 per shift and two shifts operating a day. On the average a commercial surimi facility produces 25,000 tons of surimi a year. With a pollock recovery rate of 20%, 125,000 tons of pollock would be required for each facility to produce 25,000 tons of surimi. Since the most recent pollock apportionment is 1,433,300 tons, 1,300,000 mt, the pollock resource would be completely maximized at 12 surimi factories. By using the total allocation of pollock for surimi production, 288 jobs would result. This scenario assumes that only surimi is produced, no other products such as roe, fish meal, fish oil, or fillets are produced. However, this employment estimate may be an overstatement. Surimi production is already a highly mechanized process and the trend is toward increased mechanization. As this occurs, employment will be displaced from the production process.

At the present time 11 domestic factory trawlers are plying the waters for bottomfish. they range in size from 133 feet to 338 feet with the usual size being 155 to 165 feet. They all produce fillets. No surimi is currently produced on domestic factory trawlers. A fillet line requires about the same number of employees as a surimi line, ten per shift and two shifts totaling 20 employees. Also on an average sized vessel is a crew of four to six who operate the vessel and catch the fish. Using the same technique as for surimi, given that the average factory trawler processes 15,000 mt of fillets a year, a pollock recovery rate of 20%, and a total pollock apportionment of 1,300,000, the maximum number of people who could work on factory trawlers is 425.

Employment for shore-based surimi and fillets facilities include not only production and technical employees but also support employees. Support employment manages the operations, maintains the facilities, and performs general labor. According to a study prepared by Pacific Rim Operations for the Alaska Department of Commerce and Economic Development, Office of Commercial Fisheries Development, support employment is consistent whether a plant performs several pollock processing operations or only processes surimi or fillets. A typical facility would usually have five management employees, five maintenance workers, and ten general laborers totaling 20 additional employees. From the previous calculations for surimi, the addition of 20 employees per facility would yield a total of 240 additional employees.

The same total would apply to shore based fillet operations. A lesser number of additional employees would be required for factory trawler fillet operations since a lot of the maintenance would be part of the

crew's function. However, factory trawlers would have management on shore along with other labor and maintenance employees to prepare the vessel for the next trip

All of these calculations are based on a static pollock allotment. As more is known about the resource the outlook could change. Because pollock was underutilized, estimates of its abundance may have been too low leading to an expansion of the industry. The opposite is also true. As more vessels target pollock, the resource could be strained and begin to decline. It is hoped that judicious management will optimize the resource to provide a steady source of jobs in the bottomfishing industry.

Summary

With its concern for health, America's population has been shying away from high fat foods such as pork and beef and has been consuming more fish. In addition, a recent medical study suggested that fish oils might be beneficial in the prevention of heart disease. Increased consumption of seafood is providing the impetus for a fledgling bottomfish industry to continue to expand. Alaska, with its large populations of bottomfish, can only gain from high demand for seafood in terms of employment, income, and industrial development.