the LODE STAR

Charting the course of fisheries development.

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U.S. Surimi comes of age

Surimi has hit America like a Nolan Ryan fast ball.

The Americanization of surimi is big news for U.S. food processors. Surimi made from Alaska Pollock is a tremendous protein resource for an industry now devoting millions of dollars to research to find new products for use in a host of different industries.

AFDF is exploring some of the future uses of surimi as a protein in the new that surimi is being made on local shores. The industry may be a $6 billion industry before it's through, some experts predict. Consumption of seafood analogues alone may reach 1 billion pounds per year by 1990.

There's no question Alaska has a reliable supply of pollock for surimi. And where there may have been before, there is no longer any question that American processors can make surimi of just as high quality — and perhaps using better technologies — than the Japanese.

Though Alaska Pacific Seafoods is yet the only U.S. surimi producer, other seafood processors in Alaska are coming on line. One processor promises to be producing surimi within six months to a year.

And new products and applications for surimi are being developed all the time, from new seafood analogue formulations to dramatically new food ideas never designed before.

There are imaginations at work here, minds applying themselves to the birth of an industry, minds that will be, for the surimi industry in America, its incarnation, its livelihood and the source of its creativity.

Surimi: It's American now

The Alaska seafood industry has kicked a chink in the myth that top grade surimi cannot be produced on shore in America.

Aided by surimi technologist Billy Thrash of Bayou La Batre, Alabama, AFDF production manager Chris Riley and Alaska Pacific Seafoods (APS) plant staff (managed by John Sevier) produced surimi higher in quality than any Japanese commercial product at the APS shore plant in Kodiak, Alaska in late Janaury.

The breakthrough came January 26, after only a few weeks of experimental production. Riley, Thrash and APS plant engineers George Morrell, Louie Reyes and Bill Woods monitored the line, adjusted machinery, replaced four pumps and fine-tuned the system in preparation for commercial startup. But even before the line was completely adjusted it was able to produce surimi with top-grade whiteness, with factory ship grade gel strength, and with a moisture content nearly as low as top-grade Japanese surimi.

"The fact that we were able to make the equivalent of top grade surimi after only a few weeks of experimental production proves that it's not all as hard as we have been led to believe," said AFDF director Chris Mitchell. "The going myth has been that a shore-based plant in the U.S. cannot make high quality surimi. And we are disproving that myth."

The AFDF/APS plant is the first commercial-scale surimi production line in Alaska, and the first continuous pollock surimi plant in America. It marks the first commercial-scale entry of a United States company into the pollock surimi industry, which until now has been controlled by Japan.

Please see page 8

THE VIEW FROM HERE

by Chris Mitchell

The following comments were delivered in San Francisco in November, 1984 at the NFI surimi committee meeting.

The industry has moved along since then, with a crack opening in Japan's market and continually accelerating foreign penetration of our market. The urgency and importance of the statements remain unchanged. My purpose in making this statement was to catalyze action by the industry to enable full "Americanization" to take place. Tariffs are a bad word to many and a political impossibility to others. Nevertheless, if we want to develop a U.S. industry, some positive (to U.S. production) or negative (to imported product) action is required without delay.

Please note that the numbers shown in Figures 1 and 2 are not intended to be realistic but were used instead to demonstrate the relative competitiveness of U.S. versus foreign product should tariffs on the "origin" of surimi be enacted.

Surimi is one of the hottest items in the food industry today. From near obscurity five years ago, surimi has skyrocketed in popularity, surpassed all expectations in imports and consumption, and has grabbed the attention of the forward thinkers in the U.S. food industry.

Surimi consumption in the U.S. (based on imports) rose dramatically from less than 1,000 tons in 1979 to 30,000 tons in 1984. Japan's biggest kamaboko producer has built two plants in the U.S., and the U.S. industry has gained proficiency in secondary surimi processing at a rate that few predicted—but many have watched with interest.

The same is true for the Alaska pollock resource from which most surimi is manufactured. Five years ago, American fishermen caught but a few thousand tons. In just the first eight months of 1984, the U.S. domestic catch had exploded to over 525,000 tons.

What we're seeing now is the tip of the iceberg. In 1985 American pollock catches will exceed those of foreign fleets for the first time ever. If surimi is not locked into the imitation seafood corner but is allowed and encouraged to compete with other proteins for the U.S. food dollar, consumption of surimi in America could skyrocket to a billion pounds in 1990.

The technology for the manufacture of both raw material and most existing finished products came from Japan, and for this foresight and aptitude exerted in the U.S. market, the Japanese are to be commended.

The problem is that about 60% of Japan's surimi is produced from pollock which is owned by American people, and caught and processed in the U.S. Fisheries Conservation Zone. The surimi is shipped to Japan and made into finished products, and then sold back to Americans. The same scenario is also being planned by Korea, a very competitive challenger.

This is the very situation that brought the automobile industry to its knees in the late '70's. Something has got to change.

Obviously several forces must begin to work together to turn this situation around. One way is to encourage our government to support the domestic surimi industry is by instituting some sensible and consistent tariffs on foreign-processed surimi.

Present Customs headquarters rulings call for no quotas and for tariffs ranging from 0 to 10% (depending on product form, import amount and packaging method.)

My guess is that the very few existing domestic secondary processors would prefer high tariffs, which would allow them to compete with the proliferating importers, and also would allow them an opportunity to gear up to levels competitive with established foreign producers.

Many domestic secondary processors, however, are also importers, and as a result they sit on a double-edged sword. They need the rapid market growth that imports stimulate, but need also the solidity that domestic strength provides in building up for future production and product diversification.

Fishermen, the backbone of this industry, have the most to lose if this status quo doesn't change. Foreign fishermen harvest most of the pollock in America's FCZ, and domestic fishermen fortunate enough to participate in the fishery get a whopping 4 to 5 cents a pound.

For each 5 cents the U.S. industry makes from pollock sales, the U.S. seafood trade deficit grows by nearly $2.00 (CIF West Coast price of crab sticks.) And did you know that surimi made from fish caught by Americans and sold to joint venture processors is labeled as imports in Japan, and subject to quotas and tariffs? While Japanese caught and processed pollock in America's zone are not subject to quotas and tariffs? That means crab sticks marketed in the U.S. from American-caught and foreign-processed fish are at a competitive disadvantage in our market compared to pollock caught and processed in the U.S. FCZ entirely by Japanese fleets and processors!

This is unacceptable. There are solutions available to us that can be acceptable to all interest groups, and immediate action could eliminate the growing animosity among the three vested interests.

More importantly, immediate action will guarantee that we reach our single common goal: the development of an American surimi industry.

The following resolution suggests that tariffs be based not on production origin of finished products, packaging, product form, shellfish content or other meaningless criteria; but rather based upon "country of origin" of the surimi producer. Imposition of a "country of origin" tariff (see Fig. 1) would create incentive for more U.S. firms to enter the business—and they are by increasing numbers—while helping existing firms gain a market share over foreign competitors.

Figure 1:

Surimi tariffs

YEAR	FINISHED PRODUCT TARIFF (%)	SURIMI TARIFF (%)
1*	5*	0*
2	10	10
3	15	15

*status quo

Figure 1 calls for no change for the present year. Tariffs on finished products for years 2 and 3 reflect only the fact that finished product would contain foreign produced surimi. If the suggested tariff schedule were implemented based on the origin of the surimi, Fig. 2 outlines the likely ramifications:

Figure 2:

Assumptions

Surimi production cost (incl. profit)	$.80/lb
Transport Alaska-Japan	.07/lb
Transport Alaska-Seattle	.07/lb
Transport Japan-U.S.	.07/lb
Surimi content (finished product)	80%

Finished product cost = $1.20/lb + surimi cost

Japanese surimi tariff	7.5%

Surimi tariff

YEAR	TARIFF	SURIMI COST (Japanese product)
1	0	$0.94
2	10	$1.03
3	15	$1.08

Finished Product Costs

Finished product	Japan-Japan*	Japan-U.S.*	U.S.-Japan*	U.S.-U.S.*
YR. 1– 5%	$2.06	$2.01	$1.96	.90
YR. 2–10%	$2.16	$2.01	$2.02	.90
YR. 3–15%	$2.26	$2.01	$2.06	$1.90

* denotes origin of surimi

The proposed plan gives all interests the confidence that we will have a U.S. surimi industry. It allows for forward thinking, for confident planning, and for aggressive competition by U.S. companies. Foreign exporters and domestic importers aren't immediately impacted. These companies can plan for the inclusion of U.S. surimi in foreign producers' raw material procurement plans.

U.S. secondary processors are also given breathing space for a year. After that, these producers may continue their relationship with foreign suppliers if they wish—at a cost.

U.S. surimi processors get no immediate relief from Japanese quotas or tariffs. The Japanese can conduct their trade policies and set their quotas as they wish, and the U.S. should do the same. Under this plan, U.S. producers are given a year to develop the facilities and capabilties to produce surimi, and are given the support of the nation, in this small way, to do so.

The gradually escalating tariff would notify foreign producers that the situation will change.

The Japanese surimi/kamaboko industry, according to this plan, would have to buy U.S. surimi if they intend to remain competitive in the U.S. market. Foreign kamaboko producers would also be able to establish U.S. fabrication facilities, purchase U.S. surimi and avoid the tariff.

The above scenario would allow domestic secondary processors a window through which to become competitive with wholly foreign operations. The U.S. fishing industry would have a preference in the U.S. market, and would finally begin to gain the kind of federal support that can turn this industry into the powerhouse that it could be.

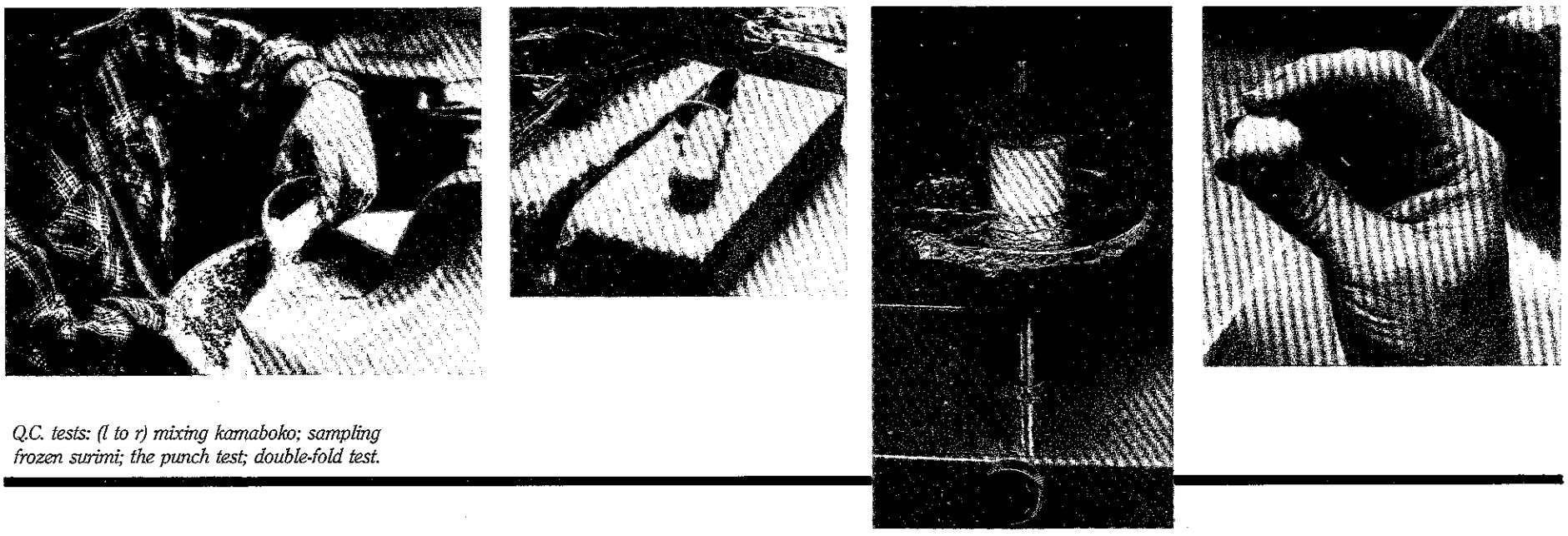
Criticism of the foregoing plan will center around the logistical problem of tracing U.S. surimi as it is purchased by Japanese importers, made into finished product, and exported to the U.S. This could be avoided by issuance of a certificate of import which could be used, traded or sold by the Japanese importer to Japanese finished product exporters.

I strongly believe that a measure like this must be taken now. It would protect American-made surimi made from America's pollock, from becoming a wedge between this industry and success.

Second and equally important, a plan like this would be a loud and unmistakable signal to foreign and domestic industry alike that the U.S. government supports, defends and encourages the development of this important new industry in this country.

THE SCIENCE OF SURIMI

Quality control lab turns craft into science



Q.C. tests: (l to r) mixing kamaboko; sampling frozen surimi; the punch test; double-fold test.

For eight hundred years, Japanese surimi makers have relied upon the expertise of surimi artisans to test their product quality. These artisans used their years of experience and knowledge handed down over generations to learn to feel moisture content with the palms of their hands, to judge gel strength with their fingertips, and to estimate surimi quality with keen accuracy.

The Amer[illegible] industry doesn't have access to ei[illegible]ndred years of experience to draw from, but it does share some turf with the most sophisticated food industry in the world, and it is from the U.S. food industry tha[illegible]DF and APS borrowed the technology t[illegible] up the APS surimi quality control laboratory.

The APS QC lab is managed by Landon Asakawa, who previously worked in the QC labs of Wakefield and Pacific Pearl. Asakawa's laboratory is outfitted with a full-scale, scientifically-oriented quality control protocol. The equipment attaches numerical equivalents to gel strength and whiteness levels, and allows APS to record and substantiate the specific properties of each lot of surimi produced.

Variables along the production line will also be recorded and compared to the properties of the final product. Asakawa hopes to establish the relationship between certain process variables and the quality of surimi produced through the process. (See "Study tracks pollock progress," this issue.)

Extensive testing. According to the quality control plan, Asakawa and his two assistants will do an intensive sampling program, initially testing 2 percent of the finished product. After that, test sampling will be decreased to the standard 1 percent or less.

Industry experts from Japan say that quality control tests are usually taken at a rate of one per day in Japanese plants. The QC protocol at APS calls for more than ten tests a day. When a lot is sampled at APS, a second sample from the same lot is frozen and then tested by identical procedures to learn how freezing affects the properties of the finished product.

Samples first are tested for moisture content. A small portion is weighed on a scale and then dried in an oven to remove all moisture. It's then weighed again to measure the percentage of moisture in the original sample.

Test portions of surimi are also pressed between two plates of plexiglass to a thickness of 2mm in order to count defect[illegible] in the tissues of the meat. Defects are measured for sizing as well as overall number, recorded carefully, and that information is passed back to the line foreman for adjustments in the machinery.

From that stage, surimi samples are mixed with salt, chopped and stuffed into sausage casings to form a kamaboko gel. The kamaboko is heated, allowed to set, and then tested for gel strength, foldability, and whiteness.

Different samples are cooked in their sausage casings according to three different protocols: one sample is cooked at 40 °C for 20 minutes and then 90 °C for another 20 minutes. A second is cooked at 60 °C for 20 minutes and then 90 °C for 20 minutes; the last sample is cooked at 90 °C for 40 minutes. The 40–90 ° sample will have the strongest gel strength, a property most important to kamaboko producers. The other two samples will have a softer gel strength (which is more desirable for companies producing sausage and hot-dog-like products) because cooking at 60 °C for extended periods of time enhances protease activity which breaks down proteins.

Cooled samples of the extruded kamaboko material are tested in a Hunter Lab colorimeter, which measures reflective whiteness on a percentage scale. This step eliminates the subjective judgment that might allow inaccurate quality assessment.

The final testing stage is the punch and fold scenario, in which the sample is set on a Voland Stevens LFRA texture analyzer. This creature consists of a small plate with a tiny plunger hooked to a calibrating device. When turned on, the plunger descends into the kamaboko sample at a constant rate of speed. The texture analyzer measures the amount of resistance occurring when a tiny plunger attempts to poke through the material, and the amount of energy used to break the surface of the sample.

The final—and hardly most sophisticated—test is called the fold test, in which plugs of kamaboko sliced 3mm thick are folded in half and then in quarters to test the bendability of the material. If the 3mm sample can fold two times without tearing, it is said to pass the F2 test, and therefore has the highest gel strength.

Better grading system. Results from the QC lab will accompany each lot of surimi as it is sold in the U.S. market. It is thought that these calibrated specifications will become more useful in the U.S. food industry than the simple grading system now used by Japanese producers. Many food processors in this country, who will be using surimi for a wide variety of products other than seafood analogues, will find some properties to be more important than others. For example, AFDF research shows that food manufacturers using surimi for breaded, extruded shrimp products need surimi with a high gel strength but do not particularly need perfect whiteness. Companies making surimi-based pizza topping may require a lower gel strength but perhaps a higher moisture content.

As the applications of dried surimi begin in the industry, the moisture level of the raw surimi may become irrelevant to some customers.

This method of measuring all properties would allow companies to specify their surimi needs without paying for qualities not needed in their product.

Continuous moisture reading. One of the most significant pieces of quality control equipment will sit right atop the filler at the end of the production line, beam infrared light down onto the surimi as it is extruded into pans for freezing, and continuously record the moisture content of the surimi as it comes off the line.

The machine is called the Quadra-Beam 475 continuous infrared moisture meter, and it works on this premise: all molecules are constantly in motion. The molecular bonds that attach two hydrogen atoms to a single oxygen atom to make water are always dancing, and it takes a specific amount of energy to set th[illegible]olecules going. Some of that energy is within the infrared spectrum, and is measurable by infrared light. The Quadra-Beam shines a filtered infrared light into th[illegible]rimi mixture, and measures how [illegible]ch energy is absorbed by the mixture. That number correlates to the number of water molecules encountered in the mixture, which indicates the water content of the mixture.

The moisture meter will sit atop the filler at the very end of the line and will continuously measure moisture content of the final product as it is extruded into pans to be frozen.

Because most process variables, such as water-to-fish ratios, pH, and additives, are electronically monitored along the line, many variables can be changed during production to adjust the moisture content of the final product.

This processing line marks the Quadra-Beam's debut in the surimi industry, and perhaps in the seafood industry as well.

Asakawa said the most important thing about the quality testing lab is that it allows APS to refine centuries-old Japanese surimi making traditions with twentieth-century American technology. "The tests we are able to perform here ensure us that we can start out in the surimi business with expertise already behind us. We don't have to evolve into the technology," he said.

"This knowledge gives us a big lead on what customers will want in their surimi, and the more information we can supply the better our surimi will be."

"It's easier than I expected to hit very high quality surimi in a shore-based plant. We've already beaten the Japanese shore plant product. . . . There is an obvious quality difference between Japanese shore product and our surimi. . . ."

Chris Riley
AFDF production director

Study targets new uses for surimi

When Henry Ford first heard about the inexpensive, versatile soybean in the 1930's he got so excited he swore he would make a Ford car out of them.

Which he did. In 1938 Ford fabricated a dozen different car parts out of soybeans, from gas pedals to radio knobs. He even created a soybean-based plastic material for his bumpers—a plastic so tough it couldn't be dented with a sledgehammer. And to introduce his new cars he wore a business suit made of soybean fibers. (See "From the Ground Up," The Lodestar, Spring 1984.)

Henry Ford's soybean car wasn't much of a success, but the soybean was none the worse for it. In the fifty years since that day, soy, meal and oil have become a $12 billion dollar industry in the U.S., and its products are used as ingredients in hundreds of food, household, pharmaceutical and chemical products.

The success of that little bean came because someone studied its functional properties and investigated how it could be used in a variety of different industries.

AFDF is using the same theory to explore a tremendous new market for surimi. The Foundation has contracted with Webb Foodlab, Inc. of Raleigh, North Carolina, to research the functional properties of surimi and the potential of surimi proteins in the U.S. protein ingredient market.

Proteins are a hot item in the U.S. food market today, earning enthusiastic attention from the food and financial press alike. An October, 1984 issue of The Wall Street Journal featured a research project investigating a process that would use modified proteins to break down wood into paper, or create textile fibers out of spiders' webs.

Some of the industry's most innovative research is going into protein development, and surimi may be at the head of the class within a few years.

According to Dr. Tyre Lanier of North Carolina State University, surimi proteins have a stronger bindability than mammalian or avian muscle proteins and therefore are capable of being used in strong network structures at relatively low temperatures. "Addition of surimi to fabricated meat formulations should thus be considered an excellent means of improving the water/fat binding properties and/or the textural properties of [a] product, possibly at an economic savings," Lanier has said.*

While the seafood analogue market is growing at tremendous rates annually, some surimi experts believe that it is the protein ingredients market that most clearly holds the potential both in volume and diversity of uses for surimi.

Webb Foodlab, Inc., under the direction of Dr. Neil Webb, is now studying frozen surimi (dried surimi will be investigated in a later project) to establish the viability of surimi as an alternative protein ingredient to egg white protein, soy protein, wheat gluten, caseinates, or other proteins now being used in the U.S.

Webb's work will be applied toward possible applications in pressed meat and sausage products, fabricated meat and fish, snack foods, canned meat products, pasta, special dietary foods, and sauces.

Most protein ingredients are purchased by U.S. food processors according to specifications which have not yet been applied to surimi. This project will investigate the unique properties and establish specifications for surimi protein.

Webb will research those properties deemed most important to food processors who may be using surimi protein in the future, such as:

- oil binding capacity—to identify protein functionality for input into least-cost formulations in typical emulsified products, and compare functionalities with meat proteins, deboned poultry, soy protein, and other materials.
- solubility/hydration properties—by

LEAST COST LINEAR PROGRAMMING

More than one way to skin a crab

Twenty-seven years ago a few progressive computer programmers nosed around into the sausage business and set up what's now known as the least-cost formulation process of meat processing systems.

Least-cost linear programming (LCLP) is a computer program that saves meat processors money by choosing the least expensive combination of ingredients in product manufacturing. The program is used in the sausage and blended meats industries where prices fluctuate weekly and nutritional values of the finished product are tightly regulated. The program computes nutritional values and current costs of various ingredients (pork, cow meat and bull meat in sausage, for example.) and then assesses which blend will most economically produce a meat product within certain nutritional requirements.

Since its introduction in 1958, LCLP has been found to be extremely valuable in the sausage industry where nutritional criteria are closely regulated and ingredient prices vary every week. Without LCLP, a purchasing agent can figure a nutritionally acceptable combination, but would have no way of knowing whether or not it was the most economical mix available.

Now Dr. Tyre Lanier, associate professor of food science at North Carolina University in Raleigh, believes linear programming can be put to use in the surimi industry.

With assistance from AFDF, Lanier and George Selfridge of Least Cost Formulations, Ltd. of Atlanta, Georgia, will program LCLP into an IBM personal computer to compute the variables involved in surimi-based product formulations. The program will compare costs, nutritional qualities and functional properties of surimi with those of other proteins.

Lanier said he and Selfridge plan to design a liner program around a surimi-based seafood analogue as a starting point for domestic analogue producers. "What we will have then is a general model for almost any type of surimi-based product," Lanier said. "That will be a good starting place [for this program in the surimi industry], much better than starting with a sausage or hot dog program and trying to adapt it."

Lanier believes the LCLP program will be of use to food companies manufacturing products using surimi, because it can assess costs as market prices fluctuate, and also compute the effects of variables—properties of different lots of surimi, varying water content, discrepancies in quality—on the overall quality of the final product. When in use, the LCLP program should tell food technologists how they can save money by using one of a list of alternative ingredients in their food processing.

"Any time you've got a food that can use alternative ingredients and you can choose between them to produce the same result, or near the same result, linear programming is useful," Lanier said. "For instance, I've seen linear programming applied to the corn syrup industry, to show that in certain types of food, using high fructose corn syrup was the best alternative because it gave the sweetness desired at a lower cost."

Linear programming can reduce product costs by 5 to 10 percent in the blended meat industry, according to IBM data. Applied to surimi production, linear programming may help increase profits, but also—and perhaps more importantly—establish a system whereby consistent product can be turned out from a variety of ingredients, and even a variety of grades of surimi.

Surimi-based seafood analogues must be made within certain parameters: high quality surimi crab sticks have a certain gel strength, a certain water content, and a certain small percentage of cryoprotectants.

One requirement in using LCLP is knowing the behavior of the materials in the process. Feed formulations are simple because the interactions of nutrients are generally minimal. But in surimi processing, the functional properties of each ingredient, and their effects on each other, must be established. The results of adding two

The Surimi Connection

About twenty years ago, a glass manufacturer in Caracas, Venezuela, named Raphael Tudela heard that the Argentinian government wanted to buy $20 million worth of butane gas. Tudela didn't have any butane gas, nor did he have $20 million, but he had a great desire to get into the oil and gas business. And he had an idea.

Tudela knew that Argentina had an oversupply of beef and was unable to sell it on the international market. "If you buy $20 million of butane from me, I'll buy $20 million in beef from you," he told the Argentinian government, smiling coyly at his formidable competitors for the deal.

He got the contract and found himself with $20 million worth of beef, no butane, and a great idea. He flew to Spain where a major shipyard was about to close down and leave hundreds of Spaniards jobless.

"If you buy $20 million of beef from me, I will build a $20 million supertanker in your shipyard," Tudela told the Spanish government. They shook hands with great verve.

Tudela then flew to Philadelphia and knocked on the doors of Sun Oil. "If you charter my supertanker to transport your oil, I will buy $20 million of butane from you," he told them. And they did, and he got his butane, and sold it to Argentina and found himself in the oil and gas business, and a cool $20 million richer.

Now that's marketing.

AFDF has always espoused the catalytic approach to marketing: it is not the battery cells, but the connections between them that charge a system with energy. AFDF historically has been a catalyst for the surimi industry, making connections between food processors, ingredients suppliers, equipment engineers, technologists, and charging those connections with energy and information.

AFDF has added two 100-watt energizers to its system. Richard Rhoda, who assisted AFDF in coordinating the 1983 ANUGA World Food Fair in Cologne, Germany, is now the AFDF surimi sales manager. He will be assisted by industrial marketing consultant Bob FitzGerald; together they are developing a long-term marketing strategy and sales program that

centrifuge method, comparing these properties with other proteins;

• foaming capacity and retention—identify foaming characteristics by use of high-speed whipping techniques to test applications in "lite" foods.

The emphasis will be on those food systems used in the processed meat industry; other applications will be studied in subsequent AFDF projects.

Some results from this project will be applied to a Least Cost Linear Programming project, also sponsored by AFDF, which is being developed to assist surimi product manufacturers in computing the least expensive formulation in surimi-based food manufacturing.

Webb Foodlab was selected from a number of proposers to perform the project. Webb is a private firm specializing in technical services for food and related industries.

AFDF will publish the final report from the Webb functionalities study in early summer.

**From "Surimi: a Unique New Food Protein," by Tyre C. Lanier, presented to Meat Industry Research Conference September 14, 1984.*

ingredients together may affect the texture, flavor and appearance of the final product, and that information must be known and quanitified beforehand.

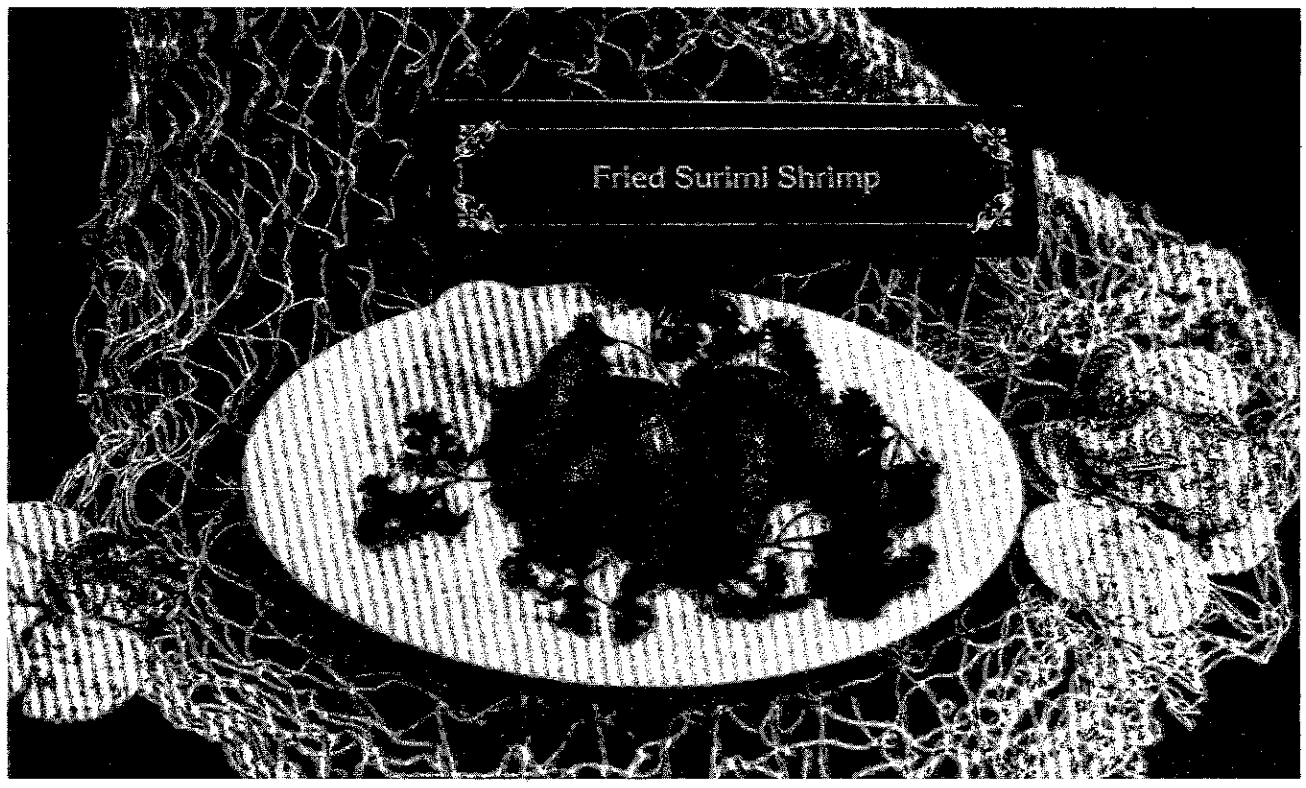
"It's not like adding a certain amount of corn that has 50 percent protein to a certain amount of soy that has 25 percent protein. Th[illegible]ou could pretty accurately predict what the protein content is going to be. ...it's exactly additive," he said.

"But for instance, if we mix two surimis—one with a [illegible] value of 300 grams, and one with a bind[illegible]e of 200 grams—will they come out with 250 grams? or 210? or 270? Those are the questions we're trying to answer."

Finding that data requires first some means of measuring the functional properties of the materials being mixed and secondly, some experimentation with mixing of the ingredients. This is something Lanier and Selfridge will experiment with during the project setup.

The LCLP project complements a research project with Webb Foodlab, Inc. to investigate the functional properties of surimi (see "Study targets new uses," this issue.) Information from that study will be applied to the least cost formulations program in order to establish the effects of each ingredient in the finished product.

Stay tuned to The Lodestar for more information on the applications of LCLP in the U.S. surimi industry.



New on the surimi scene

Surimi has become as American as processed extruded Velveeta cheese, and in its wake the surimi-based foods on the market will slowly become American-made also.

First among the lineup of new products to be made of U.S. surimi are "Seafood Treats," produced by Billy Thrash of Polytech Seafoods of Bayou LaBatre, Alabama. Tiny ¾-ounce shrimp shapes are extruded from top-grade surimi at the Polytech plant a[illegible] flavored with real shrimp extract. The shrimp are breaded and sold by Bojay's Foods, Inc. to bars and restaurants in Alabama for $2.00/lb.

"The shrimp were evaluated and compared to extruded (re-formed) real shrimp at an organoleptic test once, and beat them by far," Thrash said. "John Kramer, the president of Bojay's, thinks they're the greatest things in the world."

Thrash said surimi-based shrimp is different from real shrimp which is extruded into uniform shapes in that "it doesn't require a breading matrix for binding. Surimi protein binds well enough itself, so you're able to get a more realistic texture and retain higher protein."

Thrash produces about 75 pounds of finished product per hour in his pilot plant where he has been making surimi and kamaboko products since 1980.

Around the corner in Tampa, Florida, Treasure Isle, Inc. now is bringing something new to the table. Their "First Mate" breaded snacks are surimi-based shrimp shapes flavored with a teriyaki style profile. First mates are battered, then individually quick frozen and sold in 8 lb. cases under Treasure Isle's label. First Mates can be baked or deep [illegible], and have a shelf life of nine months.

These two shrimp products are the first of many new innovations springing to the surface of the emerging [illegible]rimi industry.

will help U.S. surimi get off the ground and onto America's dinner plates.

FitzGerald previously managed two successful U.S. Senate campaigns, marketed wind energy technology in Western states, and ran the 1980 census for the state of Montana.

Rhoda and FitzGerald will seek out progressive food companies in the U.S. who are interested in exploring the variety of uses for surimi not only in seafood analogues but as a protein ingredient, a meat extender, a binding agent, and a versatile, inexpensive, accessible new food on the American market.

Rhoda and FitzGerald can be contacted at the AFDF office, (907)276-7315.

The American surimi industry worth billions

Right now, there is a market in the U.S. for 70 million pounds of surimi products a year, using 45 million pounds of surimi, produced from 102,000 tons of pollock.

If the entire pollock surimi industry—including harvesting, processing, secondary processing, sales of byproducts, and distribution of surimi products—were all Americanized, the total value of the industry might be over **$6 billion a year.**

Below are a list of twelve assumptions from which these numbers were figured. Of course, no one can project prices, markets and tonnages with perfect accuracy; these numbers represent only an indication of the value of the industry from what is known about its past and its potential.

Assumptions:

1. MSY (maximum sustainable yield) of pollock is caught and processed in Alaska; all of the fish is utilized, whether primary processing occurs on shore or at sea. Total catch = 1.716 million MT (3.785 billion lbs.)
2. By-catch processed into fillets; 30% yield at $1.00/lb. Wholesale value $1.25.
3. Ex-vessel price for all pollock is $.05/lb
4. Surimi A (top quality) wholesale price = $.80/lb.
   Surimi B (reg. quality) wholesale price = $.37/lb.
5. Finished product = Surimi A × 1.75.
   Average wholesale price of surimi A-based product = $2/lb.
6. Finished product = Surimi B × 1
   Average wholesale price of surimi B-based product = $2/lb.
7. Feedstock to meal processing = 678 million lbs. meal @ $350/MT ($.1587/lb.)
8. Roe yield = 3.785 million lbs. @ $2/lb.
9. Oil yield = 59 million lbs. @ $400/MT ($.18/lb)
10. Roe consumer value = 1.5 × wholesale
11. By-catch fillet and surimi consumer value = 2 × wholesale
12. For surimi A and B, tonnage is split 50/50 between retail and foodservice, priced $3/lb at retail and $6/lb at foodservice. For by-catch fillets, tonnage is split 50/50 between retail and foodservice, priced at $2.10/lb retail and $5.68/lb foodservice.

Value in millions of dollars:

Product	Ex-vessel	Primary process	Secondary process	Distrib. level	Consumer value retail	Consumer value foodservice
By-catch	38	114		142	98	250
Surimi A	143	502	2,198		1,648	3,297
Surimi B	47	82	412		309	618
Meal		108				
Roe		76				114
Oil		10				
TOTALS	228	898	2,610	142	2,055	4,279

Consumer value total of surimi = $6,334,000,000

Total value through secondary processing stage = 59% of CVT. Thus distribution margins total 41% of CVT.

These numbers can only estimate the potential value of the pollock surimi industry, according to the statistics available at press time.

Whether the U.S. food and seafood industries will take an aggressive stance to regain control of this industry remains to be seen.

ANOTHER VOICE

We learn by listening.

In 1984, the U.S. seafood industry for the first time asserted its rights under the Magnusson Act. In November, the North Pacific Fisheries Management Council recommended in its state-of-the-industry report to the U.S. Department of State that U.S. policy in 1985 allow no foreign fishing in the Gulf of Alaska, and call an emergency halt to all foreign trawl fishing within 20 miles of the Aleutian Chain.

The NPFMC established a foreign groundfish allocation of 228,998 metric tons, 72 percent of which will go to Japanese companies.

The decisions were part of an effort to reclaim for American companies Alaska's plentiful resources—65 percent of which are now controlled by foreign interests or joint ventures with foreign interests. Under consideration here is a "Five-year Phase In" program designed to steadily decrease foreign allocations between now and 1989, while increasing domestic involvement in the harvesting, processing, marketing, and trading of U.S.-owned marine resources within the 200-mile limit.

The issue is not a comfortable one. Between 25 and 30 American companies will be involved in joint venture harvest operations with foreign corporations in 1985, and those companies depend upon cooperative exploitation of these resources.

As the U.S. surimi market grows (imports of Japanese surimi products have increased by 100% every year for the past four years) foreign surimi producers have an equally increasing incentive to maintain control of the Alaska pollock resource. There are two major companies who control the seafood industry in Japan, and they are the same companies who buy American salmon and salmon pro[illegible] at a rate of nearly 100,000 tons per year. As indicated by Nippon Suisan president Mr. Oguchi, Japan should use this position as a "trump card" in negotiating for more allocations in U.S. waters.

At the same time, Nichiro Gyogyo Kabushiki Kaisha, a Japanese trawler com[illegible] was accused of underlogging catches of pollock and other Alaskan species during the 1982–83 seasons. In an effort to make such violations too expensive to repeat, the U.S. district court sentenced the company to pay a $2 million fine.

And these are just the more visible of the myriad of issues surrounding international fisheries negotiations. *The Lodestar* will look at other approaches to the problem in subsequent issues; here, we reproduce some editorials from Japanese newspapers which reflect their attitudes toward U.S. ownership of U.S. resources:

The following comments are portions of an editorial published by the Daily Fisheries Economic Newspaper Nikkan Suisan Keizei Shinbun on November 1, 1984 and translated for Bill Atkinson's News Report by its editor/publisher, William C. Atkinson.

The United States . . . is applying pressure on Japan by threatening a reduction in the fishing allocations [in response to Japan's failure to comply with IWC 1985 whaling quotas.] The whaling operations and the fishing allocations are two totally unrelated matters. It is not unlike the activities of gangsters, who take hostages to assure compliance with their wishes. One wants to take a serious look at whether the U.S. is infringing on the rights of those involved in the whaling industry.

This attitude is not limited to whaling. The U.S. uses threats of cuts in the allocation in other areas, too, [saying] 'Japan is not cooperating in the developing of U.S. fisheries.' 'Japan won't teach us how to make surimi.' And so forth. It is totally unacceptable for a world leader to do as they please, just because they are strong. The stronger one is, the more self-restraint should be exercised; this applies to countries as well as individuals.

If sanctions and whaling are tied together, Japan will probably have to respond with some kind of sanctions of their own. If the Japanese are shut out of U.S. waters, they will have to take measures to protect themselves. If they don't, Japan will be forever bowing to the U.S., eventually losing any inkling of national pride . . .

The following comments were made by Mr. Oguchi, president of Nippon Suisan, in a year-end meeting with reporters to discuss his views of the Japanese seafood industry.

The main item of cor[illegible] during this past year has been the Japan-U.S. fisheries negotiations . . . . The climate is extremely difficult, and while the enactment of the provisions of the Packwood-Magnusson Act was put off temporarily, the problem has not disappeared.

With the exception o[illegible]w people in Alaska, the U.S. as a whole does not realize the importance of Japan as a market for U.S. fisheries products. More than 60% of the total U.S. fisheries exports are to Japan. It is important for the average American to understand this point, and Japan should consider this a "trump card" during negotiations. . . .

The Lodestar will investigate and publish further comments from industry leaders on both side of the Pacific in subsequent issues. Care to comment? Write a Letter to the Editor.

Guess who's coming to dinner?

You now have 4,761,999,999 neighbors.

Worse yet, you have to share your food with them. With populations increasing at 1.7% (that's about 85 million new people a year) most countries are on the scout for new sources of protein. In places where fish stocks are not as plentiful as Alaska's resources, seafood processors are coming up with creative ideas to increase yields from the fish they can harvest.

A new system developed in England called the Lensfield process enables fish processors to increase profits by extracting useful proteins and phosphates from the bones of demersal fish. The process apparently increases protein yields by 24% and phosphate yield by 13%.

Processors in other nations are exploring new potentials for minced flesh of incidental catches. Some new products include fish crisps, fish noodles, balls, sausages, pate (made of fish "sawdust") and of course the now-familiar kamaboko. Some developing countries are investigating the use of minced fish in making an inexpensive, nutritious baby food.

In Guyana, a dried salted mince sealed in plastic bags is marketed in the hot interior, where it has a shelf life of four months at ambient temperatures.

In Sweden, Alfa-Laval is exploring the uses of krill. One engineer there said Alfa-Laval had perfected a technique for efficiently shelling krill, and the company is now working on removing the krill oils from proteins.

Japanese surimi process[illegible]e making "spread-style" surimi blends with spinach, meat, poultry, or spicy flavors, for spreading on crackers. Also on market shelves there are surimi mousse and surimi pudding.

And in Canada, Mermai[illegible]ther Company is perfecting its process for tanning salmon hides for shoe leather—a process that exemplifies the human capacity for creativity in a pinch.

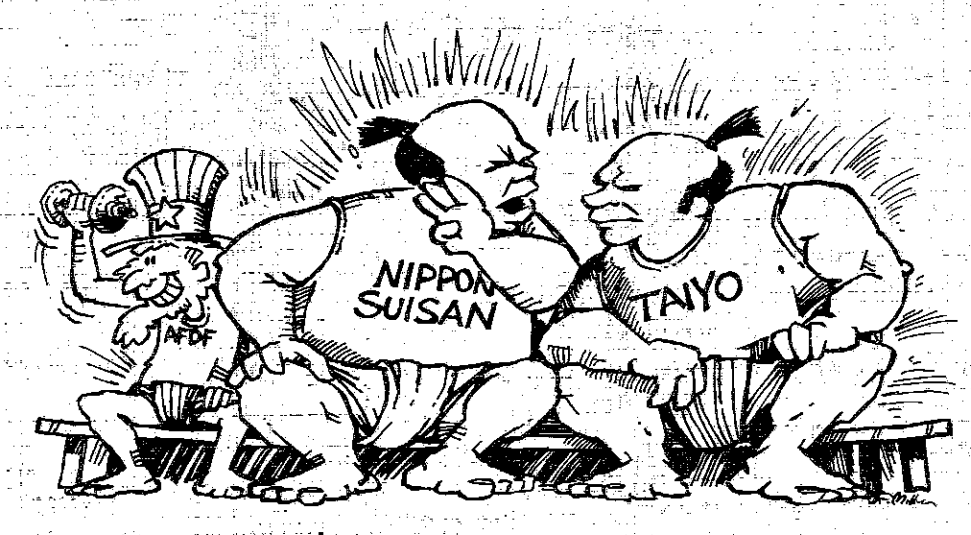
If the U.S. food industry, which is the most sophisticated in the world, lent its muscle to this creative process, we could be sure that none of our four billion neighbors leaves the dinner table hungry tonight.

Dear Editor,

I was somewhat dismayed to see the report of the Brand Group so prominently featured in your magazine ("Buyers: Surimi is Better than the Real Thing," Autumn 1984) The report is fundamentally flawed because they have failed to inform the consumer of the presence of the various cryoprotectant agents such as the 4% sucrose and 4% sorbitol. It is also clear that the nutrition data suggests the clear inferiority of the products in comparison to those that they are imitating and that the FDA is beginning to critically address this problem. It is clear that surimi has a potential application in our society, but it is also clear that we must not mislead the consumer if it is to gain its rightful place.

I would also ask that the potential for the use of traditional mince and of partially washed minces might also be given greater consideration.

Joe Regenstein
Assoc. Professor of food science
Cornell University



"So WHERE'D THIS NEW GUY COME FROM?"

The editor's turn

Off the Cuff

by Krys Holmes

This is a story we all could learn from:

There was a tuba player who performed in one of the nation's largest symphonies for many years, and oh, he was dedicated. He would oomph on the down beats and pah on the upbeats and he never missed a note, or a rehearsal, or a performance.

Once the tuba player had a night off, and he decided to spend the evening listening to the symphony from the audience, for a change. And so he bought his ticket, and he sat down, and he listened to that symphony just as intently as a lover listens to a love song.

When the performance was over, the tuba player popped out of his seat and ran backstage, his face glowing with wonder. He grabbed his fellow tuba players by the tuxedo sleeves and said: "Guess what! The whole symphony doesn't just go *Ooom pah pah. Ooom pah pah!*'

Not many would call the surimi business a symphony, exactly. At least, at this point the orchestration is a little weak. But recent events tell us that things are starting to come together, and if you've ever explored a new idea, or made a new product, or formulated a new theory, or rehearsed a new piece of music, you know that it's that moment when things just begin to come together—when the real slips just an inch closer to the ideal—that is the most exciting moment of all.

When AFDF embarked on its surimi project two years ago, the staff thought there were only a few people in the country who even knew what surimi was. But they soon learned that they had lit a fire underneath an idea that had been smoldering for some time. One by one, names began to surface of people who had experimented with surimi, or developed a product, or had gone to Japan to study surimi making. People began trading information. Some companies began keeping their information secret, it was becoming that valuable.

Now Americans are involved in all levels of industry development. Arco has experimented with super-chilling fish to improve preservation. Baader has developed its 182 pollock filleting machine which improves the quality of surimi and provides surimi makers an option to sell fillets in a premium market. Alfa Laval continues to develop methods for preserving fish meal and oil, which combined with surimi can be a profitable venture, contributing as much as 40% of total fish costs.

Dr. Tyre Lanier is working on a new cryoprotectant system for surimi that adds no sugar or aftertaste, to improve the marketability of surimi and its products. Ken Hilderbrand is building an R-base 4000 computer program that will allow rapid comparison of new surimi production techniques with any now used in Japan. Woody Harris is helping open up political and regulatory doors for the industry. NOAA even plans to use its Nimbus 7 satellite to try to assess the size of the Alaska pollock biomass for the first time.

AFDF has not developed this industry any more than a symphony conductor creates the sound of a symphony. AFDF is the catalyst, bringing together the forces that eventually will help this industry become the $6 billion powerhouse it has the potential to be. And it is the priveledge of those involved with AFDF now to experience that moment when things appear to be coming together for the first time.

Zeitgeist is a German term meaning "world time," that describes what happens when several individuals in different parts of the globe invent the same thing at about the same time. When the world is ready for something, somebody will pop out and make it. America seems to be ready for surimi, and hundreds of people have surfaced almost simultaneously to offer their ideas, their creativity, their innovation, their energy, their enthusiasm.

As the surimi industry begins to take root in America, it is the combination of those instruments—people, ideas, creativity innovation, energy and enthusiasm—that will make the difference between blowing notes in the back row, and orchestrating a symphony.

"Surimi will not only transform the seafood industry, it could also have a profound influence in the processed meat industry in America."

Dr. Neil Webb
President
Webb Foodlab, Inc.

The Lodestar is published quarterly by the Alaska Fisheries Development Foundation, 805 West Third Avenue, Anchorage, Alaska 99501. Phone (907) 276-7315. Editor: Krys Holmes; Executive Director, Chris Mitchell. *The Lodestar,* encourages your letters and comments, and cordially invites new subscriptions.

Test your Surimi Savvy

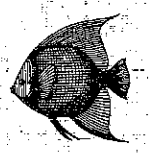
A quiz to check your knowledge of pollock surimi and how it is made.

1. How much surimi and surimi products were imported into the U.S. from Japan in 1984? And how much were those imports worth?
2. How much Alaska pollock is there in the North Pacific? How much is harvested every year?
3. What percentage of the pollock catch is used by Japanese companies to process surimi?
4. How much fish and fishery products does the U.S. import and export every year?
5. What is the nutritive value of surimi?
6. What is the price of raw surimi F.O.B. Seattle?
7. What is the difference between surimi and minced fish?
8. Can surimi be made from any fish?
9. What can surimi be used for? What kind of products can it be incorporated into?
10. What is a Pacific pollock?

Answers to quiz:

1. According to latest figures, an estimated 5,510,000 lbs. of surimi, worth $4.9 million, and 80 million pounds of surimi products, worth $160 million, were imported in 1984.
2. The North Pacific Fisheries Management Council (NPFMC) estmates 3.8 billion pounds of pollock are available a year; total resource is unknown. About 2.6 billion pounds are harvested annually.
3. 70 percent of all pollock harvested—or about 431.2 million pounds—is used by Japanese companies to make surimi.
4. The U.S. exports $1.1 billion worth of fishery products annually; we import $4.1 billion worth. (According to U.S. Senator Frank Murkowski)
5. In 100 grams of surimi: 80 calories, 16 gm. protein, 0 gm. carbohydrate, 74 to 76 gm. water, 0.2 gm. fat, 4 gm. sugar, 4 gm. sorbitol, 0.3 gm. tripolyphosphates, 30 mg. cholesterol.
6. About $.87/lb for top grade surimi; $.37/lb for surimi with lower gel strength.
7. Minced fish is simply the chopped flesh of a fish, as is used in fish sticks or fish patties. Surimi processing further refines the mince, washing out all water soluble proteins that contribute to deterioration of the flesh. During the surimi-making process the pH level is also monitored and a very small amount (0.3%) of cryoprotectants are added to inhibit the breakdown of the proteins. Surimi has a unique protein binding ability not found in animal, aviary or vegetable proteins, which give it its gel strength.
8. Surimi has successfully been made from cod, menhaden, croaker and sardines, although for various reasons surimi made from most other species is not as high quality, or not as economical, as surimi made from Pacific pollock. Sardine meat makes a yellowish-colored surimi; croaker makes acceptable surimi but is not as plentiful as pollock; cod has been found by some processors to make good surimi in experimental situations, but cod can be used more economically in fillets because of its large size. Experiments using menhaden to make surimi are now underway, and though there is much debate over menhaden's usefulness in surimi, some believe the process would be a good alternative use for that plentiful species.
9. Surimi has been most successfully used in seafood analogue products, imitating crab legs, flaked crab meat, shrimp, scallops, and lobster. But surimi technology is used throughout the food industry today: Campbell's Chicken Noodle Soup uses basic surimi extrusion technology in creating those little chunks of chicken that float around between the noodles. Aside from seafood analogues—which are constantly being improved by technologists—surimi already has been successfully made into lunchmeats, sausage, spaghetti noodles, imitation lox, a meat extender, soup bases, snack foods and a number of other products. Food technologists now exploring the properties of surimi say it can be used in pizza toppings, chocolate cake mix, imitation potato chips, as a foaming agent in whipped topping, and as a protein ingredient in basic food manufacture. Studies are continuing now to explore the many uses of surimi, including freeze-dried and spray-dried applications.
10. Pacific Pollock *(Theragra Chalcogramma)* is the largest finfish resource in the world. Pollock is a mid-water gadoid fish related to the cod family. It is harvested by trawlers who tow trawl nets to catch the plentiful fish. An average pollock weighs about two to three pounds, and has firm, white, light-tasting meat common to the cold, fresh waters of the North Pacific. Pollock is ideal for surimi because though some can be found up to five or six pounds, most are too small to fillet economically.

An independent report on the Japanese surimi industry reveals that as long ago as 1982 Japanese surimi producers believed what AFDF and APS recently proved: that it is technically possible to produce surimi in a shore-based plant that is equivalent in quality to factory-trawler grade surimi, "if it is processed within 15 hours of catch." Publicly, the Japanese industry has unanimously denied that high-quality surimi could be made on shore.



The Lodestar recently learned that in November, 1983, croaker surimi sold on the Japanese market for nearly twice the price (700 yen/kg) as pollock surimi (350-400 yen/kg). At an NFI-sponsored surimi conference in Seattle October 4 and 5, members of the Japanese surimi industry denigrated the use of croaker in surimi production, saying croaker lacked whiteness for high quality surimi.

Continued from page 1

The AFDF/APS surimi production line combines proven Japanese techniques with American innovations from the food industry. The line differs slightly from both Japanese factory trawler and shore plants, and combines the advantages of proximity to the resource with the lowered costs of a shore-based plant, a bonus expected to help keep prices of AFDF/APS surimi competitive with Japanese surimi.

Billy Thrash, owner of Polytech Seafoods and one of the first surimi and kamaboko producers in the nation five years ago, lent technical assistance to the plant setup process. The line was installed by Bob Ryan of Ryan Engineering of Seattle.

The production line begins with an initial washer/scaler and a Toyo heading and gutting machine, which delivers gutted fish skin-up into a Bibun SDX-16 deboner. There the meat is removed from the skin by the action of a belt moving against a large metal cylinder in such a way that the meat is minced through small holes in the cylinder while the skin rolls along the belt and is discarded.

Alongside the Toyo machine, AFDF/APS is experimenting with a Baader 182 filleting machine which fillets the pollock before it enters the system. This is expected to produce a higher quality surimi because it more completely cuts out all but the whitest meat, but use of fillets also decreases yield of finished product.

Fillets from the 182 are fed into a second deboner which is set alongside the Bibun deboner, and meat from both machines is deposited into a ratio tank. Correct meat/water ratios and pH level are two of the most crucial criteria of high quality surimi and it is in the ratio tank that these initial levels are established.

The mince/water ratio is pumped into a series of wash tanks and screens. This process must be precisely timed so as to adequately wash out the water-soluble proteins from the mince while not overwashing, which causes the mixture to puff up like tapioca.

The last washing includes a small injection of concentrated saline solution to assist in water removal. From there the washed mixture is pumped to a Fukoku refiner where any small bone particles, scales and other defects are removed from the surimi. The mixture then drops down into a screw press dehydrator where the water is squeezed out of the mixture for the last time.

Finally, the surimi is mixed with 4% sugar, 4% sorbitol, and 0.3% tripolyphosphates in a Bibun BM230 mixer, then extruded into metal trays and frozen by contact plate freezers to −20 °C.

The plant will process between 3,000 and 4,000 pounds of surimi per hour at full-scale capacity.

According to current information, there are [illegible]al primary differences between the AFDF/APS surimi pr[illegible]ion line and most Japanese surimi-producing factory trawlers: first and most important is the quality control lab which is designed to measure product quality in mathematical values, rather than measuring quality by the "artisan" approach as Japanese f[illegible]cers do. In the APS quality control laboratory, managed by Q[illegible]nager Landon Asakawa, each lot of finished product is sampled and tested by sophisticated calibrations now used in the food industry, and each quality variant (whiteness, gel strength, foldability, etc.) is measured and quantified precisely so as to ensure quality consistency down to a minimal fluctuation. (See "The Science of Surimi," this issue.)

There are other significant differences: the AFDF/APS line provides three wash tanks and screens which are designed to rinse the soluble proteins from the flesh more thoroughly than the one or two wash tanks provided on a trawler. The option of three wash tanks (the system also works with one or two) means that the mince/water mixture can be washed quickly, each time with fresh water, rinsing out more of the water soluble proteins that inhibit gelation capabilities in mince.

A factory trawler has no room for three wash tanks, nor is the required fresh water accessible on a ship where fresh water must be manufactured from seawater.

Another primary difference is that most Japanese surimi trawlers run on a batch system; the AFDF/APS plant is a continuous system. A batch system provides more flexibility on the line, and can be shut down and altered without losing much product. A continuous system requires a constant flow of product through the line to maintain correct ratios and adequate pressure in the screw press. The primary advantage of a continuous line, however, is that ratios and mixtures can be held consistent without laborious monitoring, and requires fewer people to run than a batch system does.

Another significant change in the system from a Japanese plant is the technological assistance from the U.S. food industry. Moyno and Crepaco pumps, which are sensitive enough to move strawberry ice cream without crushing the strawberries, replaced impeller pumps in places where surimi must be transported carefully to prevent chewing up the meat.

Continuous pressurized pumps were installed in the ratio tanks and the last wash tank to monitor pH levels and add the saline solution in precisely rationed amounts, according to the mixture going through the machinery. This added technology ensures quality control without adding higher labor costs to the price of the end product.

Lower labor costs, better instrumentation, fewer repairs, and—most importantly—proximity to the Alaska pollock resource are expected to give American surimi processors an edge in the upcoming competition for control of the U.S. pollock surimi industry.

The 80,000 pounds of surimi produced in Kodiak so far will be the first of 860,000 pounds promised to the U.S. food industry by APS through a contract with AFDF. The surimi will be distributed to U.S. food companies now engaged in new product [illegible]development, with large quantities slated to be sold to [illegible]panies now ready for commercial production of surimi-based foods using American-made product.

The surimi production line is the result of a two-year project sponsored by AFDF and National Marine Fisheries S[illegible]e to begin a commercial surimi industry in Alaska based up[illegible]the plentiful Pacific pollock resource.

AFDF and NMFS are chartered to reclaim for U.S. fishermen, processors and end-users control of those domestic fishery resources which are now primarily controlled by foreign interests.

the LODESTAR
Charting the course of fisheries development.
Alaska Fisheries Development Foundation
Volume III, Issue I Winter 1984/85

"Time was invented by God Almighty in order to give ideas a chance."
Nicholas Murray Butler

Itzhak Perlman subscribes

To the theory that every minute he's not practicing the violin, somebody else is. So who's reading *the Lodestar* when you're not. Send a postcard to: The Lodestar c/o AFDF, 805 West Third Ave., Anchorage, Alaska 99501, (907) 276-7315.

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