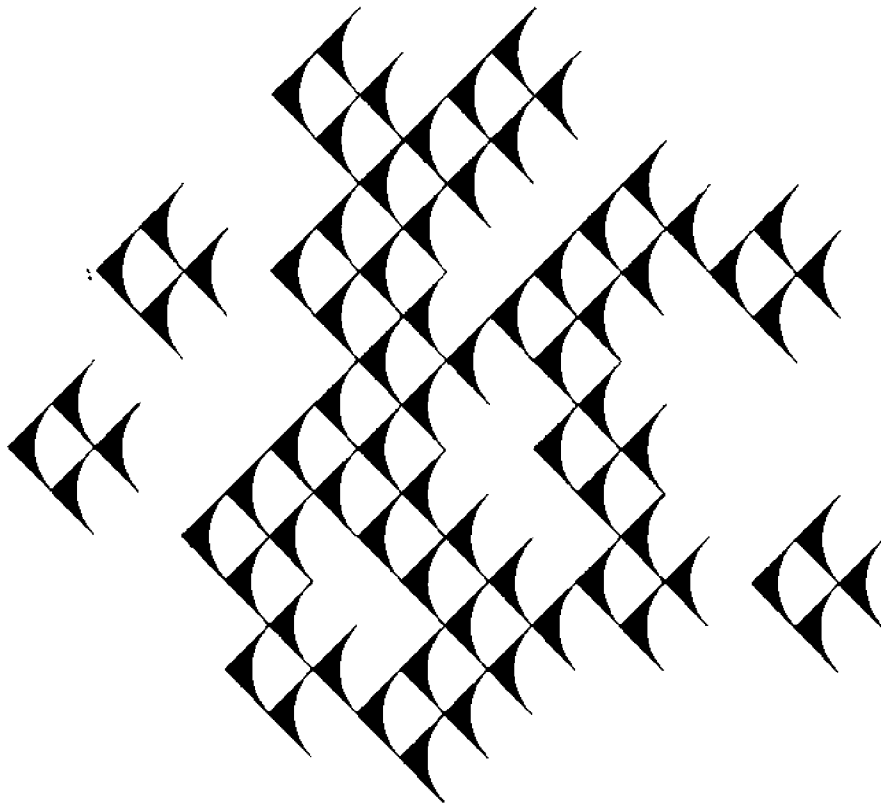


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Underutilized Species and Seafood By-Products

Proceedings of a Workshop
May 22, 1985
Corvallis, Oregon

Joe Yuska and Sandy Ridlington, Editors

Oregon Sea Grant
ORES-U-85-002

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Sponsored by

U.S. Department of Education
Department of Agricultural and Resource Economics,
Oregon State University
International Institute of Fisheries Economics and Trade
U.S. and Foreign Commercial Service, International
Trade Administration
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Acknowledgments

The workshop from which these proceedings were drawn was supported by a grant from the U.S. Department of Education.

This publication is the result, in part, of research sponsored by Oregon Sea Grant through NOAA Office of Sea Grant, Department of Commerce, under grant no. NA79AA-D-00106 (project no. R/PPA-20). The U.S. Government is authorized to produce and distribute reprints for governmental purposes, notwithstanding any copyright notation that may appear hereon.

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Preface

Many fish species and by-products of the seafood industry are "underutilized" on the West Coast; however, deciding which ones offer realistic economic opportunities is difficult. This workshop sought to provide the answer to the question, What opportunities for developing underutilized are viable? It also sought to answer the questions which naturally follow: What technological problems will be encountered? What about marketing? How have other people fared in similar projects?

Designed around a panel format, this workshop encouraged audience participation, and, indeed, the speakers and audience did engage in substantial and useful dialogue.

Presentations

WELCOME

Gene Nelson

Professor Nelson is head of the Department of Agricultural and Resource Economics at Oregon State University.

The key question we want to address in this workshop on the under-utilized species and seafood by-products of the Pacific Northwest is, what is the realistic potential of underutilized species in the West Coast fishing and seafood industry? This is one of four workshops being conducted under a grant from the U.S. Department of Education's Business and International Education program and is designed to promote a dialogue between individuals in the private sector and persons located in the educational institutions and agencies of the Northwest.

This workshop comes at a time when the Northwest and Oregon economies are facing some significant challenges. Fishing, forestry, and farming--the three F's in this part of the country--are all facing depressed markets and an overall decrease in production capacity. The situation is not necessarily one of catastrophe; these industries will survive. But some significant adjustments will occur over the next few years. I think it is important that we recognize that at a time like this innovation and survivorship become more important. This is the time when all those people who are innovators and survivors come to the floor and provide the leadership to keep the important sectors of our economy going.

I have been reading the work of a Portland psychologist who has studied survivorship. His studies started with observations of veterans returning from the Korean War. We have developed certain characteristics associated with survivorship and I think we need to keep them in mind as we approach the task before us. Survivors are goal directed in terms of their dedication to getting things done. At the same time, they are flexible, willing to look at new ideas and to develop them. Third, when survivors are faced with adversity, they try to find something positive they can learn from the experience.

I think that is where we are today in the fishing industry. We are trying to learn some things and to develop new ideas that can help us through this particular time. You'll notice this is called a workshop. I underline the word "work," because I think it is significant. You must get involved in a workshop, and what you get out of the experience is directly proportional to what you put into it. It is important to get involved by asking questions and sharing ideas.

We're not implementing programs at this workshop, but we are developing ideas we want to consider for action later. That's what we want to see coming out of this particular workshop.

OPENING ADDRESS

Pete Granger

Pete Granger is executive director of the West Coast Fisheries Development Foundation, Portland, Oregon.

I want to elaborate on what we mean by "underutilized" and "by-products." I would also like to briefly run through a list of species. I am unfamiliar with some of the species, so I'll just name them. Try not to make any judgments about the potential for these products, I'll just give you some facts now, and we'll discuss potential later.

First, I should describe the West Coast Fisheries Development Foundation. We are a nonprofit foundation and trade association located in Portland, Oregon, and serving the West Coast seafood industry in Washington, Oregon, and California. We started about five and a half years ago as a conduit for the National Marine Fisheries Service to issue fisheries development grants to the seafood industry throughout the country.

There are regional foundations in other parts of the country. The industry formed the foundations and then began receiving the Saltonstall-Kennedy fishery development monies that have been available over the last five to six years on a varying basis around the country.

The foundation has participated in many technical research projects involving the industry--exploratory fishing, developing products, processing equipment development, helping develop markets, and promoting the products of the West Coast industry. No definitive commodity commission exists for West Coast seafood products. Oregon has the closest thing in the Otter Trawl Commission, representing bottom fish and shrimp products, the Dungeness Crab Commission, representing Dungeness crab, and the fledgling Salmon Commission. Otherwise, Washington and California really have no marketing groups that function on behalf of their seafood products. The West Coast Fisheries Development Foundation has fallen into that role. At present, we are a 150-member organization that uses approximately \$800,000 a year of the \$9,000,000 Saltonstall-Kennedy money that is available nationwide.

Let's get into definitions. A friend of mine who works at the National Marine Fisheries Service (and who will remain unnamed at this point) defined underutilized species a few years ago. He sent a note to my predecessor, Bill Johnston, that said, "Bill, you know why they are called underutilized and they stay underutilized? Because they taste like s-h-i-t." Well, I don't propose that be our definition but it struck me as quite hilarious at the time because we were involved with a couple of species whose taste was really not in the greatest regard by consumers in this country.

I think "underutilized" is really a misnomer. To me, underutilized to some extent means large volumes of fish, such as Pacific whiting, that are swimming out there in vast quantities. At least we think the quantities are vast. However, a number of species do not exist in large numbers but are in fact underutilized: rock crab and skate are examples. They are in small demand in the marketplace. So I like the term "nontraditional." That term also applies to the species of which we have large numbers. Let me give some examples: dogfish, shortbelly rockfish, krill, pomfret. These are all species that I think you would acknowledge as unknown in the marketplace and thus nontraditional. Species that we might call "traditional," such as albacore tuna and Pacific squid, are in fact underutilized. Albacore, for example, has traditionally been put in a can. Now that the canneries are closing, what do we do with our albacore? We consider it a traditional species, but I would consider it, in this vein, a nontraditional or underutilized species. We have to develop a new fresh-frozen market for it.

Squid is another example. Most of the squid we catch is from Monterey and San Pedro, but we are catching squid on the Oregon coast now. Most of our squid is used for bait. Squid ought to be a food item. It is an excellent food. If you have tasted it, you'll know it is a wonderful fish; it should be given more value as a food item for the fisherman, the processor, and the marketer. Again, I would put it in the category of "underutilized," even though the amount of resource we have out there is relatively abundant.

"By-product" is another word that is hard to define. I'm not really going to define it but I will mention four types of by-product. Certainly when by-product is mentioned, the first thing that comes to mind is fish waste: the carcasses, the frames, the guts, and the parts of the fish that are discarded at the fish plant as unusable.

A second by-product is specific components of the waste, for example, the eggs, or the roe, of the fish; the shells of the shellfish; the skin, the oil, and the fins. These are products that are used in other parts of the world as byproducts but which we do not use in any way.

A third by-product is the flesh, the discarded flesh on the frames of the fish. There are techniques for deboning this flesh and then using it. Surimi is one of the products of such techniques. Again, I consider this a by-product.

Finally, specific products that can be manufactured from the waste constitute by-products: fish meal, refined fish oil, a component of shellfish shells, fish fertilizer, and fish pellets that go into the aquaculture industry. I hope this survey has given some perspective on what we mean by "underutilized" and "by-products." I think anyone who is in the industry has his or her own definition of what we mean by these terms.

Now, I would like to go through a list of species, offering some anecdotes on certain species that I know a little bit about and which the foundation has had some experiences with in the past few years. I might mention that in some cases when the foundation decides to promote a particular species, in certain circles it has been accused of ruining a fishery. For example, two and half years ago we started a squid promotion. At that time there was a viable squid fishery in San Pedro and Monterey, and we knew there were squid off the Oregon coast even though really none of it was being harvested. We felt that squid ought to make some moves as a food item in the domestic marketplace. The next thing that came along was our friend El Nino that wiped out the San Pedro and Monterey fishery. It didn't wipe out the Oregon fishery, but we had to put our squid promotion on hold.

We helped develop and expand the markets for the brown rockfish that we had tremendous numbers of until a year or two ago. This product came on so fast that a lot of the fish companies needed help in getting it out into the traditional marketplaces in the L.A. and Bay areas, and into Denver, Phoenix, and Chicago. Of course, we helped orchestrate some of that. Now, here we are with rockfish having quotas.

I think rockfish are going to come back, but again we're on a slow boat. This is typical of commodities across the country. When you have a lot of product, you want to create demand for it. That's the proper place for promotion. When you don't have as much product, you go a little bit slower and you get into the quality of the seafood or the health aspects of your industry which I think will become an important focus in the next few years.

Shortbelly rockfish is a very small species of rockfish off this coast. We harvest a number of its larger cousins. It yields a very small 1-ounce to 1 1/2-ounce fillet, which at this time does not fit into the traditional market of our other groundfish. We have experimented with shortbellies in surimi. We had our company in Los Angeles do some studies last year on making surimi out of the shortbellies, and it had mixed results. I think it needs some more work. It's my understanding that Quest Trading in Coos Bay will be harvesting a number of shortbellies under an experimental permit with the Fisheries Council this summer. I think they have identified some institutional and export markets for the small fillets. That is to their credit, and it would be a real breakthrough if they could make some moves in that area.

Pacific sand dab is a very small flounder which again does not yield a very large fillet. If we ate our fish the way they do in the Gulf and South Atlantic states we'd be using the sand dab. They pan dress it, cut the head off, leave the skin on, either bread it or not, and cook it quickly in a very hot skillet. Then they pick the meat away from the bones. It's a perfectly acceptable way to consume the fish.

Jack mackerel is a product we have a lot of. I do not know a lot about mackerel other than that it mainly goes into pet food. If it is caught at all, it mainly is caught in Los Angeles and San Pedro. A large

wholesale distributor in L.A. has some Saltonstall-Kennedy money, and the company is moving some mackerel into the retail marketplace. What product form they have it in, I am not sure. They are just getting underway and they may have some interesting results.

Basking shark is a large, gray, docile shark we have off the Oregon coast. It's not a carnivore. Certainly one of those 20 to 25 footers would yield a lot of meat. I don't know much about the texture of that meat.

Ratfish is a very small fish that comes up in the draggers' nets frequently. Again, there is a lot of it out there, we think. We really don't know much about it and it has never had much of an opportunity in the marketplace.

The roe from a variety of species (groundfish species that otherwise have markets in the rest of the world--pollock, cod, and possibly whiting) is a delicacy in other parts of the world. We don't use it at all right now.

Rock crabs will be talked about at some length by Chris Toole from Eureka, California. He has had a lot of experience in trying to get a rock crab fishery started, and I'll defer to his information on rock crabs.

Krill. I did not know that we had krill in any abundance off our coast until last year. Apparently, there are certain amounts of krill at least off the Monterey, California area and maybe in other areas too. Krill is bandied about as the possible food source of the future. The Russians, I know, have harvested a lot of krill in the Antarctic region. I'm not sure what they do with it. We are not doing anything with our krill.

Giant Pacific octopus is an Oriental delicacy which we are not using.

Fighting dogfish. Personally, I think dogfish has a lot of potential. We're helping a company in Puget Sound, Arrowac Fisheries, move some dogfish for the first time in the domestic marketplace in the retail sector. We are not calling it dogfish. We are calling it North Pacific shark. We've gotten the okay from the Feds that it is an appropriate nomenclature and I think it has some real possibilities. We are going to be moving it into L.A. and Kansas City.

Sea cucumber is another Oriental delicacy.

Ridgeback prawn. Various prawns are available, such as deepwater prawns.

American shad. A lot of shad goes up the Columbia and to some extent up some of the other coastal rivers. We don't do anything with it right now except take the roe out of some and ship it to the East Coast. Every

year 2 to 3 million pounds of shad go up the Columbia unused. The problem with shad is that it is soft. It's a herring. It also has an incredibly complex bone structure which makes it difficult to fillet. But these obstacles have been overcome in other species in the past, and perhaps we could overcome them in shad in the future.

Box crab is a local product that some people present toady have had experience with.

Pacific whiting is probably the number one target, the number one priority for all of us involved in fisheries development on the coast. There is an incredible amount of standing stock. Some people think that 150 to 400 thousand metric tons can be harvested. At this point the joint ventures and a very limited amount of domestic production accounts for less than half of that. Pacific whiting is being moved now essentially as a headed and gutted product. But there is some development toward moving it as a fresh fillet item. There may be some potential for it as a block made into portions. We are going to look into a number of these things over the next two to three years. We are hoping for a major Saltonstall-Kennedy project on whiting. Certainly, the world market is available for whiting. Whiting is a world commodity, and if we can put out a quality product, I think the only thing we really need is a falling U.S. dollar to make our price competitive with those in some other marketplaces.

Skate is a product of Europe and the Orient. Both places enjoy much production. We don't do anything with our skate. Skate wings are excellent. But again, we aren't doing anything with them.

Pomfret is a distant water species we know very little about. The Japanese take pomfret from time to time in experimental fishing. We are hoping to get some pomfret landed by an experimental Japanese fishing vessel that is going to be stopping in Newport this summer. Some negotiation is going on at the State Department to allow that to happen.

Carp and some other freshwater species. A lot of freshwater carp swim around in the lakes behind the Columbia River dams and the Snake River system, but we are not doing anything with them at this point.

Sea urchin is another Oriental product that may have some possibilities.

Albacore tuna and squid in this area must be seen as nontraditional. We've viewed them as traditional in a certain way, but now they are faced with some market problems. We should take a look at them as underutilized or nontraditional species. There are some others. Look at our trawl salmon. Its price is depressed mainly because of the high-quality competition coming in from other parts of the world. We must raise the image of our trawl-caught salmon. It is truly as good as the other fish that's coming in, but somehow in the market it is not perceived as such.

I will leave you with a very exciting point that came to light in the statistics just released by the National Marine Fisheries Service for

1984: "the per capita consumption of fish rose almost 1/2 pound in the U.S. last year." This is exciting news for those who are trying to promote and develop seafood. If we can sustain that kind of growth in the next few years, I believe we will have a market not only for all the traditional products we can put out, but for a number of the nontraditional products.

PANEL: WHICH UNDERUTILIZED SPECIES AND BY-PRODUCTS HAVE REALISTIC PROFIT POTENTIAL?

Because of technical difficulties, these proceedings do not include the presentation by David Crawford, Program Director, OSU Seafoods Lab, Astoria, Oregon, or the beginning part of the question and answer session which followed this panel.

Chris Toole, of the University of California Cooperative Extension, has been in Eureka for four and a half years as a marine extension agent with the Sea Grant program. He has a B.A. from U.C. Santa Barbara in environmental biology and a B.S. and an M.A. from Humboldt State University in fisheries biology.

Humboldt County is probably one of the areas of California closest to Oregon in both its fisheries and available species. Let me start out with a couple of general comments reflecting some biases of my own regarding underutilized species. Pete Granger has done an admirable job of describing what an underutilized species is. I have to admit that most underutilized species are underutilized for a good reason: they are difficult to catch in commercial quantities or they are difficult to market, or both.

The true test of an underutilized species is whether it can be the object of an alternative fishery. The expression "alternative fishery" is seen bandied around quite a bit. I have been guilty of using it myself. Usually it is used without describing for whom or for what it is an alternative. An alternative fishery should be one which has some potential for replacing a traditional fishery. I am not convinced that most of the species we talk of as underutilized really are capable of replacing our traditional fisheries.

Another question about alternative fisheries is, who is it an alternative for? I am interested in fisheries that may potentially be an alternative for displaced salmon fishermen in our area of the coast who own small boats and essentially have no working capital. Pacific whiting is not an alternative fishery for them; however, some of these other smaller species may be.

I don't think most of these species really are alternatives. I think that they are better termed "supplemental fisheries." The most a fisherman can hope for from them is a way to supplement his income while he is fishing for a variety of species or for some of the traditional species. I'd like to see the term "supplemental fishery" used a little bit more because it doesn't create false expectations.

What I would like to do for the next few minutes is discuss some species that I am involved with, mostly in cooperation with the National Marine Fisheries Service, Sea Grant, and cooperating fishermen in the Eureka area. I am going to describe some failures as well as some

potential successes because both are important to any discussion of underutilized species. Once again, these are from my own perspective.

One of the species we first started looking at was the octopus. It is a very low-technology fishery. Essentially you just put a wooden box in the water which the octopus adopts as his "lair." I encourage fishermen to fish octopus pots along with their crab pots. In Humboldt County, we have had four fishermen test fish octopus pots so far. Three of them didn't catch any octopus; the fourth man was somewhat successful.

In Humboldt County there are certain spots where we can apparently catch octopus with some consistency, but this does not really have the possibility of being a fishery that stands alone. The best way an octopus fishery will work is if you intersperse some of these pots among your crab pots during the course of the Dungeness crab fishery. The fisherman who successfully caught octopus averaged one per 21 pots at an average weight of 13.2 lbs apiece, although catch rates were as high as one octopus per every six pots and some octopus weighed over 20 pounds. Even at a low price of 50 cents a pound this will supplement your income. (Note: In 1985 the average ex-vessel price for octopus was \$.70/lb.)

Two species I have been working on for the last three months are the spot shrimp (or prawn) and its cousin the coon-striped shrimp. Spot shrimp are found in rocky areas and canyons offshore at depths greater than 80 fathoms. Coon-striped shrimp are found in the crab grounds, usually over muddy or sandy bottoms. They occur in 30 or 40 fathoms or less in the area. We have a number of pots that were on loan from the National Marine Fisheries Service as well as pots that were developed by a cooperating fisherman. He and I fished pretty heavily for the last three months off Eureka. There is one area near Crescent City where documented catches of 2 lbs/pot have occurred. However, spots such as this are very uncommon. We found no locations in our Eureka survey that even came close to it. You may be able to supplement your income by combining this with your crab fishing operation. However, it is not going to be something you can survive on.

There hasn't really been a squid fishery along our part of the coast, but some fishermen have been trying to develop one. The last two summers we had a boat from southern California do exploratory survey work off the coast and show some of the local fishermen squid fishing techniques. The survey didn't find squid during those years but there weren't any squid anywhere in California at that time due to El Nino. This year we do have one local fisherman who has converted his boat for squid fishing and is working in cooperation with a pilot in a small airplane. They are doing a squid survey this summer from the Oregon border down to Cape Mendocino and we are hoping that they will have some success. This is funded by the West Coast Fisheries Development Foundation.

We have a very small shark fishery in Humboldt Bay. It's a gill net and hook and line fishery for leopard shark. The problem with shark is marketing. Personally, I would not like to see these shark fisheries developed to any great extent in the bays. The leopard sharks in

particular come into bays (Humboldt Bay, and I'm sure it's the same up here) to pup and to mate during the spring months. They are really concentrated in certain areas of Humboldt Bay, and I am afraid somebody might develop the marketing and wipe them out pretty fast. We are encouraged by the possibility of offshore shark fisheries. Two fledgling companies in Eureka are experimenting with shark jerky products, hoping that they might create some markets.

What I was actually asked to talk about today was the rock crab fishery. This was started as a cooperative fishery with the National Marine Fisheries Service and fishermen in Humboldt Bay. Pots have been loaned to the fishermen in exchange for their providing biological data and catch information to us. This is a fishery that has a very small potential in terms of numbers of fishermen, but which does seem to make money for the few who get in first. Eleven permits for rock crab fishing in Humboldt Bay have been issued, but most of the permittees have not been actively fishing. Two to four active fishermen would pretty much occupy all of the fishable sites. But there are a lot of little bays up and down the coast of Oregon and especially in the Puget Sound area in Washington, where a handful of fishermen should be able to make some income from rock crabs.

The three species in Humboldt Bay are pretty much the same as you have up here. Red rock crabs account for about 85 percent of the catch. What fishermen call the brown rock crab, or the true rock crab, makes up about 12 percent of the catch. We have just a few yellow crabs in Humboldt County. I believe that once you get further north you don't get them at all.

The most successful pots used in Humboldt Bay are manufactured in San Diego. These are elliptical plastic pots which break open down the centerline and are stackable. The technology involved in bay rock crab fishing is very simple and inexpensive. A skiff with an outboard motor works just fine. Most of the fishing occurs at depths of about 12 feet so a power block for pulling pots is not required. "Hanging bait" such as rockfish carcasses works well and is very inexpensive.

Looking at catch rates, we found over the last year that one pot usually brings in about 30-80 crabs. Most of them are of a relatively small size and are unmarketable. Our fishermen have found that for a crab to go to the market whole, it has to be at least about 5 inches in carapace width (5 1/2 to 6 inches is the most desirable). The averages we've been getting on these are about three pounds a pot. This may not sound like much, but when you can get into the bay in such an accessible fishery, you can go out and pull all your pots in a two-hour period. You can potentially fish them twice a day and produce quite a volume with a small overhead.

Catch can be extremely variable. It all depends on the tides, rainfall, and a lot of other unexplained factors. Crabs segregate by sex in Humboldt Bay. The males usually have larger claws in proportion to the body. You'll find areas where you catch nothing but females and

other areas where you catch nothing but males. We are trying to find out how you can predict that a little bit better.

Most of the crabs in Humboldt Bay go into the claw market. They are declawed and the claws are sold separately. The crabs are returned to the bay. The claws make up 20 to 30 percent of the total weight of the crab. They retail for about \$2.50 to \$3.00 per pound. A small portion of the crab from the Humboldt area is marketed whole. There is a better market for whole crabs, but it has been harder to get into. The National Marine Fisheries Service has worked on live markets for rock crabs. There are places specifically around the San Francisco Bay area, where Philippino and Oriental markets desire live rock crab. We've had a hard time setting up a reliable transportation system to market live rock crabs from Humboldt Bay into these larger areas. I suspect that you would find markets in Portland, Seattle, and elsewhere as you swing up the coast.

We've been doing some studies along with the fishing. We've tagged a lot of crabs. We've been looking at their growth rates, movements, molt cycles, and reproductive rates. At certain times of the year, most of the crabs are unmarketable after they have molted and haven't filled out. We are trying to define this a little bit better. The report I've written on the first year of the study is available from the conference organizers. If you would like some more information on that you should contact me (my address is University of California Cooperative Extension, Marine Advisory Program, Foot of Commercial Street, Eureka, CA 95501).

One of the other things we've been looking at is the effect of claw removal. There is a precedent for this with the stone crab fishery in Florida, where studies showed that there was no difference in mortality between crabs with one or two claws removed. Of course, mortality is still higher than for crabs that have not lost any claws, but a significant portion of the de-clawed crabs survive. We find that rock crabs with missing claws range from 5.7-27.7 percent of the catch and crabs with obviously regenerated claws make up 1.0-9.6 percent of the catch.

There have been studies at Humboldt State University to look at the effects of claw removal on mortality. The researcher, Gerry Gray, found that if you don't declaw the crab cleanly--that is, if you tear the flesh--it will die within two days. A clean break doesn't have any physiological effect on crabs. One thing I've been looking into is background rates of regeneration and the number of crabs that naturally don't have claws. It takes two to three molts before their claws come back to full size. Once again, there are more details in the report.

I am not here to try to sell rock crabs or any other species as an alternative fishery; I'm here to throw out ideas. I think there is a very limited potential in terms of the number of fishermen who may be interested in a fishery like this. However, there is a great potential for this fishery to develop in the embayments along the Oregon and Washington coastline. Rock crabbing is one fishery in which a fisherman can definitely make a profit with a very small investment.

A marine biologist, Richard Starr has an M.S. from Oregon State University and for the past four years has worked with the Oregon Department of Fish and Wildlife. At ODFW he is responsible for the research on and management of both the scallop and the squid resources and is currently conducting research on squid characteristics. He is using hydroacoustic equipment to assess the amount of squid we have. Mr. Starr described how the squid fishery on the Oregon coast has been unfolding in the last couple of years.

When you talk about underutilized species and their potential for development, you need to define whether you are talking about the potential for fishermen, the potential for processors, or the potential for the rest of the industry. Today, my remarks will combine a few of my ideas about the potential for all of us in the industry.

I will talk first about estimates of squid biomass, my own untempered optimistic views of the potential for squid in the Pacific Northwest, and the limitations I see for the development of the squid industry.

Squid are abundant worldwide. One investigator estimated that in 1969 the world's harvest of squid was about 1 million tons. He estimated that the world's shelf resources could withstand annual harvest of 8 to 10 million tons. Oceanic resources are about 10 times that. To give you some idea of the magnitude of squid resources around the world, it has been estimated that sperm whales alone eat 100 million tons annually.

Drs. Bill Percy and Kathy Jefferts have collected and cataloged 51 species of squid in the eastern Pacific. Some of these species may be abundant. They appear frequently in trawl catches.

We have no abundance estimates, however. Our efforts to date to target on deepwater squid species have been fruitless. Thus, I have to conclude that most of these deeper species are not currently practical to harvest and thus have a low potential as underutilized species in the near future.

A few species do have potential, however. In 1983 the Japanese and Canadians conducted some experimental gill net fishing for squid off the Canadian coastline. They attempted to fish for the flying squid. It's a large squid weighing up to nine pounds. It occurs off our coast as well and is collected in trawl nets. The Canadians concluded that in some years the abundance of flying squid (Onmestrepes bartramis) about 20 miles offshore is great enough to support a fishery. They also jigged for

the smaller squid, the nail squid (Onychoteuthis borealijaponicus), which lives in shallow water and is also collected in trawl nets off our coast. They didn't have much success fishing for the nail squid. Another squid that seems to be somewhat abundant off our coast is the small Rossia pacifica squid. I've seen quite a few in catches of scallop trawls. I don't have any idea of the abundance of that species as well. Some work in Alaska has shown that it's abundant in Alaska and is a preferred species in Japan.

The squid species that does seem to have the most potential is obviously the market squid Logligo opalescens. The market squid is a species that has a proven track record. It's been harvested in California for over a hundred years. The 1978-80 annual catch averaged 13,000 tons, and fishermen received a price averaging \$100 per ton for their catch. The peak harvest was caught in 1981, amounting to about 26,000 tons. Recent prices have ranged from \$200 to \$600 per ton as squid world markets have been clamoring for squid and the abundance in California has been depressed. This year, squid seem to be returning, however. Oregon fishermen have long known that squid occur off our coast, but only recently have they targeted on the market squid.

In Oregon, the first substantial harvest occurred in 1982 when about 50 tons were landed. Landings tripled in 1983 and 1984. Landings today (1985) are about 1,000 tons, or double that of last year. We are still fishing. The ex-vessel price on the Oregon coast has been \$200 to \$600 per ton. Most of that squid has been frozen and sold for bait or for food.

Let me give you my untempered optimistic views of the squid resources. Almost all the squid landed in Oregon to date have been landed in Newport. Almost all the squid have been harvested from one or two discrete areas. Over the past several years I've received information from crab fishermen about squid spottings up and down our entire coastline. That is what we expect, as the market squid ranges from Baja California to southeast Alaska. Last year we saw evidence of major spawning schools in the north and south coasts of Oregon as well as the central coast. Perhaps even more promising for squid in Oregon is the fact that only two processors have bought most of the squid landed on the Oregon coast. Also, due to limited processing capability, the two processors have limited the amount of squid that has been harvested to date. As more processors get involved and the processing capacity expands, more squid will be landed.

Foreign demand for squid is large and will undoubtedly increase as world population increases. The Japanese, who buy most of the squid exported in the world, annually purchase about 100,000 tons. Domestic purchases are relatively small but may be expanded with some innovative processing and marketing.

There is room to market squid creatively. All squid now landed in Oregon are frozen whole for food or for bait. Cured and dried squid are

also sold in large quantities in foreign countries. I think this represents an area the processors on the Oregon coast can become involved in.

Value-added products provide a way to increase the sale of squid to the domestic market. Squid can be processed in ways that would be more acceptable to the U.S. public and that would add value to the product. Squid can be made into breaded rings, tubes, and steaks, and it can be added to other foods, such as frozen casseroles. These are examples of value-added products that have tremendous potential to return a profit to the industry. Squid also has potential as a basis for surimi products.

So far I have been talking about my untempered optimistic views about squid off our coast. There are some limitations as well. The weather can be rough off our coast during the times that squid are harvested. This can severely limit the amount of squid we are able to harvest. Certainly the weather and sea conditions influence the size of the vessel needed to harvest squid and substantially increase the risk involved in participating in the fishery. The most efficient gear in our area with which to harvest food meat squid seems to be the purse seine: a piece of equipment that requires vessel modification and a substantial investment for most Oregon fishermen. It also takes a sizeable investment in time to learn how to catch these animals. Catching costs are higher here than in California because of the further distance from the fishing grounds to ports. It appears that large volumes of squid are going to be needed for squid to be profitable to a fisherman. Once caught, the squid may not always be large enough to produce the quality product now demanded by the market. If the squid are not large enough, they will go into the bait market, which, at present appears to have a saturation point of 1 to 2 million pounds in the Pacific Northwest.

Processing costs are high because the product's quality is critical. In fact, many processors are still trying to figure out how to unload squid from the boats without destroying the product. Investment costs are high in equipment for squid processing. Cleaners are expensive, as are machine costs and labor costs to produce anything but whole frozen squid. Storage costs are high. Processors have to pay for the development of new processing equipment and new packaging, thus increasing the initial investment. As we know, many costs are high because of the current interest rates.

Distributors want a constant supply. Squid occur during short periods of time off our coast. If we have poor weather, the processors may have difficulty providing a constant supply of squid to distributors.

Finally, the dollar is strong abroad, and U.S. squid has to be sold at a cheaper price to be competitive with foreign squid. In addition, shipping costs for squid are high in Oregon. So, the profit margin for those involved in the industry may be very slim. Most processing plants that are currently unstable may be undertaking a large risk given the size of the investment required and the uncertainty of the return. Despite these limitations, I feel that the market squid has a tremendous potential

off our coast to provide a profit to fishermen, processors, and the rest of the industry. Certainly, I think more can be done with bait in the market place and with food as well.

Now for my comments on underutilized species in general. I firmly believe that the most realistic profit potential is not in harvesting new fish species but in using the species we currently harvest. Most of the species I consider to be underutilized in the Pacific Northwest are now caught as by-catch in current fisheries but are discarded at sea because of the low value of the product at the dock.

Oregon Department of Fish and Wildlife people working with groundfish estimated in 1978 that 50 million pounds of fish were tossed over the side by trawlers. That number is a crude estimate but I think it gives you an idea of the magnitude of the situation. Imagine the dollar potential if those fishermen could have received even 5 cents a pound for that product.

From 1974 to 1983, about 100 million pounds (round weight) of fish and shellfish were landed annually in the state of Oregon. If we estimate the recovery or yield to be about 20 percent from those fish and shellfish that we landed (and 20 percent is a fairly realistic number), then that means we are producing about 80 million pounds of fish by-products annually. Most of these fish by-products are now treated as waste and hauled away or discharged into our bays. If we could land all the fish that were caught and more fully use the fish brought into our plants, we could dramatically increase the dollar value of our fishing industry. You may ask me, "Is that realistic?" I think it is.

Today, I would like to toss out some ideas for the people who have some way of really finding out if this is realistic. Perhaps some other people, with different types of expertise, will get involved in assessing the situation.

I think the key is that we must economically process and market our by-catch and our by-products. Thus, our processing plants are going to have to start diversifying and start producing more value-added products in relatively large volumes to offset the high costs of producing a relatively high-value fillet. The industry must produce cheap products from fishery by-catches to be able to compete with the other food and protein sources and be able to create the new markets. It will take time and cooperation with other industries to make these low-valued products profitable.

For instance, Oregon has a large poultry industry. Fish by-products provide an excellent source of protein that can be used for poultry feed. The same idea could be tied in with Oregon's rabbit producers. Cat food and fish food can be produced from the fish by-products that are now tossed away. The Ocean Protein plant in Coos Bay is attempting to do this with Pacific whiting by-products. I've been told that currently the market for fish protein is soft, but I think there is room to work on that.

Vegetable canneries in the Willamette Valley are struggling. Perhaps vegetable canners and fish processors can get together to produce a canned fish product or a canned fish and vegetable product that either provides a seafood base or a seafood and vegetable gumbo base.

To make these by-products profitable will require the industry to take a lot of risks. Businesses would have to invest in new equipment, new plants, and new products. Firms would have to join forces, sometimes with nonseafood corporations. New consumer markets would have to be aggressively developed. A lot of risk is involved, but I think it is also possible to turn this currently depressed fishing industry into a profitable operation with the utilization of these fishery by-products. At least, I think the possibility should be pursued at several different levels.

In summary, I believe the fishery resources are there but we need to figure out ways to use them.

Glenda Durham

Glenda Durham is president of the International Export Management Group in Portland. Glenda has a B.A. from the City University of New York and a law degree from Rutgers. She has an interest in developing the freshwater resources of the state, in particular, the carp resources.

The fish that we can sell for a decent dollar are pretty hard to find, and the ones we can get lots of aren't getting any bucks. In the U.S. at this time there is a severe erosion of both major components of our domestic food production. Many of you probably don't know it, but the farmers in the U.S. owe more money to American banks than do Brazil and Mexico combined. We hear a lot about the farm crisis in terms of debt. The problems we don't hear about, I think, are potentially more serious. We've got a terrible soil erosion problem and we've known about that for years. What is emerging at this point is a dependency on imported fertilizers which easily rivals our dependency on foreign oil in the 1970s. It is no less serious. As a matter of fact, in many ways it is probably more serious.

A good example is phosphate fertilizer. Traditional purchaser nations are now flooding the markets with produce in part from American phosphate exports.

We have a tremendous resource in pond fishes. We have literally billions of pounds of carp. They can be trapped in canal traps; they can be purse seined; they can be engineered for an industrial, a commercial, or a traditional net and line fishery. They don't necessarily go into food directly. We may see food products in some abundance five years from now, but we have a fishery right now that could provide other jobs in the

city of Portland. The carp fishery could provide up to 100 jobs in Harney County, where the state is being asked to put up \$5.7 million in industrial revenue bonds just to create 37 jobs. This carp resource is phenomenal when we consider its availability and its location. This abundant resource is located at the foot of the Columbia/Snake River system; it can be processed, put on barges and sent up that system as a perfect kind of fertilizer for the vast agricultural areas that we have there.

When we start looking at food, the first thing we have to consider is the fact that we are already importing nearly 70 percent of all fish eaten in this country. When we consider the value-added products (frozen fish sticks, for example) we are talking about nearly 100 percent imported products. It is not necessarily true that we are going to see increased investment and profitability in our fishery just because Americans are beginning to consume more fish each year. Overwhelmingly, we are bringing it in from other countries. What's happening, obviously, is that our coastal fisheries are drying up and our inland fisheries are lying fallow. We are missing a major food source.

For carp as a food, there exist major markets--institutional, commercial, retail, and gourmet. Carp can be made into a series of copycat dishes. You can process carp to taste and resemble cut loin, sausage, baloney, and ham. You can grind it up and flavor it, put it in taco sauce, or use it as filling in chow mein instead of pork. There is such a variety of possibilities.

A carp processing operation has been proposed in Harney County. What might make the Harney County example relevant is that ranchers there raise a great number of cattle, put them on cars, and mail them out about five times before they get near your supermarket. It is all very expensive. There is no reason a fish processing plant could not function back and forth between processing meat products and processing copycat products out of carp. I submit that it is at least a whole lot easier to bring grain to feed the cattle in a feedlot in Harney County than it is to take those cattle and box them clear up to the places where the slaughterhouses are located.

We have to be cognizant of facts that I think are pretty disturbing. Americans are not particularly genteel about shortages. Look at Watts in the immediate aftermath of riots there in 1975. I was in New York during both major gasoline crises in the 70s. I do not see any facts in the basic data surrounding our domestic fisheries capability and our declining topsoil which suggest that the prophecies we have all heard for the last 20 or 30 years will not be fulfilled. The prophecies include periodic food shortages in the U.S. Having looked at the various responses to shortages ranging from Cabbage Patch dolls to gasoline, I think that we are facing a situation where we are going to have shortages. If those shortages occur, there will be a violent reaction to them. These reactions may not be confined to the areas where the shortages are most severe (i.e., racial ghettos and urban areas).

If we do not begin to focus our attention on the productivity and the potential of our inland fisheries, we will have missed a major domestic resource that can help substantially to ease dependence on imported fertilizers, and frozen fish products. This we can do ourselves. We do have to begin to address the structure and economy that will permit expanding domestic food production as we enter a period when the topsoil depletion is a major factor and the American population as a whole is moving steadily toward retirement. Developing this resource will give us a very good chance of providing low-cost food to these people, and subsistence employment or commercial employment in inland fisheries jobs would be an option to large numbers of other people.

Richard Ranta

Rick Ranta of the National Marine Fisheries Service has been a fisheries development specialist for the last five years. Before that, he was in the inspection service of the National Marine Fisheries Service and saw firsthand the amount of waste generated in fish plants. Rick presented a paper for Dick Nelson, deputy director of the Utilization Research Division at NMFS, who was unable to attend this workshop.

The Utilization Research Division of Northwest and Alaska Fisheries Center is located in Seattle. I'll refer to it as the Center. It is involved in some of the research projects related to underutilized species and new product concepts. These are aimed at providing data and information useful to the fishing industry in taking advantage of the opportunities that might arise in the underutilized resources and by-products. The role of the Center is not to develop products, but rather to research concepts and provide information needed by others to develop products.

Dick asked me to emphasize five areas that offer potential for the industry--Pacific whiting, fish oil, Alaska pollock, Bering Sea surf clam, and by-products of fish processing.

Pacific whiting is a resource that is of particular interest in this geographic area. Although the presence of the Myxosporea parasite limits the use of the species, there are three potential uses that should be discussed. One is portions cut about 3/8-inch thick from frozen fillet blocks, battered and breaded, then packaged in the frozen form. These portions can be cooked directly from the frozen state and present no significant soft-texture problem even though the parasite is present.

The extremely soft texture of Pacific whiting is often not evident until the fish is cooked. Since only about 5 percent of the fish are unacceptably soft, it seems reasonable to develop whiting products based upon fish cooked at the processing plant. The soft fillets could be culled out at the time the fish are processed. The final product form could be frozen entrees with sauces and stuffing that would add value to justify the processing costs. Third, the development of surimi-type

products is a good possibility for Pacific whiting. The Center's research in controlling texture changes is encouraging but not complete. Research on methods of inhibiting the enzyme that causes the texture problem is currently in progress.

Medical research results indicate a positive value of fish oil fatty acids in the diet. The Center has a research project to purify and fractionate fish oils. The fractions will be made available to research organizations conducting studies on the effect of fish oil fatty acids on human health. The ultimate result would be more fish consumption for health reasons; some increased use of fish oil for medical purposes is also possible.

This week Time Magazine had an article on fish oil. Dr. Conner of Portland was quoted in the article: "I am tempted to try some cod liver oil myself. It's an easy way to get in shape; to get in shape the hard way is to jog. One of the easy ways to lower your cholesterol is to consume fish oils."

Another topic is Alaska pollock. The major program emphasis on pollock is due to the large size of the pollock resource. Very little additional research is needed on surimi since the basic technology is well developed. The National Marine Fisheries Service, through the Saltonstall-Kennedy (S-K) program, is providing funds to the Alaska Fisheries Development Foundation to conduct a surimi production demonstration operation at Kodiak, Alaska.

Further research is needed in the area of handling and processing Alaska pollock prior to use in shore plant surimi production. Other research needs include stabilization of mince using cryoprotectants other than the sugar-sorbitol-phosphate combination used for surimi production. This will be an important advance in that it will offer a wide range of opportunities to develop new products.

Currently, the Highliners Association is involved in an S-K project to investigate the feasibility of using minced pollock, processed and frozen at sea, in a variety of product forms. If the product is successful, medium size trawlers such as combination crabber-trawlers could mince and freeze Alaska pollock. At-sea production of mince appears feasible, but final success will require development of marketable products using the minced pollock as the raw material.

The center is also cooperating with industry on an on-line project making reformed pollock portions. TransPacific Seafoods, Seattle, was awarded an S-K grant to use pollock fillets to make pollock nuggets. They are breaded, 3/4-ounce nuggets which are consistent in size and shape. The market potential is still being explored, but current indications are for school lunch and restaurant-cocktail lounge snacks.

The use of the underutilized species (Alaska pollock, whiting, red hake, and cod) in frankfurters with up to 15 percent replacement of red meat is being considered for approval by the USDA. This could result in a

substantial market for Alaska pollock. The Department of Agriculture will consider a petition for the fish replacement following tests in progress to determine whether nitrosamine forms in the meat-fish frankfurters.

In regard to Alaska pollock, the industry should give serious consideration to the idea of freezing Alaska pollock at sea in headed and gutted form followed by short-time frozen storage, then filleting and freezing. The frozen headed and gutted pollock could be shipped to plants along the Oregon coast where they could be thawed and processed. Several options of product forms are possible. Some could be marketed as fresh fillets and some as frozen fillets; some could be reformed. The Center's tests show that prepared in this way pollock has a reasonable quality. Careful handling, close control of temperature during frozen storage, and protection from dehydration and oxidation are critical. Test results at the Center showed excellent quality fish even after one year in frozen storage.

Another project that the Center was involved in was two cooperative explorations of the surf clams in the Bering Sea. A harvestable resource with excellent eating qualities was located. Although samples of several hundred surf clams failed to show paralytic shellfish toxin (PSP) in meats, the toxins were found in other species of clams from the same area. Therefore PSP remains a possible problem. By holding the product in quarantine until tested, it may be possible to overcome this problem. The economics of harvesting and processing do require further study. As long as the East Coast surf clam resource can supply the market requirements, it is unlikely that this resource will be harvested.

And finally, the Center is exploring potentially profitable by-products from fish processing. These include fish silage, fish oil, fish bonemeal, and concentrated liquefied fish. Fish silage can be used as is and in fish feeds and as a supplement for cattle or sheep. It can also be co-dried with other ingredients to produce a high protein ingredient for use in animal feeds. Fish oil and fish bonemeal are high-value products which can be recovered from fish processing wastes. Concentrated liquefied fish is a product that could be used in mink feed and fish feed. Researchers at the Center are studying various methods for producing and stabilizing fish solids. They are also studying concentrated liquefied fish, the effects of various technological processes, chemical composition, and nutritional values. The results of this research into by-products will be made available to the fish processing industry.

DISCUSSION

Question: Is the presence of contaminants a serious problem in carp farming?

Glenda Durham: Carp are very selective eaters that rout around for the things they like to eat the most. Often when they are brought from muddy water they need to be held in fresh water for a week, as do clams or

oysters and for the same reasons. The biggest problem in transit costs occurs in places like Lake Pithin, Minnesota, where for many years there was a major PCB contaminant. Mercury, PCBs, and several other substances lodge in the fatty tissues, and they are never excreted. What happens in a fishery like this is that you can get the fish up to seven pounds, keep them, and sell them, and then you have to throw back the big ones because they are still contaminated even though the contaminant has been gone from the water a decade. Carp is attracting premium prices in the commercial markets of New York and the East generally. Because of farming, our carp does come from very clean water sources. It is something that we haven't exploited traditionally as a market.

Question: What type of investment are you looking at in gearing up to harvest the carp?

Glenda Durham: That depends on how you want to go about it. A really fascinating fellow named Larry Hollingshead, a commercial fisherman and carpologist, has built a couple of specialized purse seine boats with holding tanks. I suspect those things probably run about \$100,000, but what we are thinking of in terms of Oregon's carp harvest is more of an industrial activity. Traps on canals would probably cost \$35,000 to \$40,000 each. The reason for that is that these fish are unbelievably strong; they rout, and they will thrash and dig. You can trap them, you can purse seine them, and you can catch them from a dock. Your potential investment goes from the cost of a fishing pole up to a fully equipped seiner.

PANEL: ENGINEERING AND TECHNOLOGICAL PROBLEMS FACING NEW PRODUCTS

David Crawford

David Crawford directs the OSU Seafoods Laboratory at Astoria, Oregon.

The key to marketing underutilized species lies in their conversion to products that are more acceptable to the consumer. This is our basic feeling. Traditional forms of processing have not and probably will not be economically successful. This is going to bring about a lot of problems. The level of processing is going to be considerably different from that which exists now. Higher levels of sanitation and improved packaging are going to be required. More intense marketing efforts are needed. One of the most important things required will be a large number of personnel different from those people in the seafood industry now. Capitalization will have to be increased, and that may require aggressive selling through market channels that are not handling fish at present.

Up to about a year and half ago our program at the laboratory had been directed largely toward improving yield and extending shelf life of

Pacific shrimp, groundfish fillets, and Dungeness crab. However, in the last year and a half we have reoriented much of our program toward trying to develop means of processing underutilized species in the forms that are more acceptable. I would like to tell you about some of these ideas.

One of our major efforts is under the umbrella of the West Coast Fisheries Development Foundation. About a year ago, Duncan Law retired. His position was part of an Experiment Station project. We reoriented that project toward a broad based application of surimi technology that might transform underutilized species into products that could be used. That project is funded by state funds and by funds from the West Coast Fisheries Foundation which are specifically designated for working on hake.

We will be working on this process from several points of view. Surimi technology has unit operations that can be applied to fishery products to produce things other than surimi. Heat set gel product technology can also be applied here.

Our efforts with hake have initially dealt with the washing process. This requires a considerable amount of water. In the process, the Japanese techniques wash out quite a bit of soluble protein. This is necessary to create the gel strengths which the Japanese require of their products. It does not necessarily mean that we need to do the same thing. Our results to date show we are washing out about 5 percent of the dry matter protein. On an 80 percent moisture basis, that is quite a bit of yield. We are trying to save that protein by leaving it in the flesh through use of isoelectric washing. This is our main focus at present.

We are considering concepts in which we can restructure the heat set gels. We think this is also the key to forming products that are more acceptable to the public. In addition, we will be searching for a means of stabilizing this intermediate form or the final product with things other than sucrose, sorbitol, and phosphates. The sweet flavor produced by these stabilizers has limited applications in the United States. Once you get beyond scallops and other crustacea, you get a product that is too sweet for most Americans. We feel there are ways to get around this.

In addition, we have written work on shad into our new Sea Grant project, which starts July 1, 1985. We hope to apply surimi techniques to shad to try to transform it into a new product. We are not planning on washing all the fat; rather we are going to try to create a new texture. The flavor is not a problem, but creating the right texture is going to be.

We are also using these techniques on squid. The product will involve using the mantle and the tentacles or possibly just the tentacles. Some rather unique products have been produced to date.

The other area we are working in deals with large finfish. Look at the market. If you were a food fabricator and you wanted to find some source of flaked fish and wished to put it in casseroles or entrees, there

are very few places you could find it. You might find it in canned tuna, which is already a canned product with a flavor that is very heat damaged. You can buy headed and gutted fish, but you have to remove the skin and do other things to it before you have something that you can put into your product form.

Couple this with the fact that there is no market left for albacore tuna in the Northwest and fishermen are selling albacore off the boats at a price that hardly leaves them with any profit. We thought we would avoid applying the techniques that are used in canning tuna, such as the precooking operation and the removal of the loin. Instead, we decided to flake that flesh and put it into a container that would be Cryovaced and microwaveable. It would sell on the market as a product that could be used for further processing into casseroles and all kinds of entrees or used cold for salads.

The main effort in this project will be to develop the cooking techniques to improve yield. The main purpose is to establish the shelf life of this material. We already have a good idea that it is going to be fairly long because I have precooked tuna loins in my own freezer at home that are just fantastic. It has some real possibilities. Again, we are going to be faced with a considerable effort marketing this essentially new product. I do not know of any other product of its type on the market, and it definitely has possibilities.

In closing, I would like to say something about waste products. We have worked with fishery waste products for many years and haven't been too successful at creating anything that has brought anybody profit or created an industry. However, the techniques we have investigated are employed now in processes that are used to make wet hydrolyzed fish for the Oregon moist pellet. We have developed a means of stabilizing the material over a fairly long period under acid conditions. We have evaluated the nutritional characteristics of the product.

A private company in Astoria is developing a self-contained unit which will hydrolyze batches of material on a continuous basis and concentrate this bone-free hydrolysate to about a 50 percent solid. This product has some difficulties with inconsistency because of the raw material that goes into it. However, it has some real possibilities in various animal feeds. These types of products have some very unique characteristics, and they have market applications in a wide area. This is the same type of technique used to make the chicken, beef, and fish flavorings that are put on dried pet food to make it palatable to pets. There is a wide market in this area.

We also have carried out a pilot program with a company involving a normal fish meal operation in which we coupled the steam-cooking operation that is used prior to pressing with a deboning machine. In pressing, you remove the stick water which has the oil and soluble protein in it. Instead of drying the resulting press cake, we ran it through a deboning machine which removed the bones. In this operation, unlike the deboning operations of raw flesh, the skin is also saved with the flesh. You can

convert a carcass waste, such as in rockfish, which when dried is too high in oil, to a high protein product that has oil levels equivalent to those in commercial fish meal. Our purpose in this case was not to dry this material and produce a fish meal but to convert it directly into a fish food, which worked fairly well.

Unfortunately, we worked on the project right in the middle of the recession, and the cooperating company had to divert its funds to other places. That project died. This project still has some real opportunities because the fish can be dried, or it can be partially dried and pelletized and frozen. It should have a market in the pet food industry because it is low in ash and high in protein. There are ways of processing groundfish carcass waste to produce a product you can possibly create a market for. The big problem with this is that there is never enough of this waste in one place to make the process economical. You have to provide transportation for the waste and that creates problems. When you look at a large pile of carcass waste, it appears to have a lot of protein, but when you pay two and one-half cents a pound on it and you calculate the cost per protein unit, you are getting higher costs than the price of fish meal from Peru.

Edward Kolbe

Edward Kolbe, who has been a fisheries engineer at Oregon State University since 1974, is an associate professor of Agricultural Engineering. He spreads his time between fisheries research, fisheries extension work, and teaching on campus. He spoke on the engineering problems facing us as we develop new products.

I would like to talk about some engineering and technology problems. I don't know how you separate those two terms, or distinguish between the product development and the problems associated with some of the traditional products. There is a danger of coming up with the proverbial laundry list of things that need to be done. A couple of reports are available, one of which is Seafood Science and Technology Workshop: A Selection of Unsolved Problems. This is simply a collection of ideas from industry, university and government research people who collaborated and tried to prioritize the list of things that need to be done.

I would like to talk about three categories: quality enhancement and control, productivity, and process development. Many of our efforts in the past have looked at the on-board storage, handling, and refrigeration of fish; we as engineers might look at those projects as influencing the quality of products. One of the things I frequently get interested in is the possibility of a very high quality frozen fish product. That relates to storage and on-board handling and the length of time the fish are held prior to processing and freezing. The engineers can take some of the current technology which has been demonstrated or proven from other areas and other products and apply it to this area. No new technology needs to

be invented. Moreover, in the case of a high quality frozen product versus a fresh product, the term "frozen fish" is an obstruction. The frozen product can actually be better than a fresh product. Also, the industry should be aware of the difference that occurs if fish is frozen and held in storage in a well-controlled environment, as opposed to a poorly controlled environment.

In most of these engineering questions, the criteria of success are defined by the cost to produce the product and the value of the product when it is marketed. Does it make any difference if you design the system so that it will maintain a very high quality product? That's a food science question.

If it does make a difference, can that process earn enough money to pay for itself? The engineer can possibly assist by helping to design something less costly than what exists now. Specifically, there is a question of how on-board storage and handling of fish influence the gel-forming characteristics of some of the fish used at present in the production of surimi. That is a food science question that some of my colleagues and some of you could address better than I can. If it appears that on-board handling correlates with the gel-forming and storage ability of that surimi product, then we engineers can help. Much of the technology I introduce will be transferred from elsewhere. An example is the practice of bleeding, gutting and boxing fish which has been demonstrated in other countries and other areas as beneficial. It's nothing new, but it needs to be demonstrated and investigated for species and new products that might be produced here.

A few years ago we looked at the shrimp cooker on Laitram peelers. The shrimp cooker used a level of energy common among steam cookers in the industry. Essentially, what the manufacturers appear to do is take the raw shrimp cooker and attach it to a perforated box that steams the shrimp as it passes by on a conveyor belt. It seemed to work fine. It seemed to work and nobody was concerned about how much energy it was consuming in the process. It wasn't important at that time, perhaps because it was inexpensive. Later, it was even less important because there were not that many shrimp. Its significance depends on the processor. That was an example of something that appeared to work fine, energy not being the major item of concern. Now it is.

Surimi technology, as it has evolved in Japan, appears to be a similar situation. We will have to give serious attention to the energy and water consumption required. Wastes are being dumped in municipal sewage treatment plants. Dumping will have to be reduced because the plants can't handle it.

On the other hand, the protein in waste water can be used. Those are certainly engineering problems. The production of fish meal and fish protein concentrates and related products represents some important areas.

Finally, in the area of productivity, the control of spoilage along the route, whether it occurs in transport, in frozen storage, or in the

retail market, is a significant problem not only in the fish business, but in any kind of fresh or frozen food. That is an area where engineers can continue to work to better control some of the storage and transport systems.

The third general area that I would like to comment on relates to the process development. Machine design is required for new product development. This is not necessarily an appropriate university project, although the squid-cleaning machine concepts that were developed at the University of California have worked well. The concept was developed at the universities, but the equipment development was done in industry.

We hope to help Dave Crawford with some of the extrusion technology that he will be working on. The dewatering process in surimi production looks like an area where much engineering attention is needed, such as the use of flexible membranes or vacuum drying, or other types of alternative machinery for the existing screw press.

Finally, there are two possible directions engineering should go in machine design. One is the production of processes and machinery that would be oriented toward large-scale operations, and the other is a more labor intensive or slower production rate process that would fit the many smaller fish processing firms on the West Coast. A \$50,000 piece of equipment is not appropriate for everybody. There are some things engineers could do that would be an intermediate step appropriate to the smaller processor.

Barbara Rasco

Barbara Rasco is assistant professor of food science and technology at the University of Washington. She recently received her Ph.D. Previous to moving to the University of Washington, she worked on fuel alcohols for Cargill, Inc. She talked about upgrading by-products for the use in food and chemical industries.

I am fairly new to large-scale fisheries. I had the good fortune to work with Dr. Herbert Hultin for my Ph.D., investigating enzymes from shark pancreas. I would like to address some of the problems I have worked with in waste product utilization in the agriculture industry.

What we are dealing with is applications of new technologies, particularly those encompassed by biotechnology. These technologies are receiving a great deal of attention from major agricultural producers as they see the raw material, labor, energy, and waste processing costs rise.

The problems agriculture faces are similar to the problems you experience in fisheries. These problems are the need for value-added products, new and expanded markets, and improved product quality.

Implementing new technologies will help solve some of these problems. Recent developments in enzymology, microbial fermentations, and separation technology hold the most promise for solving the problems of waste product utilization in both the fishery and agriculture industries.

Last week, a letter came into our department from the Institute for Fisheries Technologies Research in Trumso, Norway. This organization is establishing a research group in biotechnology that will be touring the University of Washington the first week in July. Their main areas of interest are the production of biochemicals from fish waste, the applications of enzyme technology to fish processing such as deskinning and roe purification, and the production of digestive enzymes from fish viscera. This group in Norway may be a step ahead of us as far as forming an organized front in finding applications for biotechnology for the fishing industry, but I think workshops such as this one will help to get our fishery industry thinking along the same lines and looking to the new technologies for answers to important problems we all face.

I would like to share with you some of my experiences with upgrading agricultural by-products. Frequently, I have found that the most acceptable solutions are the simplest solutions. These required simply pulling the pieces together that you find in other areas and using your imagination to get the job done. With this, and with anything else, it's hard to see the forest through the trees.

Some of the major areas in which upgraded by-products would be most useful are (1) the food and feed ingredients in a value-added market, (2) a potential source of energy on a small or large scale, (3) feedstock, and (4) specialty chemicals and pharmaceuticals.

Cornstarch will probably be the major source for feedstock chemicals in the near future. Besides using ethanol and sorbitol, viable commercial processes are available for making glycerol and butanol from corn. Glucose produced by enzymic hydrolysis of starch in the corn wet-milling industry is used in huge quantities for amino acids, citric acid, and a number of other biochemical and pharmaceutical fermentations. All of these processes have much in common. They use one or more enzyme treatment steps; they use a resin fractionation or clean-up step; and they involve some sort of drying or evaporation.

Another area receiving a great deal of interest is the fermentation of cellulosic waste materials to sugar or to energy in the form of combustible gas. Anaerobic digestion of sunflower hulls, peanut shells, manure, and slaughterhouse wastes are in commercial or at least large experimental stages.

Chemical conversion of other by-products into industrial chemicals is a further area of interest to major agricultural producers. The conversion of xylans from corn cobs, oat hulls, and brans into furans is a successful commercial process. Some of these processes use extremely high pressure to fracture pentosans, hemicellulose, and lignin into monomeric units. These materials are very difficult to digest chemically. Indus-

try's ability to hydrolyze these materials has recently increased substantially because of progress in the isolation and development of new strains of fungus and bacteria, as well as the commercial development of enzymes that these microorganisms contain.

Before one considers upgrading a by-product to a value-added material, one must know that the product will meet a need and have a market, be technologically feasible, be competitively priced, and be safe to use.

To begin, one must determine what valuable materials are left in the waste material. Is it worthwhile to spend the capital to salvage internal organs for the isolation of enzymes, hormones, or other biologically active components which would be useful in the pharmaceutical area? This is a specialty market, as I am sure you are all aware, with very high value added if a manufacturing process can be developed economically. This sort of product is an important market for certain slaughterhouse by-products, primarily the pancreas, heart, and brain. However, it is not a very good market for other things, such as the eyes, hoofs, spinal cords, bones, skin, and hair.

Lack of centralization and high transportation and labor costs, as I just mentioned, would keep the use of waste material from being a very viable option for the Pacific Northwest fisheries. I do not feel that it would necessarily limit the New England fisheries. In areas very close to Connecticut and Boston, one could take some of these by-products out, freeze them, and ship them to Pfizer Laboratories or whoever might be interested in processing them further into specialty chemicals.

Specialty lipids are also an extremely high value-added product. Marine organisms are a unique source of certain waxes, polyunsaturated fatty acids, cyclic aromatics, and phospholipids. None of these lipids is very easily synthesized; many are not available from terrestrial sources, and microbial fermentations to produce them have been, for the most part, extremely unsuccessful. I recently found a new chromatographic method for large-scale purification of fish oil and other oils which are very easily oxidized. An account of this technology was published in the April 29 issue of Chemical Engineering News, put out by the American Chemical Society. Although very few details were given about this proprietary process, there were indications that this new technology would open up markets for fish oil in the paint, lubricant, and cosmetic industries. A clean, nonoxidized fish oil produced by a relatively simple resin separation would also help to sell the idea of fish oil as a nutritional supplement or as an ingredient in fortified foods.

Pure substrates generally are not required for the conversion of fermentable carbohydrates to acids, alcohol, acetone, or methane by enzymes and microbes. However, the fermentation of carbohydrate containing fish products to feedstock chemicals or energy has less potential in the fishing industry than it would in agriculture until effective chitinases are developed. Nonetheless, I feel the fishery by-products could become an important source of things like gums, stabilizing and filtration agents.

The recommended daily allowance (RDA) for calcium is going to increase substantially for women within the next year. It is going to jump from approximately 800 mg per day to approximately 1200 mg per day for postmenopausal women. Consumption of calcium supplements will be the only way that many of these people, particularly elderly women, will be able to meet the new requirement. As a result, the market for oyster shell as a nutritional supplement will expand rapidly. This increased demand for calcium supplements may also open up a market for fish bone-meal. Heavy metal contamination, particularly lead and cadmium, are a potential health risk, and several of the bonemeal products on the market contain very high levels of trace minerals. Fish bonemeal from a species like Alaskan pollock should be a very safe product and may be something that would be worth looking into.

I feel that the greatest market is for a wide variety of value-added products in the food ingredient or the feed market. Increasing the palatability or the concentration of the desirable components, such as protein, would substantially increase the sale price of the finished product.

I have recently been working as a consultant for industry in developing and converting an animal feed product into a human feed product. This feed ingredient, produced from cereal, currently sells on the animal feed market for \$100 to \$150 per ton. We have managed at our labs to improve this product so that its value is over \$300 per ton by simply modifying the color and taste of it. This involved a fairly simple modification of current manufacturing processes of this food product in conjunction with the proper yeast fermentation treatment.

I believe that the same sort of developments that we have seen in the last few years in agriculture are also possible in fisheries if the proper emphasis is placed on research and development. Current levels of funding from government and industry sources, as you know, for this type of applied research are bordering the abysmal. Luckily, much of the technology is available and is in use commercially or at least in advanced developmental stages and is ready to be implemented in fisheries.

DISCUSSION

Question: I didn't read the magazine you were talking about. Could you explain a little bit more about that simplified resin process?

Barbara Rasco: It's Japanese technology, so there are some personal things that come over. If you get an issue of the magazine (Chemical Engineering News, April 29 issue), it might help you out a little. I am fairly sure it is an ion exchange separation using a proprietary resin that has been developed. I could not find the patent number, and there weren't any references. It was one of those news briefings they have in a fairly popular trade magazine. It does not involve a solvent extraction;

it does not involve any heat treatment. It would involve a desludging step and then running the oil through the resin. It may have to be heated slightly. I don't have any idea what the resin costs are, but most of these resins are fairly easily regenerated chemically, so it may be something to look into. There was a drastic lightening in color and a marked increase in stability after the resin treatment, and it takes away a lot of the oxidized flavor that would be in a fish oil.

Question: On surimi, I hear about large quantities of water being used. How many gallons are involved?

Dave Crawford: For every part (weight) of fish, the amount can range from one part to eight parts of water. Usually, it runs around three. It depends on the quality of fish, and sometimes they go through more than one wash.

Question: The only thing I've seen to make surimi is that pilot project we had in Kodiak. What are the costs involved?

Dave Crawford: You could purchase the Kodiak facility equipment for between \$500,000 and \$600,000. That is just the process line alone--the fish washers and so forth, down to the press. That would not include the Baader 182 filleting machine. It probably costs \$145,000 to \$150,000.

Question: Do you have to filet fish before you make surimi out of it?

Dave Crawford: The answer technically is no. The Japanese technique, with their Tokyo filleting machine, is just to butterfly it, which leaves the dark membrane and quite a bit of the backbone attached to the butterfly. The Japanese technician I talked with felt that filleting the fish, as we are doing, gives a much cleaner product. The reasons the Japanese technician felt we were able to produce the high quality surimi in a shore plant with older fish was because we had lots of water available and were using a skinned fillet. The yield is a question I haven't been able to follow up on yet. I don't know how the yield would compare under those two circumstances, but keeping the skin out of the deboner seemed to be an important step.

Question: Is squid better raw material than bottomfish for making surimi?

Ken Hilderbrand: No, but you can make surimi out of squid. We are using some of the techniques used in surimi to restructure squid. It isn't necessarily surimi. We are using salt crystallization and heat setting which is the conversion of surimi into kamabokò products. Surimi is only an intermediate; it is the washed flesh that has been stabilized with sugar and phosphate.

Referring to the original question, filleting the fish is an inefficient way of doing it. Using hake as an example, the yield of hake fillets is about 30 percent. The yield is based on round weight. On deboning yield, you have about 40 percent yield, so you are losing a considerable amount of edible flesh and sacrificing a lot of yield if you go the filleting route. At the prices we will have to pay for fish in the lower 48 states, you will not be able to waste that much.

Question: Dave or Ken, wouldn't the Baader 182, which processes clean fillets, influence the volume of water required?

Ken Hilderbrand: Yes, I think that is true. You would use less water with the Baader 182. In Alaska, they used two parallel lines. One line was for clean fillets without skin and the other was for the split fish which were fed into the deboner on the skin side. The amount of skin particles and dark meat would influence the volume of water required.

Dave Crawford: I disagree with the fact that skin particles don't have much effect on the taste. It's how old the fish gets and how much degradation has occurred. You need to wash the fishy flavor out, which takes more water if the fish are older. With very fresh fish, you don't have this problem. The skin and bone particles should be removed by refiners or strainers. You may have to run them through twice.

Ken Hilderbrand: The experience they are having in Kodiak right now is that the contamination count, or particle count (used as part of the Japanese grading system), is substantially reduced if the fish are filleted first. It may be possible to take particles out with a refiner, but they have not been able to do that as yet. About the water: I don't know if there is an answer coming out of the Kodiak experience yet, but the amount of water that you use for actually mixing in the ratio tank to wash the fish, as Dave said, may vary from four to one, to eight to one. However, that is obviously not the total water consumption. Other factors influencing water consumption also exist. One is the spray washer they use for rinsing the meat. After the fillet comes out of a dewatering screen, it's spray washed again. They are actually trying to use water to blast the material out of the little holes in the dewatering screens, which requires a substantial amount of water. I believe the main water gauge they were using on that line in Kodiak was running somewhere around 50 gallons a minute.

Dave Crawford: Yes, we don't have very much experience with the data. The information I was relaying to you was obtained from Japanese literature, which I have learned to take with a grain of salt.

Question: The question I have is about the water. You haven't described the problems. Is 50 gallons a minute an environmental consideration, or is it more just a problem with availability of water?

Answer: The amount of water you use is a very important consideration in a shore plant operation.

Question: In terms of availability or price?

Answer: Disposal, waste disposal. I think what you do with that water is going to be an important consideration in a lot of shore plant situations. Disposal is not an important consideration, obviously, on the trawlers. Availability is certainly a problem that the Japanese trawlers have had to face. They have been looking for ways to produce high quality surimi using a minimum amount of water. They have not yet attempted to use a completely skinless fillet. I don't know exactly why. Someone suggested it is because the Germans will not sell them the Baader equipment.

I've also read that the temperature of the water used was significant, possibly depending on the species and age of the fish, but 10 degrees Celsius or 50 degrees Fahrenheit was supposedly a high temperature at which you had to start refrigerating. Depending on the water source, that could be a significant energy draw also.

Question: Referring to supplementary income for the fishing personnel. Points I've heard mentioned by this panel have been really high-tech hype and high-expense processing. Is there any work being done on processing near the harvest with small-scale refrigeration and other things that could enhance the supplemental income of the fishermen themselves, or must you go through this large-scale technology, as impressive as it is? Are there certain kinds of technologies that we can learn from, such as the Japanese, that can enhance the by-product and waste disposal closer to the point of harvest?

Dave Crawford: I am going to display my ignorance here for a minute. I have always wondered why the Alaskan fishing plants hadn't gotten into the concept of possibly raising livestock on their processing waste.

Ken Hilderbrand: There certainly are people in Alaska looking at ways they can use fish and shellfish waste to feed cattle in the Matanuska Valley. They have a pretty substantial agriculture and dairy industry, and they would like to use some cheaper feeds that are produced locally. Part of their problem up there is one of logistics. They don't run barges from Kodiak to Anchorage very frequently. Anchorage is not a very substantial port and it is a difficult port to use. The best port is Seward, which is a long way from the Matanuska Valley. Even though there is a railroad, all kinds of economic problems prevent using that approach. It is apparently cheaper to buy feed in Seattle and ship it up than to try to use local meals, particularly things like shellmeal made in Kodiak. It's a matter of economics. The object is not to feed the world; it's to make money.

I don't have an answer to your question about what is being done in the area of research that would be applicable to smaller scale, nearshore local fisheries. I know that my organization, the Extension Service, for some time has sponsored a number of educational workshops that are aimed directly at that audience. However, that is educational work that deals with existing technology. I am not aware of any recent developments in small-scale technology.

The costs of that surimi line in Alaska are not representative of the cost it is going to take to get into a surimi-based local product. You can use smaller equipment. That line is set up to produce a low-cost, high-volume intermediate. If you are going to make money in the lower 48 states using this process, you need to produce finished products. You will not sell low-priced surimi to somebody else to fabricate into their products. You are taking that to a much higher valued product with a smaller operation and lower volume of fish.

When you are thinking about raw materials for making surimi, keep in mind that you do have a major competitor in Alaska. There is about one billion dollars worth of surimi made by the Japanese in Alaska right now. If the shore plants are successful in buying raw material for a nickel a pound and producing it at a 20 percent yield, they will have a dollar a pound in the raw material that they are working with to produce surimi. When producing surimi, take the price that you have to pay for it in the round, divide it by the yield, and you can come up with more than a dollar a pound. You will have tough competition unless the surimi you produce has some other attribute that makes it worth more money. Geography will make it worth more money because of lower transportation costs. You may have more gelling strength or color. Those things may make the surimi worth more. Keep your competition in mind. It's pretty fierce.

Comment: There is a lot of work being done at sea, with onboard technologies in refrigeration and processing. The problem is that most of them aren't cost-efficient for smaller operations. Under our type of marketing system, on the West Coast, all our fish goes out at one price. It doesn't make any difference if it's good or bad quality. There is no price differentiation. There is no reason for us to increase our onboard technology unless we can benefit from the effort. If I put in a new slush ice system on my boat, my fish will be twice as good when I get to the plant, but someone using ice bins built in 1932 can get the same price. It would be foolish to put money into that. Most of the fish development done is not cost-effective. That is the problem.

Response: There is a troller, Bruce Gore, who operates out of Alaska, doing a tremendous job with salmon. He is bleeding and flushing out the cardiovascular system, getting absolutely all the blood out, freezing the salmon on board, and maintaining the fish at minus 30 degrees Fahrenheit. However, he markets his own fish, and his marketing is based on his costs and does not have anything to do with the salmon market. He has steady customers in restaurants and specialty places that buy his fish because they know of the high quality. That is a case of specialization,

and there are several examples around. However, those are not the mass markets that most fishermen need.

The same thing can be true of certain rockfish species that go into some of the oriental restaurant markets in larger cities. They command a very high price if they are handled properly. These are types of markets small fishery operations need to occupy.

Comment: There are two retail stores in Vancouver, B.C., that are making surimi and kamaboko products in the backroom of a very small operation using ling cod. I don't know if they are making a lot of money, but it looks quite viable now. It is possible to make those products using small equipment. We recently made some surimi out of hake with a wine press, some cheesecloth, a salmon agitator, a blender, and a meat grinder. You can do it without spending a lot of money on a smaller scale.

Response: Making surimi is similar to making Norwegian fishballs. You grind it with salt a couple of times without the washing step. There are ways of getting into the surimi business that are much less expensive.

About the smallest commercial line with semiautomated equipment I have seen that you could use in a food processing plant is similar to the Kodiak pilot plant which might produce about 100 or 200 pounds an hour of finished product. We have equipment that has different capacities. Several hundred pounds an hour might be a reasonable figure to target for if you want to buy a processed line. You are absolutely right; you can make surimi with a meat grinder and a dish towel in your kitchen sink. The factory in Kodiak worth half a million dollars had a 4,000-pound-an-hour output, which translates to a 20,000- to 25,000-pounds-an-hour input. If you were going to get into surimi production there would be a lot of reasons not to go that big. If you want to do 20,000 or 25,000 pounds an hour of input, you might be better off doing that on four different lines than on one big one.

A lot of technology is involved after you get the surimi, such as the heat setting and the restructuring of it into the final form. This equipment is fairly expensive, and a lot of engineering and technology can be applied to bring down costs and make the equipment more compact.

Question: Should one of our highest priorities be to improve the quality of our products?

Ken Hilderbrand: It would be nice if we could improve the overall quality of some of the products we are selling, but it is more important that we learn how to manufacture products with consistent quality. People in the food processing business have known this for a long time. That's why when you go to Safeway and buy strawberries in a carton you can buy Safeway brand which is Grade A at one price and Scotch Treat, which is a little lower grade, at a lesser price. I put myself through college working in quality control of a local strawberry plant; that is why I know this.

There are years when the strawberries are so good that there aren't enough B grade strawberries to put into Scotch Treat. When this is the case, Scotch Treat does not appear on the grocery store shelves. Safeway will not put Grade A strawberries in Scotch Treat because they have known for a long time that the consumer is more concerned about consistency than about overall quality. That is why you and I will buy a hothouse tomato. Those of us who have been raised on a farm and used to take the salt shaker out to the garden and eat tomatoes know what real tomatoes are like. However, I will still buy hothouse tomatoes because I know what to expect, not because I think they are the best quality. I know what to expect, the price is right, and I will buy them. Those of you who think in terms of quality improvement should realize that when you decide what you are going to sell, you should maintain consistent quality, and you will do better.

PANEL: THE REGULATORY MAZE AND NEW PRODUCTS

Richard Ranta

Richard Ranta has been a fisheries marketing specialist with the National Marine Fisheries Service (NMFS) Seattle for ten years. He addressed the subject of the federal grading, monitoring, and certification program.

The first thing I would like to bring to your attention is some handouts that you have in your packets. One is a list of 20 federal standards. Notice that the last change on the list was in 1979. There are some modifications on some of these that I will go over, but these are the present standards that must be met for a product to have a U.S. grade A label on it. You can obtain a copy from my office at National Marine Fisheries Service, 7600 Sand Point Way NE, Seattle, WA 98115.

The next handout is the approved list. On the second page is information on how you can get on the mailing list. It is free and comes out quarterly. The third page lists the different products that are under inspection at the present time. Most of them, by the way, are "packed under federal inspection" (PUFI); they are not grade A. Probably the most recognizable PUFI product was tuna canned at Terminal Island, California. It is no longer under contract; the tuna canners have since moved out.

A book entitled The Code of Federal Regulations contains everything you need to know about inspection, certification, and the grades. You can purchase it at a federal bookstore for \$7.50.

My perception of the difference between the Food and Drug Administration and the U.S. Department of Commerce (USDC) is that the FDA is a regulatory agency charged with enforcement of the Federal Food, Drug and Cosmetic Act. It is involved with standards of identity and minimum health and safety requirements, and it carries the badge. When I was a fish inspector, one of the differences between an FDA inspector and me was

that the fish processor paid me to be in his plant to inspect the product. The FDA inspector could come in any time with the authority to shut the plant down. FDA inspectors are respected and feared; they put up with me. As I said, the USDC inspection is voluntary and is concerned primarily with grading and certifying products.

As I mentioned earlier, there are two types of inspections. One is a grade A; the other is packed under federal inspection (PUFI). In the Northwest, there are companies under both programs. I called the inspection office in Bellingham on Monday trying to get an update on the companies that are under inspection. It has changed quite a bit in the four years since I was in the inspection program. Right now, a couple plants in Idaho that are processing trout are producing grade A products. Domsea Farms has been under contract in Bremerton doing grade A. Bornstein Seafoods in Astoria and Ocean Foods are now under the inspection program, as is Chinook Packing, which is over on the Washington side of the Columbia River, and Point Adams Packing in Newport and Hammond. The primary reason they went under inspection is that they are selling fresh, grade A fillets to the supermarkets in California. Quality seems to be working down there. Consumers will spend a bit more money if they are guaranteed they will get an adequate product. Thus, companies wanting to sell to southern California supermarkets went under the inspection program. They have an inspector in the plant grading. The product is flown down to Los Angeles and is distributed mostly in the Alpha Beta supermarket chain.

The major development at present is a procedure for changing the federal specification on U.S. grades of fish fillet. On another handout I gave you, Rita Creitz, our national standards coordinator, put a proposed change in the Federal Register to allow pinbone in grade A fillets. In the interim, until they can get the comments and make a decision on that, the National Seafood Inspection Program is authorizing the use of the statement "Cut from U.S. grade A quality fish." This would have "Packed under federal inspection" on the bulk containers. I talked to Ms. Creitz on Monday to find out what the consensus was so far on this change. She said the East Coast bottomfish processors are against it.

If this program starts expanding, this is probably a pretty important issue: that is, are processors going to be able to go with the grade A? I don't think the "packed under federal inspection" label has much of an impact in the supermarket.

Just after I got out of the inspection business, one of the changes the National Marine Fisheries Service tried to implement was a federal standard for salmon. Right now there are no U.S. grade A whole and dressed salmon. The Washington office decided it wanted a grade A standard, but I don't think that it checked closely enough with the processors on this issue. Washington went to quite a bit of expense and trouble to try to get a standard proposed, and it didn't fly. After about six months, officials gave up. The technical working group had good representation. It included people from the National Fisheries Institute, Sea Grant, and some from industry. But they should have checked with the

industry beforehand, because the Northwest Fisheries Association said it did not want Washington, D.C., instituting a change; it wanted change to come from within the industry. So right now, on inspection of frozen whole and dressed salmon, the company who submits to the inspector is doing it on a voluntary basis.

It is fairly easy for a company to come under voluntary inspection. The first thing is a plant survey. If you have the product specifications, you send the labels to Pascagoula, Mississippi, for approval, and then you sign a contract. You can sign on an inspector for a full 40-hour week or less. In Seattle, we had a couple of contracts for 10 hours a week; it depends on how much processing is going on. I believe the current cost for a contract is about \$20 an hour.

During my six years as an inspector, I occasionally came into conflict with the FDA. The fresh fillets I was inspecting were flown from Seattle to Wakefern, which is a supermarket chain on the East Coast. At the time, I was certifying it U.S. grade A Pacific snapper. Actually, it was a rockfish. Well, my boss Tom Billy got wind of this and contacted me, and after several conversations convinced me that the FDA did not want the U.S. Department of Commerce certifying the fillets as "snapper," a name for rockfish which is not legal. You can sell rockfish as "Pacific snapper" within the state, but this was interstate, with my stamp on it. Wakefern could not economically sell the product labeled "Pacific rockfish," so they dropped the program.

Another time I was inspecting Pacific cod. They were flying it back to the northeast, and they wanted to change the name to "scrod." Well, I had to get out my dictionary. Scrod on the east coast is, I believe, small cod and is very acceptable.

Here is an example of one of the problems with the inspection program. The first company I signed a contract with in Seattle was Universal Seafoods. They were, at that time, one of the biggest king crab packers around. One of the things they had a problem with was the minimum requirement of correct weights. They were complaining that when they put 20 pounds of king crab in the box, they had to make the adjustments for the glaze. If it was 6 percent, they had to add an extra 6 percent of product. They claimed everybody else in the industry was cheating. We contacted FDA officials to find out what they would do about it, and their position at the time was that this type of economic fraud was fairly low priority. Universal kept the inspection program, but it actually put the company at a disadvantage, if you call a disadvantage having to do something that was right and legal. And that is one of the problems of having an inspector in the plant. You have to follow the rules, and a lot of the seafood companies do not want to do this.

Also, a company has to decide whether it is economically beneficial. If your cost for the inspector of the product is increasing product cost about 1/2 cent a pound, you must really show the sales department that the inspection service is going to be beneficial. You must show that it is going to help in being able to raise the price enough to offset this cost,

and that it is worth the aggravation of having an inspector in the plant telling you what to do. At present, companies in Oregon are finding that the sales to the retail outlets in California make it beneficial to sign the contracts, so they are doing it.

John McGinnis

John McGinnis, inspector for the Food and Drug Administration in Portland for 13 years, inspects food manufacturers, investigates related injuries and illnesses, and monitors proper labeling. The topic of his presentation was the Food, Drug and Cosmetic Act: considerations relative to seafood.

The FDA has a small inspection office in Portland, so necessarily none of us are specialists. However, over the nine years I have been in Oregon (and prior to that in Florida) I have done my share of seafood work.

The Food and Drug Administration is basically charged with federal-level regulation of all foods which are in interstate commerce. Therefore, we actively regulate all foods except red meat and meat products, poultry and poultry products and raw agricultural commodities, which the United States Department of Agriculture (USDA) is quite active in regulating. This is by agreement of the two agencies.

The Food, Drug and Cosmetic Act and the Fair Packaging and Labeling Act are the primary laws which we enforce when we are talking about foods and fisheries products. We also enforce the chief federal laws which must be complied with in marketing a new fisheries product. From the outset, it should be understood that there are absolutely no provisions in FDA regulations for premarket approval of food products. However, if a food is, for instance, low acid, thermally processed, and hermetically packaged, some specific regulations covering registration of the manufacturer and filing of the process are provided for. We do not pre-approve products for the market, but we will give advisory opinions.

Besides the registration of some types of manufacturing processes, there are a number of considerations which, during process development, each manufacturer must give to the type of product being developed. I am going to primarily address considerations of labeling and product safety.

The first labeling consideration I am concerned with is the identity of the product. The identity label on a packaged product must be a common or usual name or, in the absence of that, a name which will properly convey the nature of the product to the consumer. A manufacturer could not and should not use a name, even if it is common or usual in the local area which can be confused with a more widely distributed species or product using that same or similar name. When it comes to the naming of a product, conflicts are generally handled by application to the FDA to make some sort of a determination. In some cases, this results in the product

being given a "common" or "usual" name by regulation. A good example of that is Pacific whiting. Until a few years ago, there was considerable discussion about what name you could use for that fish. By regulation, and I believe it is 21 CFR 102.43, it is defined as Pacific whiting by species name.

A couple of other "for instances." When you have a manufactured product such as a surimi product, which resembles or takes the place of another product and is of a lower nutritional quality ("nutritionally inferior") to the product, then it must be labeled an imitation. However, if the product that you are marketing is not nutritionally inferior, then you can develop a descriptive name and use it on that product without having to use the word "imitation." It gets rather complicated in application.

The next primary consideration is the labeling of ingredients. Basically, you follow the same general rules there. When you are placing the ingredients on a combination product, you use the common or usual name for the ingredients.

Also, in the development of new fisheries products, there are some product safety considerations which the field investigator is going to be concerned with at the time that he begins inspecting a manufacturer, whether it be a fairly straightforward operation or a more complex operation. Consideration of these problems should be given priority from the very outset of product development. Obviously, the first problem with fisheries products is product handling before and during processing. As an inspector I am concerned with that aspect of quality which is involved with deterioration from bacteriological contamination or simple decomposition.

I am also concerned with the bio-burden or the microbiological integrity of the product at any stage in harvest, processing, or distribution. I am concerned with what steps are being taken by a manufacturer to reduce that bio-burden in the product. Some products have a special nature that can cause problems either in manufacturing or in the process of distributing the product. Certain fisheries products have known toxin formations at certain times of the year. For instance, we obviously regulate or assist the states in regulating the shellfish harvesting areas.

We are also concerned with what preservation techniques may be used at any step along the line, including harvesting. Recently we have been sampling shrimp on the Oregon coast to determine the level of sulfite usage. Many people involved in the shrimp industry that have told me they had never seen sulfites used on the Oregon coast. After we pulled some samples, we in fact found a couple of samples that had sulfites in the shrimp as it came from the boats.

Obviously, we are also concerned with the suitability of the process to the product: whether or not in the process you are going to handle that product so many times that you end up with a greater than necessary

incidence of contamination. This could be particularly important in the case of by-products and of products which are involved with surimi manufacture. I am not familiar with surimi manufacture, so I have not had a chance to get into one of the plants and see how they operate. But certainly I would be concerned with the method of operation and what kind of bio-burden might be added in the process.

There are some other things that I would be concerned with in by-products manufacturing. If the by-products are going back into the food chain, I would be concerned with whether or not you are concentrating on certain naturally occurring and not so naturally occurring contaminants in the product. Heavy metals or agricultural chemicals are two examples. This concern becomes more urgent as far as the agricultural chemicals are concerned with close-to-shore fisheries products and freshwater fisheries products. Heavy metals can be a problem with many types of fishery products.

Any questions regarding any of these considerations can be addressed either to our district office in Seattle or to the Portland office, and we can answer in detail from there. For those of you who are not currently involved with our regulations but may become involved, our Seattle office is the district office. Specialists and compliance personnel there can either answer directly or find out the answers to questions regarding FDA regulations. Since the primary concern under FDA regulation, aside from product safety, is labeling, I would direct your attention to a particular volume of the Code of Federal Regulations: Title 21, Parts 100 to 169. It contains all of the regulations governing the labeling of food, as well as the manufacturing regulations we work with. Manufacturing regulations are quite basically sanitation and product safety regulations under the Food, Drug and Cosmetic Act.

James Galbreath

James Galbreath has been the project leader of the Columbia River Commercial Fisheries program of the Oregon Department of Fish and Wildlife in Clackamas for 23 years. Mr. Galbreath's topic was the Oregon law and Oregon Department of Fish and Wildlife regulations and permit requirements.

The title I was assigned above is a little too inclusive. If we dealt with the Oregon law, I suspect we might adjourn about late July. This is going to be very short, just touching on some of the permits and the types of licenses and poundage fees we have.

So far, much of the discussion has centered around the various species of fish and the processing, inspection, marketing, and other problems that processors have. However, whatever stage you're at there is some sort of permit that you have to get from the department.

The collection permit, for example, is a \$3 fee. Either our Clackamas office or the Portland office can issue those. Jim Bergeron, an extension agent in Astoria, wanted to obtain several shad recently, but the shad fishery would not be starting until June. Therefore, he had to get a permit from us. We had seven or eight specifications that he had to follow in order to collect these fish. For example, the number of days involved is issued in the permit. The shad may be taken by gear authorized under the OAR 635432110, the same methods used to take the shad during the commercial fishery, which is a 10-pound breaking strength light-mesh gill net. The gill net boat license number has to be listed on the permit, as well as the names of the fishermen involved. Probably most important of all, any time we have this type of program, a biologist from the department must accompany the undertaking. I understand that two days ago he got his fish. None of the fish taken on experimental basis are to be sold. Any other species other than the shad must be returned to the water immediately. If there are mortalities, other than shad, they are turned over to the department for subsequent disposal, usually to a "loaves and fishes" program or a state hospital.

The second type of permit is an experimental fishing gear permit to try and catch a species with a different type of gear. Somebody is always thinking up a new way to catch a fish, which is fine. But you have to get a permit, which is usually \$2 or \$3. If the technique is controversial you will possibly get into a commission hearing or much discussion.

The third type of permit is the same one we use for either live fish or eggs. Duncan Law, for example, wanted to bring in some American eels, which he is studying in Astoria, with aquaculture in mind.

We have a scientific collecting permit. Some of you students will know that if you do any collecting of fish species in the Columbia River you must get a scientific collecting permit, as well as one from the National Marine Fisheries Service. They are difficult for universities and individuals to obtain. You have to justify your existence pretty well. These permits come out of the Portland office.

The last permit I will briefly talk about is the lamprey eel permit, which is issued for taking lamprey from Willamette Falls. The Falls is the only good site for obtaining lamprey in either Oregon or Washington. This permit is free, unless you are catching lamprey commercially. Then there is a fee.

Some work has been done with the lamprey in the past. People have gone into the production of it, either smoked and canned or rendered for fertilizer. Those projects have died out. Two years ago, the Native Americans heard that the French government was interested in some of these lamprey eels, so the Indians harvested them and sent some flash frozen samples to France. We got a report back that they were fairly acceptable, although the French thought they were saltier than those over there. This makes sense. These lamprey have come from the ocean and haven't been in the river long enough to get rid of their saltwater flavor. They were also considered to be much oilier than the European eel. However, people

are still interested, and I understand there is quite a bit of interest in China and Japan. These ideas come and go, but nobody seems to follow them through that much.

I think right now there are three people taking lamprey commercially. The lamprey are used for sturgeon bait or for the Carolina Biological Supply Company. Carolina injects these lamprey with latex and sells them to schools for the students to study.

Along with the lamprey permit, we enclose a map that shows you just exactly the area where you can go below Willamette Falls. The last two years the legal season for them extended from June 1 to the end of August, mostly because that is the primary time for them. But we also wanted to limit the time frame to keep people out of the area of the ladders while the salmonids are progressing upstream. They have enough trouble getting up there.

If anybody is interested in any of the regulations in the Oregon Wildlife and Commercial code, Oregon administrative orders (OARS), I would be happy to provide them with further information. We are always open for suggestions on these things.

DISCUSSION

Question: Mr. McGinnis, you mentioned you found sulfite in Oregon shrimp samples. Did the sulfite come from the shrimp boats?

John McGinnis: The shrimp came from the shrimp boats and had sulfites in it when it arrived at our laboratory. I can't tell from the samples (because they were surveillance samples) if the sulfites were added on the boats or at the plant.

Question: Do you know where they came from, which processing plant?

John McGinnis: No, they weren't really official samples. They weren't regulatory samples, and the levels we found weren't above or anywhere near the tolerances for sulfites. They were approximately one-tenth of the tolerance.

Question: Are there significant differences in foreign and U.S. regulations regarding standards for seafood products?

Richard Ranta: It depends on the country. In some countries, such as some of the Far Eastern countries, the regulations are quite different than they are here, whereas they are quite similar in some of the European countries. No generalization can be made.

As part of our negotiations with the Japanese on their allocations, we are trying to cut down on nontariff trade barriers, but that is a long discussion.

Question: What happens during on-shore processing and in transit? Where does the dividing line come between national standards? Do your standards apply in all territorial waters or just on land in processing?

Richard Ranta: We have had only one inspection on a processing vessel. The company went out of business. The vessel was called the Golden Alaska. It was a German hull that was brought to Alaska and was similar to a joint venture. It didn't work.

Question: I would like to amplify that question. If the product is for export, would either of your departments be involved?

Richard Ranta: The inspection I did in Seattle was for export. I talked about the grade A and the "packed under federal inspection" label. Basically when I was an inspector I was inspecting salmon that was going to Japan and Europe.

The Food and Drug Administration, by the nature of things, inspects all the manufacturers. If the product is going for export we aren't too concerned about it as long as it is acceptable to the receiving country.

Question: What is the relation between FDA and EPA shellfish programs?

John McGinnis: The FDA has shellfish specialists who work with the states to regulate the harvesting grounds. What we are involved in is an ongoing cooperative effort to sample those grounds throughout the year and determine what the status is from a microbiological standpoint and a toxicity standpoint. When the FDA or the state determines those grounds are not safe for harvest, then the state shuts them down. As far as the EPA is concerned, the EPA and the FDA work together only in terms of providing each other with information.

Question: Doesn't the EPA delegate a lot of things directly to the state?

John McGinnis: I am not familiar enough with EPA operations to answer that.

Question: Is there any attempt in the state Department of Fish and Wildlife to allocate poundage fees according to the amount of money that is derived from each particular fishery resource? In the raw fish or trawler industries a sizable amount of money is generated, even though the fee is only 3/10 of a cent per pound. Is there any attempt to put that

money back into the resource which generated it? Or does it just get reallocated to salmon?

James Galbreath: I have heard various suggestions within the department that these poundage fees should be allocated. If that poundage is collected on shad, maybe it should go into trying to determine shad markets and such. But at the moment, to my knowledge, it is not. I think it is much more applicable to underutilized species. As a former director of the department, maybe Bob Schoning has some comments on this.

Bob Schoning: The money goes into general funds. There are no allocations. Of the money that comes in through the industry in poundage fees and license fees, about a third comes out. There is no relationship between where the money came from and where it goes, as far as I know. The department budgets what it feels it needs for various activities out of the general fund. There is no direct relationship between income from shrimp or salmon and other poundage fees and the programs of the fund.

Jim Galbreath: It was a little easier to track what that balance was when it was based on a split commission. Now that they are unified, dedicated funds go into the general fund. It is a lot harder to keep track of the income anymore. Approximately 80 percent of the funds were commissioned into the salmon program. A lot of that went to the hatchery programs. But the big fund raiser is the trawl segment. If you combine all the trawl segments--the scallops, shrimp, and bottomfish--you see that they land about 80 percent of the seafood in the state, so they pay far and away the most. There is no doubt about that, even at 3/10 of a cent or whatever it happens to be.

Question: In the fisheries area, is there a commodity commission assessment on top of that fee in any of the species?

Jim Galbreath: Yes.

PANEL: ENTERING A NEW PRODUCT ON THE DOMESTIC MARKET

Because of technical difficulties, these proceedings do not include the presentations by Terry Elwell, marketing director of the West Coast Fisheries Development Foundation, or Bruce Wyatt of the University of California Marine Advisory Program. However, Mr. Elwell's and Mr. Wyatt's comments during the question and answer session are included.

Dwight Collins

Dwight Collins, a native of Eugene, Oregon, has been in the seafood industry for over ten years and for the last six years has owned and operated, with a partner, Newman's Fish Company, a wholesale business which has two retail markets in the Eugene area. Dwight is responsible for buying and for marketing seafoods. Currently, Newman's specializes in fresh fish from local producers, but it also buys directly from the East Coast, southern California, and Alaska. Dwight shared his views on marketing new species from the end user's point of view.

I'd like to switch perspectives here and look at the individual market. Are statistics appropriate for a study of individual marketplaces? I would like to preface my observations with two of my biases.

First, I believe that every marketplace is unique. The ethnic makeup of a community is important to what sells and to what new products can be introduced. Our market looks different and sells different species and cuts than markets in Seattle and San Francisco or Denver. We don't have a large ethnic group in the Willamette Valley or Eugene. We do not do anything with whole fish, headed or gutted. People like to see that nice white fillet, they do not want any bones; they do not want any skin, they want it ready to use. So we bring in products they are familiar with when we try to introduce a new product. We cannot bring in whole fish and set it in our display case, because it does not sell. We have to fillet it out. We are already cutting back on some of the items we can carry. We do not have a major airport in Eugene; thus, we cannot fly in from Hawaii or Mexico a wide variety of fresh fish which are specialty fishes that larger communities such as Portland, Seattle, or San Francisco would have a market for. Our market is different from others in the community. We established a clientele that is unique to our business and set some parameters for the forms our products come in.

Second, with experience only in a full-serve specialty store, my marketing techniques are structured to a select clientele and bring different results than they might in a full-serve grocery counter. I believe that our customers have a little more interest in fish. You can persuade them to try something new; they will take time to listen to you, and they are not quite as price conscious as customers in supermarkets. We cannot use mass marketing techniques. We do not have a large consumer share. We cannot use large-scale advertising. We work mostly with just our sales people through service.

A few examples of new products that we successfully marketed are fresh monkfish, flown in from the East Coast, East Coast cod, and East Coast haddock. Native Oregon mussels, fresh swordfish, fresh shark, soupfin, dogfish, thresher shark and in fact all types of shark are selling quite well. We have done well with frozen orange roughy, fresh Oregon scallops, and fresh Eastern bay scallops. Five years ago we used to sell only five-pound thawed out blocks of frozen scallops. Now, if we

put those in the case, customers do not want to buy them. They are so accustomed to a fresh product that a frozen product is inferior. That is another bias that we might have coming from the specialty store. We do stress fresh fish. We find that people will buy a fish that is fresh at twice the price they will pay for a fish that is frozen. The exception is the orange roughy, which, through a very good media blitz or marketing technique, struck a harmonious chord with the consumer. It is a beautifully bone-free, white fillet and it tastes nearly fresh.

A few examples that have not worked: fresh southern catfish, fresh shad, fresh pollock off the east coast, fresh or frozen squid (either off the Oregon coast, California coast, or east coast), any type of crab other than Dungeness. We have tried to sell some smoked crab meat, box crabs (a shamefaced crab), and surimi (an imitation crab meat). We have not done well at all with any of those products. We have even tried crayfish, and we have not been able to sell the crayfish very well either.

Let me draw conclusions from this about why some products have sold and some have not. I'll use the viewpoint of the retailer and then that of the consumer. Most important for me (the retailer) is the question, "Is this product going to make a profit?" Is it greater or lesser than any other items we have in the case? We have a 20-foot-long fish case, and generally, if the weather is fairly good, it's full of fish. So any new product competes for space in the case. If it makes 5 percent less profit than another product in that case we are not going to sell it. If it sells 10 pounds less a day and makes the same profit margin we still do not want to sell it. There is a limited amount of space and number of customers per day, so we want to maximize the profits.

Another reason for carrying a certain seafood, other than for profit, is to fill the void. During the winter when the weather is bad on the West Coast and we are specializing in fresh fish, it's important to bring in fresh fish from other coasts, the East Coast or southern California. We always want to offer some fresh fish to our customers so when we bring in products from other areas we end up cutting our profit margins. We feel it's necessary just to keep that case looking good and give the customer an option.

One other question is, will the customer appreciate the effort we put into getting a specialty product or offering a new product? Will it bring us a new customer? Will it give us a reputation for being unique, or of having everything? That's important for us, too. From a retailer's standpoint, those three items are very important. When I look at consumers I see that they are very uneducated about fish. They do not know how to handle or cook fish. Luckily, things are changing slowly, and we're seeing more people trying new recipes. It is becoming more of a gourmet item so they are trying new things. It helps to bring in a new product just because the consumer becomes a little more educated. It is very important for our sales people to be interested in selling different products and they must be able to educate those customers on how to prepare and present the fish. The consumer is going to rely on us for criteria on judging which fish to buy. They are going to consider the

price, their familiarity with the product, the visual presentation within the case, and their past experiences or preconceptions of that fish. I do not know which is most important to the consumer.

People are buying lobster tails at \$22 a pound. Why? We have some beautiful shrimp at \$5 a pound and they still want the lobster tails. We will bring in fresh halibut off the east coast where there is no season. On the West Coast, consumers will pay \$5.90 a pound for fresh Atlantic halibut when the same frozen product is \$2.99 a pound. Bring in fresh spring-run chinook out of the Columbia, and they end up paying \$9.90 a pound. Frozen silvers and chinooks go for \$4.90 a pound. So, price in a specialty store is not the number one factor.

Familiarity with the product is a second selling factor. The wife sends the husband in to buy red snapper, he walks in the door, and he just says "red snapper." If customers just know the name "sole," they will ask for a sole. If you have four different types of sole in the case, they do not know which one they want. Consumers are becoming better educated about the types of fish we have, but probably we will still sell more halibut and salmon during the next five months than we will of all the other fish. In the Northwest they are used to those types of fish. It is ingrained in their upbringing, so it is important. If they do not see anything else in the case that they are familiar with, they will turn back to salmon or halibut.

A lot of products suffer from how people perceive that particular fish. Squid, at 99 cents a pound is the best value in seafood that we have in the case. There are a lot of recipes out. Promotors have made a big point to publish material on how to use squid, yet we cannot sell ten pounds of squid a week. It's unbelievable. We do not have the ethnic groups, for example, the Hispanics or Italians, that appreciate squid. People find the name "squid" unappealing. Then they look at the fish, and they do not even want to touch it. Yet they go to a restaurant, order calimari, pay \$10 a plate, and enjoy it. It does not make sense.

We also have the same problem with pollock. We will bring in eastern cod and haddock, which sell for \$4.90 and \$5.90 a pound, respectively, and the pollock sells for \$2.90 a pound. Pollock will sit in the case all day and only the cod and the haddock will sell. Haddock and cod have beautiful white fillets, whereas pollock has a little bit of a grey color to it. Yet it can be used in the same recipes. I think pollock is as good a fish as cod or haddock, and yet it does not sell. People do use visual perceptions of how they see a seafood, and if they think it doesn't look good they will not buy it. I have to give the consumer a little more credit on that point. If we have some brown rockfish in the case that has been there a couple of days, and it's starting to turn a little bit brown and yellow and the fillets are a little small, people will not touch that fillet; they will buy something at twice the price.

We have some advantages. People will buy exactly what is on the recipe. If the recipe calls for a certain fish, they will come in and ask

for that fish. It is not always the best for the consumers, but it does sell some fish for us.

We have helped generate a market through demonstrations, giving tastes, showing consumers how certain fish are cooked. That has been our best help, along with media bombardment. Once consumers start learning the names of fish, reading about them in the paper, and reading recipes in magazines, and fish becomes a trendy type of food, we will start selling much more of it.

Restaurant preparation is also important. When restaurants try new items that you want to develop in the market, people who eat it in a restaurant will say "that was great" and then try to cook it at home. It helps very much to generate interest in the restaurant trade.

Something we have also done ourselves that is fairly unique is to have people fill out calling cards. If they have a certain product they like, they fill out the card and leave their phone number. When we get enough cards, we bring in 50 or 60 pounds of that fish, call all these people, and it will sell within a day.

Point of purchase materials (promotional items, recipes, etc., available at the retail fish counter) are only fair, not outstanding, in promotions. People pick them up and maybe glance at them, but I do not think these materials really get people to buy much of the product. On an industry-wide basis, how do we create more demand for certain fish? I think it is a slow process. We see some fish come into the marketplace at very low prices for two months, and then the price goes up \$.50 and we must raise our price \$1.00 and suddenly the demand ends. The problem is trying to fill a niche or to create one and do it consistently and have the product available. Availability for year-round or at least a half-year-round basis is very important for developing a new product.

DISCUSSION

Question: How long does it take for you to determine if the product is or is not going to sell?

Dwight Collins: We will probably give a product six months. With catfish, the biggest problem was that there was a demand for it, but for only 20 to 25 pounds a week. We had to bring in 50 to 100 pounds a week to make it feasible to bring it in and sell. We started to load our freezer up, and we saw that it was not profitable. It just got thrown away. We will try a product off and on probably for six months and finally, when we are not making any money at it, we will probably not try it again. It takes a lot to get us interested in buying it again.

Question: How are prices established for new seafood products that are more glamorous than competitive in terms of a lucrative value?

Bruce Wyatt: I forgot to mention that; I can do it now. When we introduced this liquid fish fertilizer product, we looked at what was on the market and there were only quart sizes. We offered a gallon at a little lower price than the quart price. There were products, I think one is called Atlas, that come in quarts. The price varies tremendously, of course. Around \$4 a gallon is the going rate, as I understand it. We actually add phosphate and urea to bring the nutrients up to a specified level. It's not very costly relative to the price that's received for the product.

Question: Do you use the health aspects of consuming seafoods in your marketing strategies?

Dwight Collins: Yes, we do a lot. I don't know what percent of our customers are buying fish because of health reasons. Doctors have suggested it for heart and cholesterol problems. They are sending in people who are on very strict diets and we pick up on that. In the last three weeks, when the national news picked up the medical benefits of eating fish and lower cholesterol Omega 3, we have seen an increase in our business.

Question: Is there a steady increase in the purchase of fish as a result of that kind of health emphasis?

Dwight Collins: We will see. We are seeing newer customers and I am attributing some of this to the fact that they heard that it is more healthful.

Question: Are there products coming out that can take advantage of the freeze-dried production capabilities we have right now?

Terry Elwell: Oregon Freeze Dry Foods has already done it. They have freeze-dried shrimp; they are the only company doing this as far as I know. I believe Oregon Freeze Dry has done a large production run for the military.

Bruce Wyatt: There is a health product on the market in California that has not made it to the shelf yet. It is "freeze-dried mussels." It is a mussel just like the black mussel you get in the bay here. Researchers are looking at it in terms of giving relief from arthritis. It has not been documented yet, but people have testified that it is very good for their arthritis. The product is freeze-dried and put in capsules.

Question: Bruce, how are you processing your albacore to make it low in sodium?

Bruce Wyatt: We have made laboratory tests of the salinity, but I can't recall the figures. We try not to get fish that are high in sodium. We measured sodium in a few fish. We try to get fish that are not brine frozen but blast frozen.

Question: What is going on in the sea urchin market in California?

Bruce Wyatt: We have just begun a new plant at Fort Bragg, which is bringing in urchins. I understand that the market is a bit soft at the present time. Right now the small urchins, not the large ones, have the best roe. We do not know how long we can go in the summer until the roe will start being of lesser quality.

Question: With respect to the apparent resistance of squid in your market, how are you marketing squid?

Dwight Collins: The fresh squid off the Oregon coast, right now, are being marketed as whole squid. We also carry calamari steaks which have sold very well for a new product. People think they are much easier to work with. We just have a problem of displaying frozen products. It is much easier for us to work out of a fresh display case.

Question: Are there calls for Norwegian salmon in your market?

Dwight Collins: No. We did bring in some East Coast salmon, Scottish salmon, and Norwegian salmon to see what the market would be just because of that bias of buying fresh fish rather than frozen fish. I did not care for the low quality as it finally came into our market. The shelf life was not good, which was a factor.

Question: Could fish wastes be delivered in large trucks?

Bruce Wyatt: Yes. There is an added bonus that we could give you at Fort Bragg. Louisiana-Pacific has a large plant which burns the bark and produces what we call a fly ash. There is a little fly ash mixed with the Fort Bragg fish compost. Clover gives a very good response if it is low in potash or if the soil is off in its pH. We actually have an experiment going right now using fly ash alone in an area where the soil is poor.

PANEL: ENTERING A NEW PRODUCT ON THE FOREIGN MARKET

Lloyd Porter

Lloyd Porter joined the U.S. Department of Commerce in 1962 after having been a director of economic research for the Portland Commission of Public Docks. Mr. Porter, a Navy veteran, graduated from the University of Oregon with a B.A. in business administration with majors in transportation and economics. He spoke on the U.S. and Foreign Commercial Service role in fisheries trade promotions.

I would like to take this opportunity to introduce our organization because we are relatively new. We are here to be of assistance to you and to offer our facilities to those of you who are looking for new markets for your product. Through an agreement with Oregon State University and this series of seminars we are beginning to expand in our own local commercial newsletter with a section on fishing and the fisheries industry. We are going to carry an article on fisheries on a monthly basis and we would be glad to put any of you on our mailing list.

In addition to our own small newsletter, we also publish Commercial News USA which is sent worldwide. Next month we will start a new onion-skin edition. A firm can come to us in search of markets for their products worldwide, give an area of the world that they are looking for representation or exposure in, give us a press release, and it will be put in the onion-skin edition. Those onion-skin editions then are sent to that area of the world and are mailed out directly by the Embassy. For example, the edition in Central America is printed and mailed out by our staff in Mexico City but hits the whole Central American region. We cover the Far East, Europe, and elsewhere. Also we have the opportunity of advertising your product in Commercial News USA. We previously did this without any guarantee that we would use it, and it was the commercial officer's responsibility to advertise the material locally if he felt there was a particular market. Today, such announcements are printed in the onion-skin edition and mailed, so we can guarantee you exposure in certain areas. Those of you who read the Oregonian last week probably saw the interview with the small manufacturer of hoist equipment who said 40 percent of his market today is overseas and he obtained it through the New Product Information Service or the Commercial News USA.

Ed Hallett

Ed Hallett owns Hallett and Associates, an international market research firm. He is also part owner of Oregon Yule Tree Company, a marketing company for nursery products (mainly Christmas nursery products). Hallett and Associates' clients are both U.S. companies seeking information about markets in the Pacific Basin, and Asian companies seeking information about U.S. markets. At Oregon Yule Tree Company, Ed's selling territory extends from New York to Singapore. He shared his experiences in marketing products overseas.

I will address my comments through the combined experiences of both operations that I work with. I would like to make two essential points. One is that I consider the world as the market, not merely one section of it. I do not see any difference between the domestic market and the international market. I do not see a reason to specialize in one or the other. I select my territory according to where I can most efficiently cover. That territory for me is a blend of parts of the U.S. and parts of the Pacific Basin. I do not see a need to have one person cover the domestic area and another person become specialized in overseas work. It is not that complicated. One person can cover the spectrum in a medium sized company.

The second essential point is that the person doing the selling or the company involved in trying to market should be versatile in production outlook, sales, promotion, and advertising. The full spectrum is required of that individual and of that company. A company that seeks only to be a producer is a lazy company. A company has to both encompass the particulars of production and have an attitude that involves the proper promotion of the product. The company may not do the advertising itself, but today, a customer demands more of a producer in terms of advice on how to properly promote and properly merchandise the product. It is for that reason that the full spectrum of attitude is required of both the individual and the company.

With those essential points in mind, let me explain what it is that I try to do, particularly with Oregon Yule Tree.

We build into our marketing targets a desire to have about 75 percent of sales take place in the domestic market and about 25 percent of sales take place overseas. It is a target we strive for. It does not always go that way, but it does move that way as a trend. We see advantages in proportioning that way. We think we are better in our domestic selling by being able to inform our customers that we have a full spectrum of experience. It helps us when we go overseas because we are also searching for products to import. This is an arbitrary decision on a company's part: whether they want to specialize in exporting or selling what they produce themselves, or whether they want to be flexible enough both to sell what they produce themselves and to take advantage of import opportunities they see.

Our company is involved in production of nursery products and in contracting other small producers to handle the production for us, while we do the marketing. Overseas, we are also sensitive to products that would work well in the U.S. market. We make decisions that take advantage of changes in the foreign exchange. We then make a customer profile on who would be interested. In this case, would consumers overseas be interested in buying Christmas nursery products? Essentially, the question is, "Who is interested overseas in buying Christmas trees and Christmas wreaths?" The similarity here between my product and your product is that both of us are literally creating demand in some cases. We are selling our products in countries that have a majority Muslim population. For example, we now sell our products as far away as Malaysia.

We asked these questions. "How do you create demand for Christmas trees?" "How do you realistically establish your customer profile?" "Who is it that would be interested in buying Christmas trees?" Then, after we described (to our satisfaction) what our most realistic customer base would look like, we developed a list of what countries seem to be the best potential markets for our products. Then we made a list of the trade restrictions in those markets. We sought help from the Foreign Agricultural Service, a division of the United States Department of Agriculture. They do an excellent job, along with the Department of Commerce, particularly in helping with the market development phase. We were able to inventory very inexpensively by a series of stamps for letters, the trade restrictions that cover the countries that we had initially targeted. From that exercise we targeted our list of markets that were the best prospects and for which trade restrictions were not disruptive. From there we started finding out who are the best retailers and distributors that service prospective Christmas tree buyers. From that, we made a trip to those countries. I do not see how a company can develop significant sales without making numerous trips overseas. Thus, we began developing our markets, in our case, in supermarkets.

The next question becomes, "How do you approach the supermarket?" "What sales pitch do you use?" "How do you convince the supermarket to buy a product that so far his customers have never purchased and probably never even thought of purchasing?" In our case, rather than selling a supermarket manager on the idea that everybody is a Christian in his market and therefore wants a Christmas tree, we sold him on the idea that what we can do is help him improve his merchandising program in December. Although the Pacific Basin happens to be a very pluralistic region in territory and religion, one common denominator found in about every market in the Pacific Basin is that December is the most important sales month of the year. We went to these supermarkets and sold them on the idea that a very good-looking Christmas tree would really jazz up their December merchandising program. That is how we are able to sell in a Muslim base market.

Once you are able to get the order, the work does not stop there. I think to be able to keep the order, you need to assist your customers with advertising and merchandising. You need to present an attitude that you

are part of a team in this distribution chain and you have some advice that you can provide on how to merchandize that product so customers will buy. This involves, in some cases, strictly information you are familiar with.

The same thing goes on in the cross fertilization of promotional information. What you see succeeding in the New England states, you talk about in Singapore, Malaysia, and Hong Kong as well, and you adapt it to fit the circumstances there. Part of this team effort of making sales succeed down the line is to offer this kind of advice. You are now the bee, cross fertilizing promotional information. It is also very helpful to have some promotional materials that will help your customers.

In successful medium sized-companies, each element of the chain behaves like a team and contributes in some fashion to the overall goal of getting that sale made at the retail level. In our case, we have developed large posters that are suitable for hanging on walls in large stores. The poster is a very nice photograph of our Douglas Fir Christmas tree plantation, with Mt. Hood in the background with children standing around the Christmas tree with Santa Claus. "Christmas Tree Land" is printed above. First of all, we are selling to customers that do not know the first thing about what a Christmas tree farm looks like and we try to create an aura. We create a reason for a customer to buy. In this case, it is an impulse purchase so we create the merchandising material to assist the retailers in successfully merchandising the product.

Interestingly, some products need to be adapted to local tastes while other products succeed because they are different and no attempt is needed to adapt to local tastes. In the case of my product line, I do not have to adapt very much. In other areas of food, quite a bit more adaptation is usually required.

I was recently in Japan doing some market research on behalf of my research company for an economic consulting firm which involved profiling of the retail market for processed horticulture products in six Pacific Basin countries. I was interviewing a buyer for one of the major super-markets in Japan, and I was asking him things about what trends are taking place in frozen foods, canned foods and juices, and he became politely irritable and said, "Get rid of your American biases when you're talking about this market. You're talking as though you're expecting the trends that took place in the U.S. to automatically take place in Japan. Get rid of that kind of bias."

In his case, what he was alluding to and what he clarified later was the tendency of American companies to think that what they produced to sell in the U.S. does not need to be reformulated at all to sell well in Japan. What the Japanese and other markets say is their tastes are often different from those in the U.S., and therefore it is either naive or impolite and discourteous of an American firm to automatically think that what they originally formulated for the U.S. market would automatically work in an overseas market. In your product line you need to determine if

yours is a product that requires reformulation for individual markets or if it actually has its best advantage because it is unique.

I would like to comment on two items. First, in maintaining your market the work does not stop once the order is signed. In some respects the work has only begun because you have to hang on to that customer. You do it in part by keeping a very watchful eye on competitors' prices, but also by being constantly sensitive to how the retail customers are responding. Do they like it? Is there something about the product that they do not like? You are constantly asking your importer, "What is the consumer's reaction?" You itemize that information and again you see if there are things that can be changed to help him better succeed in his sales down the line.

Second, there is another market out there--direct mailing. We are now associating with a company in Japan to include Christmas trees in their gift catalogue. I mention it mainly because some products will work especially well if packaged as a gift item. If you can create the proper aura around them, this represents a market segment as well. It is building up some steam in the Pacific Basin.

F. A. Burget

Tony Burget has a B.A. from the University of Miami and an M.A. and a Ph.D. from Columbia University in Asian Studies. He has worked in Japan, in California, at Columbia University and at the University of Hawaii. Most recently he is in Seattle with Security Pacific Trading Company as managing director of the Food Stuffs Division. He talked about marketing underutilized seafood by-products.

I think you should start out every speech with a joke and the best thing I could think of to say is that Americans market products. That is probably one of the funniest things I can imagine.

Underutilized species or utilized species, whatever kind of species you are talking about, Americans do not market fish abroad. We are passive sellers of fish; we sit on our behinds in our offices and wait for the Japanese to come and buy salmon and Europeans to come and buy halibut. We wait for people to come to us. We sometimes go to food shows, where we have a lot of drinks with all our friends who are at the food show with us, and go out to the best night clubs in town, and eat in the hotels where we can find a good steak that was brought in from America, and do not eat our own salmon probably and make very little attempt to know the market.

Recently, on a trip to the Tokyo food show, I was asking a group of other exhibitors how many of them had visited a supermarket while they were there. Well, no one knew how to find a supermarket and they couldn't speak the language, etc. I told them there was one in the basement of the exhibition building. Afterwards I asked them again. Only one person out of the whole group had even bothered to go downstairs in the building and look at a supermarket which was selling American crab, American salmon and things obviously made from American pollock.

Few people do much research on it, so we end up being very passive marketeers. I think some of the best examples outside of our industry are complaints about automobiles. You go over to Japan and say, "Why don't they import some of our automobiles?" Of course, our automobiles will not fit on their streets for one thing, but the other simple thing is how many American automobiles abroad do you see with right-hand drive? America makes only left-hand drive cars. It does not matter if three-quarters of the world wants to drive with right-hand drive cars; our attitude is foreigners better learn to use a car our way or we are not going to sell it to them. Just sit back and wait for them to adapt to us.

The very same thing happens with fish and particularly with food products. Cars are one thing you get used to driving on the other side, but people do not get used to foreign tastes, nor to different types or forms of products when it comes to their stomach as well as other things.

In Japan, one company that has developed in recent years is McDonalds. McDonalds made a concerted effort and combined with a prestigious department store to become a prestige item. They knew that the Japanese do not eat on the street, and they were not into fast food at the time. So they convinced the Japanese that the new prestige thing for the younger generation to do is stand on the street corner and eat. They put their franchise in this beautiful Mitsukoshi department store on the corner of Ginza that has always been standing there and removed the two big lions that composed the department store's sign and put a McDonalds right in the corner. For the past five years, that McDonalds has been the top selling McDonalds in the world. They hit on something the Japanese would buy; they did not hit on trying to change their tastes. When the other gentlemen were speaking, they were talking about Americans conceiving that other people would adapt to our things or try our things and that they want our things.

That reminds me of a story when I was about 20 years old. One of my best friends from Japan (who was a cousin of the Emperor) and I came on a trip together to America, and because his family was well known, we got on a talk show. I was there to help translate for him. It was one of these well-known talk show persons. I don't know if he thought he was being humorous, but he said to the young man, "I was over in Japan last year and I was really disappointed. I couldn't see any rickshaws or see any geishas, and you know people weren't wearing kimonos any more, and I wondered, what do you think of the Americanization of Japan?" This young man looked very calm and said, "I know exactly how you feel. I feel the same way. This is my first trip to America and New York City and I

haven't met a cowboy or an Indian yet and I wonder what you think of the Japanization of America?"

We are going through a lot of changes in the world and I think the idea is to latch on to the changes, become a part of them, and market through them. I think if you cannot market utilized species, to stand here and tell you how to market underutilized species is kind of a farce. Americans have to learn to pack salmon the way Japanese want it, or the way Europeans want it. We have to learn to do the eggs, we have to learn what to do with fish heads from the species that we do sell, how to use them, how to cut fish. When I joined the New England Fish Company seven or eight years ago, the first job they had me do was a big report on packaging for the Japanese market. I worked hard on it and told them how to box and many other things including the labeling in foreign languages. I was called up before the board, and they told me what a great thing this was. The simplest thing I could think of among all the other things I said was that in Japan, because of the hand handling of the product, it's very hard to work with a 100-pound box. A 50-pound box--a 20 kilo box--is much more marketable in Japan. We can sell to lower levels, like supermarkets, and cut out the cost of reboxing and maybe get a higher price for fish. Everyone said the thing was really great, but six years later when New England Fish Company went bankrupt, we were still packing in 100-pound boxes. I guess my little report was still sitting on someone's shelf.

We are participating in or financing about 16 operations in Alaska this summer. I have not seen anyone in any of these operations over the last five years who has a box printed in Japanese. I seldom see anything that has anything in kilos on it. The boxes you do see stamped in Japanese are the boxes the Japanese have stamped themselves.

The last time we had a box of ikura, a Japanese person came by and said, "Oh, do they have ikura in America? Do they make ikura in America?" I said, "Sure, we make a lot of this in America." And he said, "I have never seen any American sujiko." Fifty percent of the sujiko sold in Japan comes from the U.S.

We are very, very stupid. We sell to the Japanese, and we let them put their own company's name on the box in Japanese. So if we dump one customer and go to look for another customer, they have never heard of us. They do not know that maybe last year you had 20 percent of the market. They do not know the quality of your products.

In talking about utilized species or underutilized species, the first thing to consider is our boxing and labeling. We have very strict labeling regulations. Last year I sold some pink salmon to Italy for \$1.95 a pound f.o.b. This was with the head on. At that time we were selling headless salmon to other places for \$.95 or \$1.00 a pound. The reason they would pay that much was we were the only people they could find who would put a label on the box they sent us, in Italian, with the health regulations of Italy, and get the certificate for them. So I made \$.95 to \$1.00 more a pound on a fish by putting the label on the box.

We still send about 50 percent of our salmon to Japan in the round. They make the money on dressing it, taking out the eggs, and salting it. A product that sells in Japan for \$6 a pound is very smart. We sell it here for \$1 a pound and let them make the other \$5 on it. We are not packaging, marketing, and preparing our products for their tastes.

I worked for about six months for Pizza Hut a long time ago when they first went to Japan. They went into Japan and were really balmy. By that time, the Japanese really liked pizzas. They were buying the frozen home pizzas and were beginning to like them. But Pizza Hut went in with their famous double thick chewy crust, which Japanese do not particularly like, and extra extra cheese; that did not go over that well either. Things that went over really great here didn't go over well there, so we took over a team and reformulated their pizzas. We made smoked salmon, pineapple macadamia nut, and cheese pizza. I think we made everything but ice cream pizza, using Japanese tastes. We actually had pizza with dried squid sprinkled on top. Pizza Hut is now all over Japan.

Pizza Hut, even though the company is from Kansas, said, "We are going to do it for the local people and by doing it that way, we'll make it taste the way people want." Sell your franchise, but do it the way the people in your target country want to do it. Sell your fish but do it the way people in your target country want to do it. If they want Japanese dress on your black cod, get out there and dress it Japanese; don't try to change them. They are not going to change. All they are going to do is pay you \$.20 less a pound and cut it up when they get it over there. Why can't you make the \$.20? Why can't you keep the income and the labor in the United States instead of sending it abroad?

Even something such as sujiko in salmon roe, we will sell mostly as sujiko. We produce very little ikura, and if sujiko were selling for \$4 a pound, ikura would be selling for about \$12 a pound. We take the first step but not the second step. We sell very little salmon caviar, which is very similar to ikura, to Europe. We dealt with some Iranians from Germany who operate a tremendous plant that wanted 500 tons of chum roe in the caviar form for each of the four months of summer and would pay \$7 a pound for it. They tried for three years and could not find anyone to export it to them. They were even willing to send over people to work in the plants.

There are many things people can passively do to improve their product. A year ago, at the Singapore food show, I sold five vans of red rockfish heads for \$2.65 a pound. The processor I got them from paid me \$.06 a pound to take the heads away for him, and we paid \$.15 to have them frozen. We went to the food show, asked a local person to cook them up into the taste of Singapore, with Malay curry sauce, and people stood in lines all around our stands waiting to eat these great fish heads. They were great because they had big cheeks, and big lips, and big eyes, which are really the delicacy. There was an old woman I almost had to kick away from the stand. She would stand there and wait for the eyes. You and I may not like eyes, but if eyes are selling for \$15 a pound, I'll pack them up and send them over there. The Russians sell to Hong Kong an average of

16 forty-foot vans a month of our red rockfish, exactly the same type we have here. We do not sell any of it there.

There are many things to learn about the market. I think the most important aspect of learning about the market is what you want to sell in a place and whether it sells well there. Both of the gentlemen who spoke earlier talked about some ways of finding out. One which we have probably all heard about is to attend food shows. Probably the big mistake made by someone going to a new country for the first time to sell a product is that the person has never been in the target country and knows nothing about it or its people. That person probably does not speak the language and has a lot of brochures in English. Sometimes he gets really gung ho and has an exchange student, who is not a professional, write the label in that country's language so he can put it on the product.

One of the great stories at the Bahrain food show last year was that of the 700 foreign companies that attended this mammoth show, only four were American. A poor rice salesman from Louisiana was going to be a good marketeer. He had read many books about poor marketeers in America, so he really went gung ho and made 20,000 rice bag labels in Arabic because he was informed in a briefing that if you are going over there to sell something you better be prepared to ship it if it sells. He knew it took a long time to make these bags, so he was going to pack this rice up now and be ready to ship it out. The rice salesman jumped up proudly, showing the other guys in the group, "Look at this, I've got my bags in Arabic." We were saying good for you, when one of the people from the U.S. Embassy who works with the Department of Commerce in Bahrain walked by and said, "That's a joke. You can't put that up, people will get mad." The salesman said, "What do you mean, a joke?" Someone had left a little character out and instead of rice it meant death. All these bags in black letters said "death, product of Louisiana." The poor guy went back and I guess emptied 10,000 or 20,000 bags and threw them away.

Two months before Burger King opened up in Australia, the company ran a big association campaign. Full-page ads proclaimed, "The Big Whopper is Coming." The Australians were in hysterics over this. Everyone was cracking up and people said, "This is unbelievable. Who's putting these ads out? It has to be some character from America." Finally, someone told the marketing agent from Burger King that in Australia, the whopper is the local term for the male sex organ. There were a lot of people interested in the new product.

If you are going abroad to investigate a market, the number one thing is to visit supermarkets and restaurants, not the hotel restaurants. Observe how your product sells in a supermarket, and notice what salmon sells for in an average Japanese restaurant. A hotel in Japan will charge \$35 for a salmon steak. In Seattle they are as low as \$25 in some restaurants. That is not the average market price. In small Japanese restaurants for working people, a small salmon steak lunch will cost \$1.50. By doing this you become more familiar with the price.

See what housewives buy, also. About ten years ago at New England Fish Company, the Japanese traders said that Japanese salmon has to be sliced this way and cannot be sliced that way, and so you could not sell American salmon steaks. But maybe you could sell a little bit of sockeye because that is very prestigious and some people who like foreign delicacies might buy that. We said no, we are going to send a bunch of dark chum steaks. They went berserk. All the trading company people I talked to said I would never sell it. We imported about seven vans of dark chum, half a van of sockeye, and half a van of silvers. In two months all the dark chums were gone, but about half of the silvers and the sockeye were still in the warehouse in Japan. The reason for this is that Japanese trading company gentlemen do not know what the Japanese housewife will buy.

I dare you to go out and find the head of the marine products division at Mitsubishi and ask, "When is the last time you've been shopping with your wife in a supermarket?" He very seldom makes it home before midnight, not because he's working that hard (he works till about 8:00). Men don't go with their wives to the supermarket; they don't know what their wives buy. Half the time they come home so drunk they don't even know what they're eating. People buy cheap things first. They're not going to buy a totally new thing that's expensive. They'll try to find a salmon steak for 100 yen. The Japanese slice-cut steak is 300 yen. The wife knows her husband is coming home zonko anyway and she can spend that extra 200 yen on going to the beauty parlor or going to the movies. You know what her husband is going to be eating? Our 100 yen salmon steak. So, you have got to see what the housewife is buying, not what some bigwig in a company will buy. The Japanese trading companies are just about as unaware of their own consumer market as the Americans.

I think we take too much advice. I was raised in Japan and speak Japanese. Japanese traders get so frustrated when they can't say to me "Oh, this is the way Japanese do it." Because I know it isn't the way they do it. Any time you get in a negotiation you're going to hear, "Oh, we do it differently because we're Japanese." That's wrong. They do some things differently, but they are just like any other consumer. They are people who buy cheap things. They are people who buy expensive things. They are people who buy things because they have got a foreign taste, and people who buy things because they have the old taste, and you have got to figure out which market you are going to aim at. If the mass market likes the old taste, then find out what the old taste is.

Campbells Soup tried and tried to get into the Japanese supermarkets. They never really hit the big Japanese market. Finally, after 20 years in the market they went to the Ichiban-Spice Company, which makes spice bags for Japanese companies for processed foods. Campbells started importing their spice packets for their soups from Ichiban. Obviously, the spice packages are made to Japanese tastes and now Campbell's is the number one soup on the market in Japan. Campbells did it the Japanese way.

The only way you are going to do it is their way. It does not make any difference if it is Japan, Saudi Arabia, France, or Canada. You are

not going to sell things in Canada unless it has a French label. Even if you hate French you have to put French on the label. You have to put kilos on your label or you are not going to sell your product.

DISCUSSION

Question: You say, "You have to stand on the corner and find out for yourself." I wonder, are consultants just trying to make a buck off me?

Tony Burget: Yes, many are. You make more money selling falsities than you can by telling people the truth. I was a consultant for Dodwell Trading, Limited, in Japan, and we sold a thing called "Baby Champs." It's a terrible champagne they make from peaches. It tastes like peach syrup with bubbles in it. The head executive of Baby Champs came over to Japan and paid our company something like \$100,000 so we'd do this great market research. We went around to supermarkets and gave people these little cups full of the product. People spit it out and threw up and everything else. So we wrote this long report for them and told them all the reasons this Baby Champs would not sell in Japan. The head executive was so mad he quit doing business with our company and went to our competitor just to prove he was right. Of course, the company went bankrupt in about two years. They lost their shirt on it.

Some consulting firms learn that they have to say what the employer wants them to say. If you think your product is going to sell and you come in and say, "My bright red label in Japanese is going to be great, everyone will love it. My grandfather had this bright red label and it's really neat. I know the Chinese like bright red labels so the Japanese are going to like it," is the consulting firm going to say, "You can't use that label in Japan; Red is not any good in Japan"? The company would find another consultant. So there are a lot of consultants that have to stay in business by not telling the truth because people don't want to hear the truth.

Also there are lots of people who deceive others by saying they speak Japanese. I probably get five or six application letters a week from people who say they speak Japanese. Half of them don't speak Japanese. Some of these people only know how to say "Hello, How are you? I am fine, and Good bye." But they come to me and say they know how to speak Japanese. Am I going to test them? How can I test them? When I went to the New England Fish Company for an interview, of course I said I spoke Japanese. Afterwards I asked, "How did you know I spoke Japanese?" They said, "Well, you lived there a long time." But I know people who have lived in Japan for 25 years and don't speak Japanese. They don't try to learn the language.

Question: You stressed kilos quite a bit in your talk. Will you tell me why you say kilos should be put on containers?

Tony Burget: Eighty to ninety percent of the export market is based on the metric system. If I see a little can of mushrooms at the store, and it says "special--49 cents" I will look at the next one to see if this is 16 ounces and the other is 14 ounces. Am I saving 20 cents by getting 2 ounces less? If your product is on the market and it's in ounces and everything else is there in grams, people don't know how to compare them. They want things weighed in the way they are used to buying. If they are used to buying a 300 gram steak and they see a one pound steak, they don't relate to it.

Question: Do you carry other products along with Christmas nursery products?

Ed Hallett: Once you start succeeding in establishing your contacts, it is not at all unusual for other things to come along. Indeed, it is often the case of having to select which ones to take on and which ones not to take on. When we started marketing Christmas nursery products, we had to learn how to package them properly for the voyage. They are a perishable product and it may take anywhere from 15 to 30 days inside a dark room before they reach their destination. Once you handle the technical aspect of packaging, you discover you can use that piece of knowledge for some other products as well. As a direct result of having this experience, we're now expanding beyond the narrow bounds of Christmas nursery products to other nursery products throughout the year.

Question: Are you fluent in several languages or did you hire the expertise?

Ed Hallett: No, I am not fluent in several languages. As a child I lived in Japan and in Indonesia, and I have some knowledge of the two languages, but I do all my business in English. Often I will hire interpreters. Even though we may end up doing all our communication in English, the fact that the interpreter is there is my way of saying to the people that I am not depending on using English; I am being polite by indicating with this interpreter that we can communicate in both languages.

Question: Is politeness and courtesy more important in foreign countries than it is here?

Ed Hallett: Some of that has to do with the style. Every salesperson has his or her own style. One style will work with a certain group of customers, and then another, a relatively more slap-happy style, will work with another group of customers. Another consideration is that there is a way of behavior that signals to the customer whether or not you have any experience in mixing with different cultures. Politeness has something to do with that behavior. It is not difficult at all to distinguish people who have had experience in interacting with different cultures and people who have not had that experience. As I say, politeness is one signal.

Tony Barget: Let me add to that. Remember that politeness and manners are cultural things. Specifically, if you feel your manners are good, you may be showing bad manners. So it is probably more important to find out what the culturally correct manners are. What is the local culture? When I worked for the New England Fish Company I went to Korea with my boss and we met the Minister of Fisheries, who picked us up in his limousine at the airport. I had known the Minister for many years, so the Minister of Fisheries was being very kind to my boss. To show that he accepted him and liked him he put his hand on the inner thigh to talk to him. My boss was young and reactive to such things so he about went out the window. I had a terrible time breaking him of this thing. The Korean gentleman was being very polite. My boss just did not understand what is polite. Remember, because you do something nice in your culture does not particularly mean it's nice in someone else's. Something you may do that is bad in your culture may be nice in the other's. In Arab countries, belching after meals is considered polite. Obviously, if you do it here, your mother sends you to the bedroom.

Question: Does U.S. seafood have a negative or a positive image in the international market?

Answer: I think we do not have an image. That is the biggest problem. Very few Japanese consumers know that the chum salmon they buy comes from America. Probably the only salmon that gets promoted at the hotels and the famous restaurants is Alaskan king salmon, Alaskan king crab, San Francisco crab, (which is Dungeness) and things that are prestigious in a good restaurant. You don't have to have your product identified as American to be successful.

I do not think we have an image yet. The Avocado Board of California has a marketing promotion office in Japan; the California Cling Peach Board has an office in Japan; the fishing industry does not have a single promotional office in Japan.

Additional Comment: One project that I undertook was to do some market research in Japan for sea urchin roe from Oregon. It is auctioned off in a wholesale market in Tokyo. I was interviewing one of the auction companies, a company that acts as an agent for the auction place. One question I asked him was, "Is a product handicapped if it has an American label?" And he said not anymore, but that it was at first. It was automatically downgraded at first. I subsequently found this to be true for other U.S. products. Initially, they tend to be downgraded. But then the next phase is that individual processors establish their own reputation.

PANEL: UNDERUTILIZED SPECIES AND BY-PRODUCT CASE STUDIES:
IDEAS THAT HAVE (AND HAVEN'T) WORKED AND WHY

Christopher Riley

Christopher Riley is the production director of the Alaska Fisheries Development Foundation. This particular foundation has been extremely aggressive and successful in expanding and exploring a number of opportunities for fisheries development. Chris has worked with groups that have been trying to stimulate activities in underutilized resources in Alaska.

How many people here are familiar with the surimi manufacturing process? It's very easy to see that you haven't been subjected to much of our propaganda, so I'll go through that very quickly. I'm sure most of you have heard quite a bit about surimi. There's a lot being written about it now in the fisheries press which lately almost seems like the surimi press. It's become somewhat of a bandwagon that everyone is jumping on. Some people see it as a panacea for the fish industry, but few people have a lot of first-hand experience with seeing it produced. Basically, the surimi production process involves the separation of the muscle fiber of the fish from the rest of the fish--head, guts, the bones, fins--mincing of this flesh, and washing it with water to remove water soluble proteins, nonprotein nitrogen, certain minerals, blood, and any other contaminants that may have come through the filleting or heading and gutting process. This washed mince is then either dewatered and strained to remove the connective tissue or refined. In the case of a refiner such as we use, the refiner is employed before the dewatering process (the pressing process). Next, the surimi is mixed with sugar and sorbitol and frozen in 10-kilo blocks. It's supposedly shelf-stable for up to two years at minus 20 degrees Fahrenheit. Surimi forms the basis for a major industry: the kamaboko industry in Japan. Surimi is also the raw material for the artificial crab and scallops and so forth that you've seen in supermarkets and on airplanes.

Most of the surimi is made from Alaska pollock. We in Alaska are fortunate to have a rather large supply of Alaska pollock available to us. A harvestable surplus runs at about 3.8 billion pounds per year within the 200-mile Fisheries Conservation Zone of Alaska. Virtually all of this was taken by foreigners. Now, a significant fraction is being taken by American fishermen, but it is immediately turned over to foreigners for processing.

Pollock is by far the largest underutilized species in Alaska, and in the United States for that matter. Our group decided two and a half years ago to target pollock as our sole development goal. We looked at various options for ways to attack this problem. It seemed that the thing that hampered development of the industry the most was the fact that there was really very little one could do with small fillets. If all pollock were three pounds, we would have developed them some time ago. Unfortunately,

they average between one and a half and two pounds, yielding a lot of fillets under four ounces, which cannot be profitably marketed.

One of the logical things to do with this fraction of the catch is to make surimi out of it. We made about half a million pounds of surimi in Kodiak this winter. We put in a commercial scale line, more specifically, a line that could produce 2000 pounds of finished product per hour. However, this is not to say the plant is on a commercial scale. The line itself is commercial scale, but a commercial-scale plant would involve at least several lines.

The quality was acceptable after a few weeks; the minimum quality is above standard grade Japanese shore plant; and the top quality is something just below the best the Japanese produce on their factory ships. We feel that we can consistently produce second-grade surimi and occasionally produce SA-grade surimi at a shore plant 12 hours from the fish, which is something the Japanese had claimed was completely impossible.

If the goal of our project was simply to make surimi, we could say we were finished and we could go home and get on with other things, but the goal really is to make money. Proving one can make surimi from a technical point of view really doesn't prove anything. One has to prove that money can be made processing pollock.

The other pieces to the puzzle have started to come together. The German-made Baader 182, the new computerized filleting machine, has significantly reduced the cost of filleting fish. They are now developing a very good meal market for white fish meal. Things are moving in our direction. There is a strong market for kamaboko products in the United States. We've been very fortunate.

We have had some tests on the 182. In fact, Baader lent us one for a couple of months this winter to use as a filleting machine for our project. We put in a Japanese-style line and then tested the Baader next to the Japanese Toyo equipment. The Baader proved to be far superior, so we basically shut the Japanese equipment down.

The big advantage of the Baader machine is that it allows you to make a decision on whether to run a fish to surimi or to a fillet, after a fish is filleted. With the Japanese Toyo machine, once you run it through it's going to make surimi. We feel that the real key to an economically viable pollock processing operation is the ability to route fish either to a fillet market, where prices range up to and into the low 90s (\$.90) per pound with a 25 percent recovery, or to surimi at a lower price at 22 percent recovery. There's much more profit in the fillets, but obviously every fillet isn't fit for that market. The defective fillets containing parasites, those that are torn, and those that are small would normally go directly into surimi.

We have put together the information generated from the operation of the Baader 182 and information we've received from other processors in the

state and simulated a model pollock plant on our computer. It would produce not only surimi, but also the fillets and meal on-site, at a scale that is appropriate commercially. Specifically, it would process roe, three grades of surimi, two grades of fillet, two grades of fish meal, and one grade of fish oil. We're basing our figures on a season of 275 days a year. That's something that's probably not attainable in Kodiak. It is obtainable, however, in the Aleutians.

This information will eventually come out in published form when all of our numbers are checked and documented, but the model is something we use in-house to evaluate various options we have for development. We're looking at areas where there might be a significant benefit.

The taking of the roe is something that's really critical to a profitable operation. One of the secondary objectives of ours was to improve upon the Japanese technology to whatever extent possible. We did not want to make that a primary objective, probably because we felt we would look like fools later if we failed. It proved to be a lot easier than we thought. As I mentioned earlier, the Baader machine is a significant improvement. The entire cost of development was borne by Baader. We also worked extensively with Alfa-Laval on a different wash system that has proven to increase recovery tremendously. I'll show you the financial effects of this later.

This plant produces fillets, surimi, roe meal, and oil simultaneously. It can run 150 days a year with everything but the surimi line shut down.

In the model here, we've cut the season back. This would be equivalent to someone producing only surimi in his spare time. As you can see, the producer is losing a fairly large amount of money. A lot of people originally thought this would be an effective way to go. However, even with a relatively efficient plant, I don't believe there's any way a person is going to make money just by producing surimi and throwing the rest of the fish out.

Increasing the season's length to 275 days a year would bring the producer into the profitable range. This profitable range would be marginal; any error in any of these assumptions could prove costly to a very significant investment. However, when we start moving into a more efficient use of the fish, that is, taking the different pieces of the fish and not throwing away what we bought and sending the pieces of the fish that belong in the fillet market to the fillet market rather than into the surimi line, profitability increases dramatically.

In case 3, we've added roe to the computer model. The return on the fixed assets is up to 31 percent. Now it's starting to look like a profitable operation. We were told when we started that it was impossible to take roe from fish and then make surimi out of them. The roe removal process supposedly destroyed the fish for surimi unless one was to go to a hand-filleting operation. We found this to be true with the Japanese equipment. However, we found it to be false with the Baader equipment.

We could remove roe and then run fish through the Baader equipment with no problems whatsoever. There is also equipment around now, or will be around next year, for sexing pollock. Neptune Dynamics and Ryan Engineering expect to have a machine out next year that senses the milt in the males with an infrared beam and then knocks them off a conveyor belt. It essentially cuts in half the labor cost of removal of roe because you don't waste money trying to remove eggs from males. So, as you can see here the ability to get both roe and surimi is a significant improvement. It's something that is not done by the Japanese except in the shore plants where they use hand filleting. In this case, we add the fillets. Even after we add some \$500,000 in capital costs and a lot of people, the return on the fixed assets has gone up to 40 percent. At this stage the plant is really making fish at 62,095 tons worth. That's a lot of fish. It translates to 150 million pounds of fish per year. We have plants in Alaska which could handle that amount.

In the next stage, meal and oil are added with another significant gain in profitability. One last thing I'd like to show you is the results of the Alfa-Laval wash. Here we are using the Alfa-Laval centrifuge wash rather than the Japanese screen wash. When we go back into production we are going to have a full-scale centrifuge to run all our product through. We expect a significant reduction in the cost of processing.

Quickly, the last overhead is a look at this same model that reflects the entire industry which gives you an idea of the potential size of the industry.

Bruce Wyatt

Bruce Wyatt is a marine extension agent with the University of California Sea Grant program. He is based in Santa Rosa, California, and has worked extensively with underutilized species in northern California.

I'd like to talk initially about my work with many different people as an extension agent. I see a lot of successes as well as failures. Many times we learn a lot when we fail. We've also had projects at which we've failed but which somebody else was able to pick up and go with. Sometimes it's the timing. Also the type of people you have working in the field is very critical.

I have about 200 miles of coast in my particular district in California. I'd like to mention the attributes of people that I've seen who are successful in marketing: tireless experimentation and the love of marketing. You have to be an individual who is not going to give up or get discouraged at setbacks. You have to engross yourself in fish, go out with the fishermen, go out on the boats, and get into the packing plants. You'd be surprised how many people will let you come in and cut fish in their plant if they think it's going to help them in the future.

I learned this at one of our salmon conferences: you want to talk to the fishermen. You can find out a great deal if you just observe.

Something that really kills an operation is somebody who says, "Oh, that's not going to work." You've really got to have a positive attitude.

Anybody in this field has got to get involved in packaging. That has been touched on already.

I'm going to move to a discussion about hake or Pacific whiting. When we first started our whiting project, we went to sea. It's hard to get samples of whiting, even though we have a lot of it. When you need it, it's hard to come by. In this case, we went to sea, and because nobody was targeting on whiting, we didn't get a single whiting the first trip. Fishermen finally came up with a few whiting when they went after rockfish.

A person in product development or in marketing has to go to sea with the fishermen and spend several weeks or months. It's really enjoyable, and you learn a lot about the particular species with which you're working. You have to experiment a lot. I just finished working on a herring project. We made herring every way possible. Each time we made it, we seemed to learn something new.

You should talk to the consumers. That's been said several times already at this workshop. It's very important to talk to the people who are buying your product and ask them if they like it or how it can be improved. In doing our work with whiting, we targeted a market with nursing homes. We happened to have a senior citizens center in town, and the fishermen's wives were interested in working with the senior citizens. It was a natural place to start experimenting. We were able to get help from a chef who works for Rupert Certafresh Corporation in product development. He was horrified at some of the things we were doing but he had some good suggestions also.

At Fort Bragg we worked on a headed and gutted product that sold reasonably well. I believe there is a very good market for headed and gutted hake throughout the country. Seafood West in Lynden, Washington, is one company that does a lot of production in Washington. Eureka Fisheries does the same in northern California. I believe the market to be bigger than the one they are covering at present. One of the gentlemen here has indicated that in the south there is a possibility for marketing hake. It's a pretty ethnic product, as Terry Elwell pointed out. The black community anywhere is a good market for headed and gutted hake.

Mushiness is a problem. Whiting, for example, has a nasty attribute: when it's thawed out, some fillets will go mushy and others will not. If you happen to get one that goes mushy, it can turn your clientele off right away. I think that is what's happening with this kind of product. If this type of fillet were used right away, kept cold or frozen, handled properly by the consumer, and deep fried, we could get away from the

problem of mushiness. However, it's been difficult to get the consumer to do this.

In working with the whiting project, I was able to go to Canada, where they had a very nice operation. It was written up in Pacific Fishing. It is owned in part by the big cooperative in British Columbia. They used a modern boat built in Japan. It was 178 feet long and had steam winches. I think about 50 people worked there, 40 of whom were involved in processing. It was a hake (whiting) processing venture. In a typical day, they could produce 18,000 pounds of "deep skinned fillet." The fat layer in the middle of the fish is an off color and is stripped off because it develops a strong flavor during frozen storage. About 10 percent of the fish which the Canadians caught were over 800 grams. There is a special market in Europe for that size, for which they receive a good price. It was profitable enough for them to separate out the larger fish for the headed and gutted European market.

The Canadian operation uses the Baader machine and three Oranko filleting machines. They had four filleting machines on the boat. They had a lot of miscuts--probably about a third of the fillets. Unless skin or bone is left in the fillets, miscuts are not a serious problem, but they do reduce yield.

In order to get products, we had to go to sea with a joint venture operation. About every two weeks a Russian transport picks up products from about 12 processing vessels. About 90 percent of this product is headed and gutted. I worked on one of the catcher boats that was catching hake, or Pacific whiting for the Russians. I cut the fish in a lot of different ways and tried to get familiar with it. There is some dark flesh in the fish that I like to call enzyme. People keep calling it parasites. I used to do that, too, but I don't think we can tell that to our consumers. I think we've got to look at it as being an enzyme or something such as that. Consumers don't understand parasites. I have a campaign to look at this as being an enzyme.

I did work with Pacific whiting on several products. We did whiting in sauce for the nursing homes. We have a bankruptcy pending now because of that. We spent a lot of time and effort. I think the project is going to go; I'm not willing to give up on it. I think what we have to do is to go to sea, get a very fresh product, and fast freeze on the boat in the product form we want to promote. Then we want to get into the market. If we can get a product moving on a pilot basis like that, I think we'll find ways of getting fish fresh and of good quality to the consumer.

Walt Dickerson

Walt Dickerson is a fish wholesaler in Astoria, Oregon.

I want to explain from a wholesaler's point of view why shad, particularly on the Columbia River, is an underutilized species. In doing

so, I'd like to take a look at the East Coast, West Coast, and international markets.

On the East Coast, many times the difference between an underutilized species and a healthy market is just a matter of miles. The East Coast is a place where shad is treated not unlike our salmon on the West Coast. To call shad an underutilized species on the East Coast with their runs would be a mistake. It's underutilized just on the West Coast.

We cannot get our shad back there at the right time for sale. One of the reasons for that is shad runs on the West Coast start around the first of June, and by that time the East Coast run has been over for approximately one month. In the Atlantic, shad start in January and head north, hitting all the markets all the way up. They go into every major river on the East Coast. By the time the end of May comes around, the people are pretty well tired of shad. It's something like we have here on the Sandy River when we go out for smelt. We go out there, everybody is all excited, they get a mess of them, go home, and have them for dinner a couple of times. After that, they want to forget about the rest of the smelt they have in their bucket at home.

Eastern markets come just too late from a wholesaler's point of view. You would think we could just step into the East Coast market, but like I said, it's a hard sell. They don't want anything to do with shad.

On the West Coast there is a small, stable market for shad, primarily in California. I've sold shad in California in whole form, mostly fresh, boxed, and shipped right into areas such as San Francisco and Los Angeles for the Oriental market. There is also a stable amount of shad roe sold in California and that goes mostly into French restaurants. On the West Coast I'm involved in a couple of promotional studies on deboned shad that will be taking place in Seattle through the West Coast Fisheries Development Foundation. We've got a restaurant chain called Restaurants Unlimited in Seattle that's going to be handling deboned shad for us. We're going to try it on ground level to try to get these shad introduced into other restaurants and possibly into some supermarkets as a deboned product. Shad roe isn't as successful in the Northwest.

The solution to increasing consumption of Columbia River shad lies in the international market. This is the only hope fishermen and processors have that shad on the Columbia will become a good market item. We have been active in sending container loads of shad throughout the world. The last place we sent it was Taiwan. The shad was well received over there but the cost of sending it was prohibitive. The Columbia River has a traditional gill net fishery that can harvest upwards of 400,000 fish in any given year, if there is a market for that many fish. The international markets are big, and we have to have enough fish to make it worthwhile going to other countries and getting their orders. The problem with 300,000 or 400,000 fish is that it's not a large enough quantity for international markets. The answer to that problem is there has to be some way to harvest the shad in the Columbia River other than by gill nets. For example, trapping them at the dams. The State of Oregon

brought up the trapping possibility last year. Since then, I've taken the ball and run with it. I've thought out procedures for on-site freezing and boxing.

Gill net fishermen are on limited quotas because of an incidental salmonid catch. Along with the shad, they've got about a three week-period when the salmon catch increases to a point where the state will not allow a catch of shad to go past 300,000 or 400,000.

I think the only way a market of any magnitude is going to be established on the Columbia River is to take into account the social issue of displacement of the traditional shad gill net fleet. Some subsidy for gill net fishermen--perhaps monetary, perhaps in terms of agreements to let them trap at the dams--would need to be worked out so no one is displaced from his job.

Terry Nosh

Terry Nosh is with the Marine Advisory Program at the University of Washington, Seattle, and has worked closely with the technology of salmon aquaculture.

Rather than give a detailed account of the development of salmon farming (which really began in about 1970 in both Europe and the U.S.), I'll give you a taste of what was happening, look at the U.S. as a case history, and then provide some explanations for why this concept seems to be taking off.

The federal government began some studies in late 1968, and in 1970 they went into a joint project with industry. I'm sure you people have heard the name Domsea Farms, which at that time was a subsidiary of Union Carbide. This joint venture culminated in the production of about 10 metric tons in 1971. However, during the 1970s, it had many setbacks. Production was generally in the 200,000- to 400,000-pound area but not enough for the company to make money. About 1978 Campbell Soup bought Domsea Farms and we saw an immediate turnaround in production. Since 1979 they've been producing from 1.4 to 1.9 million pounds a year. The figures are significant, because the trend is going up. I think along with this we can expect a little more expansion in Puget Sound in farm salmon, not so much from the production of 8- to 10-ounce salmon that Domsea and a couple of other farms are producing, but from Atlantic salmon farming.

If you read fishermen periodicals and journals, most of you are probably aware that we have a number of Norwegian partnerships in Puget Sound. To put the salmon farming business in perspective, I took the numbers I could get and lumped them together under Atlantic salmon and Pacific salmon. The result points out a couple of things. Clearly, Norway is the leader in the production of farm salmon with about 25,000 metric tons last year. But more interesting than that, the total Atlantic salmon (this is completely farm salmon) in 1983 was 20,000 plus metric

tons. This exceeded the total amount of exports of Pacific salmon to Europe for the first time. The gap is probably going to widen. The 1990 projection for salmon worldwide runs from 95,000 to 107,000 metric tons, and that's only about five years away. Now, a lot of that stuff is coming over to the U.S. as fresh product. I've seen the Norwegian salmon in the market myself. It has a number of unique features. The meats, when you steak them, are marbled with fat. A human nutritionist told me that the fatter and oilier the fish, the better it is for you. The fish look like twins stacked up, every one of them weighs eight pounds. Just a fantastically beautiful looking fish.

Let me tell you what I think are some of the reasons for the success of salmon farming and importation into this country, supposedly the salmon capital of the world. First, people are aware of the health benefits of eating seafood. Second, there's been a large increase in the number of restaurants in the country and the use of seafood in these restaurants. Farm salmon targets white-tablecloth restaurants. Our own pan-sized salmon, if it is boned out, gets \$3.25 for an 8- to 10-ounce fish. That's pretty good. The Atlantics that I've seen in the marketplace are priced right there with the kings, \$5.99 in the round or just dressed, \$7.99 steaked. So, although this farm salmon is expensive, people are buying it. I think people are buying it because they desire freshness. People want fresh fish. The farming of fish provides something that the wild-harvest fishermen could never provide. Fish farmers can control their inventory; they can provide quantity 12 months of the year; and they can provide fresh, high-quality fish 12 months of the year.

Jim Washburn

Jim Washburn, of Oregon State University's Ocean Engineering program, spoke on sea urchins.

I see sea urchins as something that may help solve the problem of the low income earned by fishermen on the Oregon coast. First, I'll provide some general background about the urchin. Then I'll mention a few things in particular about the potential for an Oregon industry and my involvement in it.

First, we're talking about an animal that in California has been harvested for 10 to 20 years. Urchins have been getting scarce. I haven't recent numbers; however, I do know there has been a depletion of the resource in California. Approximately a million pounds a month has been harvested over the course of the last few years in California. Out of that only the roe is edible. Roe is 5 to 10 percent of the total weight of the animal. The rest is discarded. The market is really in Tokyo. The vast majority of the urchins are shipped to the Tsukiji wholesale market, and there the price can fluctuate tremendously.

The price fluctuates because the quality of the urchin itself fluctuates tremendously. The fluctuation is due basically to two things. When the animal is in spawning, which takes three to four months, it is

not edible. The other factor is that the quality of the gonad material itself can vary considerably. The Japanese really dictate the market; therefore, it's the color and the texture of the gonad that is going to dictate the price in Tokyo. It can vary from \$6 to \$40 a tray. A tray is about one-half pound. This price variation is over a given day, so we're talking about a real roller coaster ride for the processor when he tries to ascertain what his selling price is going to be once it arrives in Tokyo.

Processing is the key to the operation. The processor can educate and dictate to the fishermen the quality and size of the gonad he's looking for. Urchins are found in subtidal areas in relatively shallow waters. It's a diver-intensive industry. An experienced diver can recover 500 to 1,000 pounds a day. Oregon has an ideal coastline for urchins, with a lot of rocky areas offshore. The area from Port Orford south to the California border looks the most promising. In the middle coast of Oregon going northward, there are not enough rocky subtidal kelp areas to provide a high enough population.

California has had some tremendous urchin beds, particularly around Santa Barbara, which were 10- to 20-mile stretches. Divers down there have been known to recover 7,000 pounds a day. The boat gets paid 15 to 30 cents a pound. If the boat is operating with two or three divers aboard, and if they are in a really intensive bed, they can recover a lot of urchins quickly.

If you see kelp, you know there's rock below. You may find urchins in other than kelp bed populations, but they do prefer algae, so this is the first thing you look for. (Kelp is an algae, of course.)

Weather conditions are obviously a big factor. Urchins can get as dense on the Oregon coast as 20 to 40 urchins per two square meters. That comes down to approximately one urchin per square foot. There are beds in California where urchins get about double that density.

You're looking for an urchin that's 3 1/2 to 4 1/2 inches in diameter. That's not the spine diameter; it's the test diameter. That will be the marketable size animal that fishermen have to go for.

Strongylocentrotus franciscanus is the red urchin. The little purple urchin (S. purpuratus) all of you have seen is edible, but it is not one which is harvestable because of the danger of depleting the resource. The purple urchin is intertidal and in a very sensitive area. The red urchin is found down to 100 feet. Ideally the diver on the Oregon coast looks for it in 25 to 50 feet of water. I heard an urchin diver in California tell me that these urchins are more mobile than you would think. They can graze en masse like cattle. The urchins will migrate, pick clean the algae, and then move on.

A rough estimate for weight per urchin would be approximately a tenth of a pound of gonad. There are five sections inside each urchin. Thus, it will take approximately 10 urchins to give you a pound.

Over the past several months, I've worked to get a feel for the populations of some of these urchin beds and the density of them. An important factor is the time when the urchin comes into spawning. Fortunately, the Oregon urchin spawns during the late winter months. The Japanese urchin spawns from August until about Christmas, and therefore, their domestic supply is down, so the price increases tremendously because the demand is high in Japan. So our urchin is very marketable around August to December. That's good news.

The bad news, of course, are the weather conditions here on the Oregon coast. During August, September, and October, you can have good weather conditions. By November, as everybody knows, things start deteriorating.

There's a question about how further processing and harvesting could be done in Oregon. That's one consideration. Another consideration in Oregon is getting a good processor. That's really the key to an operation. I wouldn't say the processor has to have a great deal of previous experience, but he has to realize that a good quality product is necessary. The Japanese are much more quality conscious than we are, not only with the urchin, but with most seafood products. You need a processor who has tight control over exactly how these urchins are packaged. You want them in little trays, the same color, same size, same general condition; that will dictate a lot on the pricing. If you have a processor who does a poor job of putting his product in the marketplace, the Japanese will quickly pick up on that and the processor's reputation is going to be seriously hurt.

The Japanese get a lot of the dollar back on imports by controlling all of the middleman positions. The brokers are Japanese as a rule, as are the wholesalers, forwarders, and others down the line. Pretty soon a lot of our export dollar is back in their pockets again.

I foresee a particular trend in urchin marketing. Let's say we could develop a domestic urchin product that was more pleasing to American tastes. Having a product like this would take away some of the cyclical nature of the processing business and the harvesting of urchin. As it is now, the urchin business is quite dependent upon the vagaries of the Japanese import market. Furthermore, a domestic market would enhance or increase the foreign price because it would create more demand on the total supply. Right now price varies quite a bit. As a matter of fact, even one processor in, let's say, Washington (there's one in Port Angeles) can affect the wholesale pricing in Tokyo on sea urchins on a given day.

Finally, we did a little market research on other names for the urchin. The urchin gonad obviously can turn off some people. We took calamari as kind of a lead. The Italian name is riccio di mare; that sounds nice. In Spanish, urchins are called erizo de mar. Somebody give me a suggestion. The Japanese call it uni.

Here in Oregon, the weather conditions are not unsurmountable. The urchin populations, while lower than those in California, could support some fishermen on the southern Oregon coast. Weather conditions in part could be somewhat of a protection against overfishing, a problem in the last few years in California.

DISCUSSION

Question: Is the future of pollock harvesting in Alaska tied to high technology? You referred to modern equipment and the extremely sophisticated processing technologies. Is this what your group now believes that some of the foreigners are doing that enable them to move rapidly? Is high tech the sensitive economic component for us?

Chris Riley: Yes and no. The Japanese use a system to make surimi that one process engineer told me belonged in a museum, it's so antiquated; it's 1940s vintage. In fact, the man is about ready to retire and said he saw such equipment when he started working and hasn't seen it change since. We have companies in the United States and in Europe who would love to give us 1980s equipment, such as the centrifuge outfit that Alfa-Laval brought in. But, to process pollock in a manner consistent with developments that occurred maybe in the 1950s, we just have to use 20-year old technology, and we'll be ahead of the Japanese. They are maintaining their position simply by dominating the market, not because they are on the cutting edge, technologically.

Let me give you one of the reasons. This is somewhat the flip side of that strategy they supposedly have to take over the industrial world: they won't provide an American or European with protection on a patent. Alfa-Laval knows that if they go over there, if they did work with the Japanese, before long there would be a machine that resembled their machine quite closely being sold under another name. As a result, they don't have any interest in working with Nippon Electronics. If you read Time or Newsweek, you think it is a brilliant strategy the Japanese have for taking over in the manufacturing centers, but it costs too. The surimi industry is one of those costs right now.

The prices are real prices that exist with a little shading for conservatives. For example, the price for top-quality pollock roe is \$3.42 a pound; we put \$3.00 in the model. On the West Coast of the United States, SA grade surimi sells for up to \$1.00 per pound. The top pricing in the model is \$.90. I always feel that you should go slightly below market price in the model. The model allows the user to change the price if someone doesn't like it, and then come up with a new profitability figure.

Question: What is the problem affecting the quality of the fish flesh from pollock and whiting?

Answer: A myxosporidian causes the softness in whiting flesh. It also occurs in beef. It's a really widespread organism. It doesn't cause as severe a problem in beef as in Pacific whiting and I am not sure how it affects pollock. We can avoid it by processing and cooking the Pacific whiting as quickly as possible. There are some distributions of the myxosporidian in the whiting population. If you fish a resource very hard apparently the myxosporidian become less of a problem.

Question: What are the processing alternatives for urchins harvested in Oregon?

Answer: There are two or three alternatives. A few people I've talked to are trying to decide whether to open a processing plant on the Oregon coast. I'm sure there are a lot of fishermen who would be willing to go after urchin for something like \$.20 a pound. The other alternative is to harvest the urchin in Oregon and ship it to another processor, for example, in Port Angeles. Things get very tenuous, as far as economics go, because 90 percent of the urchin is waste products, so you have to pay the waste shipping costs. I think it's preferable to have a processor here. You've got plants on the Oregon coast now that are operating only partially over the entire year but which have the capital assets to operate full time. Perhaps some of these plants will undertake urchin processing.

Question: I know of a place in Hawaii where they cook the whole sea urchin over a camp fire upside down. Does that cooking procedure make the shell edible?

Answer: I don't think anybody eats the shell. Virtually everything inside the animal is gonad. There's only gonad and one percent mesenteries inside the animal. Anything inside the shell is edible.

Question: If yuppies make sushi a trendy food, do you think that will improve American attitudes to urchin roe?

Answer: I think that would go a long way towards the American acceptability of the urchin.

PRESENTATION: MAXIMIZING YOUR OPPORTUNITIES IN UNDERUTILIZED SPECIES AND BY-PRODUCTS

Larz Malony

Larz Malony is the manager of marine products at Viking International and is a member of the board of directors that oversees this series of workshops. He was very involved in putting this workshop together and has spent much time offering comments and ideas that have materialized as topics for discussion.

Viking International was first developed as an export company. We have offices in Tokyo, Portland, Amsterdam, and Switzerland. We export fresh and frozen fruits and vegetables and pulses (which are dried peas, lentils, and beans). We do restaurant consolidations into Southeast Asia for Burger King, Wendy's, Denny's, Dunkin' Donuts, A&W, and McDonalds. We also do seafoods. Over the past 15 years since Viking International has been in business, we have been asked to represent several different Northwest packers in the United States and Canada on traditional products such as French fries. We represent Lam Weston in Japan and Southeast Asia on their French fry products. Once you have developed a market for these packers, you open up markets for new products. This kind of approach expands not only for fruits and vegetables and processed food products but also for seafoods. Of course, when you're talking about underutilized species, you're talking about new types of products. Everyday, we're approached with the question "Do you think this type of new product will sell?"

The main area we need to look at is developing approaches to new types of products. I'm sure this has already been covered, but I'll offer my own viewpoint.

What we need to determine first concerning a new product made from any underutilized species or by-product is, does the new product make sense? A problem that affects all new products in the seafood realm, all over the world, is that people spend money on traditional products, such as headed and gutted salmon, black cod, and cod fillets. People are partial to products that work for them. Customers feel good about those products, and they make repeat orders. A new product is going to be coming up against these people who are going to be uninterested in hake fillets or whole frozen shad. You need to have product knowledge. Sit down and study the product; know its strength, know the things it can do, know the market segments it can plug into, and know its limits. You should approach the strengths and limits of a product. There are some things that a product will do and some things that a product won't do. On that basis, you need to be honest with your customer.

Second, study and target your market. Don't become involved in underutilized species and by-products on a spot basis. Being a trading company, we do a fair amount of things on a spot basis. We'll have a customer in Thailand interested in shark fins. We'll have a customer in

Japan interested in black cod, salmon, or squid. The order may be out of season and they're asking you to do something on a spot basis. It's not long term, because there's a limited supply, or it's out of season. However, for a new product you must target your market and create a long-term market demand.

Third, listen to your customers. Test your product's strength and its limits with your customers. Brainstorm about how that product could work in your customer's market. Give your customer room to think. Consider and develop his ideas about your product. Give him your support. If he doesn't have time to work this product right now, talk about it next week and get some new ideas about the new product in the meantime.

Fourth, get involved. If you're going to market a new product, you're really going to have to get involved. You're not going to earn a large market share overnight. You must make a commitment to that product and make it work. To develop underutilized species and new products you have to approach the market with this type of attitude, regardless of the product's success. You must have stamina and enthusiasm and you can't get discouraged. About five years ago Viking was heavily involved in surimi through our Japan office. We had a few opportunities to work on an exclusive basis with some of the producers of kamaboko and surimi-based products in Japan. We did some research on the U.S. market to forecast the market in five or ten years. I was lucky enough to do some of this marketing at the World's Fair at Knoxville, Tennessee. I had a booth there and it was interesting to hear the southern people's comments. "Is this stuff real or is it not real?"

I'd answer, "Well, it is real fish made to look like scallops, made to look and taste like crab, or made to look and taste like shrimp, so in that respect, it's real."

After a long day at the World's Fair on a hot, muggy summer day in Tennessee, you kind of feel like throwing up your hands and saying, "No, it's not real but it tastes great." We went through with that exercise and got a lot of feedback on how to change, market, and present the product.

You must make a commitment and get involved. Have a positive outlook and be convinced of the merits of your product. Don't feel bad about harping on those strengths. Be receptive to the comments of the people. Have patience and be realistic with people. If they come up and say, "What is the shelf life of this product?" you say, "Frankly, the shelf life of this product is only three months, but if we put tripolyphosphates on it, it might last a little longer." Be realistic. Don't say, "Sure, no problem, buddy. It's going to last six months in your cold storage. If you move it around from place to place, there's going to be no problem there, either." Don't say something that isn't true. People rely on you because you are the person who knows the most about the product. Be realistic: tell them the truth, and feel good about it, and that will get you a lot further than trying to fabricate things that your products won't do.

Market your product. Customers aren't going to know how to use it by somehow thinking about it. Show people how to use your product. By showing people how to use your product, you're going to discover new ways to use the product yourself. New ways to present it, new applications for it. Above all, use your basic marketing skills to get the product out in front of people. Be aggressive, but be creative. Don't force people to make a decision on products.

Are there any questions you might have regarding what I do and what a trading company might or might not do concerning a new product?

DISCUSSION

Question: Do you actually buy the product from the producer and resell it, or do you sell it on their behalf?

Larz Malony: There are many different ways that Viking works with people. For example, one way we do it is by developing a relationship with the packer whereby we are his representatives in a certain market, such as Japan with Lam Weston. We coordinate all of Lam Weston's product sales through our office. We represent them in trade shows, and we do all the marketing for them concerning the Japanese market. All the orders come in through us; all the questions and answers come through us. We know their product inside and out.

There are other ways to trade with packers who are new to us and whose product we have discerned to be of a high quality. We will take title to the product and market that product into a suitable market that we feel is worthy. Other times we are approached by packers that think their product will work in our market. They give us a certain commission to market their product over a certain period of time. That commission provides us with a commitment. You need a commitment from your packer from a trading standpoint in introducing a new product. You need a commitment from the packer to support you and establish some kind of a relationship with you.

Question: Do any of your packers "pull out" from your company and start selling their product on the Japanese market once you get it established?

Larz Malony: First, just having an office over there is an expensive proposition. An office probably costs us a little over \$200,000 a year, and it would cost any packer approximately that much per year. I think our Japan office is unique because it is staffed by Japanese who have been trained by our staff here and our packer to understand the nature of the business and what things will and won't work. We coordinate all the sales in Japan as well as all the shipping and all the new product introductions. We basically do it on a commission. We've been doing that now for a little over thirteen years. We have justified our existence to

packers. We continue to be the largest seller of French fries in the Japanese market. You definitely have to justify your position, because if you don't, many times your packer won't feel that you deserve the commission. But frankly, the commission is a pretty small amount to pay to have some group aggressively promote and deal with your product in that type of culture and make it work.

Question: How do you target a new market with a new product? How do you view a new area to know where you're going to fit in with that product?

Larz Malony: You do that by learning about your market. When I was working at the World's Fair I was also lucky enough to take down about a couple hundred pounds of salmon jerky out of Port Chattim, from near Seattle. They have a really nice minced salmon jerky. I contacted Eagle Brand Snacks about targeting a snack market for this minced salmon jerky. It was a wonderful product, and being from the West myself I thought it was tremendous. I sent the minced salmon jerky out to them and actually worked with them on it for about a year. But actually the market they targeted wasn't familiar with smoked fish and it was going to take some time. In that instance, we had a great idea but the target market was not ready for it. It was going to take a long time to develop it. When you're targeting a market, you've got to know as much as possible about it. Sometimes the only way to find out and know about a market is by experience. You must also have stamina and a positive attitude to go out and make an idea work.

Question: An earlier speaker said that some of the things you're doing overseas are really related to currency problems. Do you have the position now to move your products against the strong dollar by moving through several different currencies?

Larz Malony: Yes, we found that to be true. I don't know how long that is going to last. We want to take advantage of those situations as long as we don't need to compromise on what we're doing with our other packers. Because the French franc is so poor right now, my packer and I would lose money on fish products, whereas we used to do well on trading scallops in the French market. When we can take advantage of different currencies, we do. It's a very risky situation, and you've got to project how that currency is going to change in value. Currencies change so quickly right now and there's so much talk about trying to regulate those currencies that it's a really risky situation. We walk away from many deals because of that.