
Quality Assurance

QUALITY ASSURANCE PROGRAMS FOR PACIFIC WHITING

Gilbert Sylvia

Coastal Oregon Marine Experiment Station

Lisa Gaines

Department of Agriculture and Resource Economics, Oregon State University

INTRODUCTION

Improving and controlling product quality is possibly the greatest single challenge confronting the **Pacific** whiting (*Merluccius productus*) industry. The offshore stock of Pacific whiting is **characterized** by a complex set of product quality problems, including a relatively **soft** and delicate flesh, a high fat content, an **off-white** color, and varying levels of myxosporidea parasites and **protease enzymes** that degraded protein. These problems can result in a marketed product which is bruised, mushy, and rancid-and a product that can literally melt away during the cooking process.

Making decisions to control these problems is complicated by many factors. First, there is wide variation in the "**intrinsic**"¹ product characteristics of Pacific whiting, including variation in the level of **protease enzymes** and myxosporidea parasites. Although the dynamics of these characteristics are not well understood, they appear related to variation in biological, geographical, and environmental conditions? Second, the strategies used to address these problems will depend on the choice of product forms and market strategies. For products that undergo minimal processing and that are targeted for relatively "low-value" markets (for example, the retail domestic frozen headed and gutted [**H&G**] market) there may be less concern about product quality beyond reaching some minimum level of wholesomeness and product workmanship. For moderately processed products such as individual fillets and fillet blocks, there is greater concern about product quality, not only because market price for fillets is more dependent on the level of

product characteristics, but because there is a significantly greater degree of product handling, which increases quality control problems (for example, more exposure of surface areas and disruption of cellular walls). For more highly homogenized processed products, such as frozen minced blocks and surimi, **quality** is also important, but to some extent can be controlled by the addition of various additives to the minced product that can inhibit the **protease enzymes** or reduce rancidity and increase shelf life.

Research by seafood technologists has demonstrated that the most important way to reduce the product quality problems of Pacific whiting products is to control time, temperature, and pressure parameters during **all stages** in the production, distribution, and food preparation processes (Nelson et al. 1985). Individual **firms** or **industry** sectors which fail to adequately control these quality parameters can not only reduce their own benefits (in the form of lower prices, fewer sales, and poorer product reputation), but also the benefits of other whiting industry firms. Therefore, the activities of all industry sectors, from fishermen to consumers, need to be examined for the role they play in assuring some minimal level of predictable and acceptable product quality. The key issue for individual **firms** is deciding on the appropriate mechanisms to coordinate the activities of producers, processors, distributors, and government agencies in order to control product quality and **maximize** industry benefits and market opportunities.

The following paper concerns the marketing management concept known as "quality assurance" and its potential application for controlling the quality of Pacific whiting. In the first section of the paper, we discuss the concept of quality assurance and its use in production and marketing management. In the next section, we review issues that would be important in developing quality assurance programs for **Pacific** whiting. In the third and final section, we discuss specific strategies that individual

¹**Intrinsic** refers to the preharvest characteristics of the product. See Love (1988) for a detailed examination of intrinsic variation in seafood.

²For a review of problems affecting the **Pacific** whiting fishery, including variation in product characteristics, see the special issue of Marine *Fisheries Review* 1985:47(2), devoted entirely to issues in the Pacific whiting fishery.

sectors of the industry could adopt as part of a comprehensive quality assurance program.

QUALITY ASSURANCE, NOT QUALITY CONTROL

The U.S. seafood industry continues to be plagued by recurring concerns related to seafood safety and the need for development of mandatory seafood inspection programs. Currently, the Food and Drug Administration (FDA) has taken the lead in developing and testing a prototype quality control program using the concept known as **Hazard Analysis Critical Control Points (HACCP)**.³ This program is designed to ensure an adequate level of seafood safety by setting safety standards and randomly inspecting "critical points" along the production and distribution chain where health-related problems have the highest probability of occurring. A major focus of the program is controlling microbiological contamination of seafood.

Most quality issues for Pacific whiting, however, are not related to seafood safety, but rather are related to sensory characteristics such as taste, texture, and appearance, that is, factors which affect consumer enjoyment and market demand. Intrinsic product quality characteristics such as proximal composition (for example, moisture, lipids, and protein), **protease** levels, and myxosporidea parasites can directly and indirectly affect sensory characteristics, **shelf life**, and the ability of the product to withstand the rigors of seafood processing.

While a **HACCP** type of program could be expanded to control product quality beyond microbiological contamination, there are many types of programs that could be applied toward "managing" Pacific whiting quality. Although most of these programs have been developed by scientists and engineers in Europe and North America, they have been most comprehensively implemented by the Japanese for improving product quality of a wide range of consumer and industry products. These programs are represented by an array of acronyms, including **SQC** (Statistical Quality Control), **TQM** (**Total Quality Management**), **QFD**

(Quality Function Deployment), **CIP** (**Continuous Improvement Process**), and **CB** (**Competitive Benchmarking**).⁴ Regardless of their criteria or disciplinary focus (for example, engineering versus market versus management orientation), all of these techniques are based on statistically verifiable standards designed to reduce and control variation in final product quality.

Applying quality control concepts for seafoods in general, and Pacific whiting in particular, may be a more **difficult** problem than applying them to other food products. This is because, with the exception of aquacultural products, seafoods are "manufactured" from wild organisms that display a wide range of both "good" and "bad" intrinsic product characteristics. In addition, seafood tissue and muscle fibers are relatively more delicate than those in "terrestrial" animal products; "good" quality characteristics that enhance sensory enjoyment can be easily lost during the production, processing, and distribution process. The effects of "bad" product characteristics (such as **protease** enzymes), however, must be **minimized** or eliminated entirely. Control over quality characteristics, therefore, cannot be isolated at any one location or at any one time; rather it must be exercised at all "critical" points from ocean to plate. Comprehensive quality control programs designed to ensure quality seafood products at the point of consumption are known as "quality assurance seafood programs" (Gorga and Ronsivalli 1988).

The main objectives of quality assurance programs are sometimes perceived as intended to meet minimum government standards for hygiene and health. In other cases they may be perceived as designed to provide products that improve consumer satisfaction and confidence. Truly effective quality assurance programs, however, are designed with another goal—that of improving long-term benefits to the seafood industry in the form of higher profits, revenues, or greater shares in animal protein and seafood markets. **Effective** programs are not designed in isolation by food technologists but as part of an integrated system that includes production managers and marketing specialists.

Designing the most effective quality assurance program requires a careful analysis of the

³See Lee and Hilderbrand (1992) for a discussion of HACCP programs and application to Pacific Northwest fisheries.

⁴A description of these programs is beyond the scope of this work; however, see the October 15, 1991 issue of *Business Week* magazine for a concise review of quality control methods, especially the overview article by Port and Carey.

potential long-run costs and benefits of alternative programs. It requires vertically related industry sectors to estimate how such programs would affect production and processing costs and the demand for quality-assured products. It requires marketing specialists to determine how quality assurance programs could be effectively used in advertising aimed at improving consumer demand and consumer confidence. It requires an accurate estimation of the cost effectiveness of alternative warranty programs that would guarantee product quality.

Quality assurance also involves risk management. The variation in product quality characteristics must be unambiguously articulated, since unknown risks can lead to distrust and skepticism, especially to downstream users (for example, institutions, retailers, and final consumers). Therefore, a quality assurance program must use appropriate analytical tools, be statistically sound, and be able to clearly communicate its findings (Martin 1988). Strategic communication about risks which are equal to, or smaller than, risks associated with competitive products can help improve sales and expand market opportunities.

Developing a quality assurance program that is in the best interests of the industry, however, does not necessarily imply one grand industry or government scheme. Rather, it requires that each firm in the production and distribution process understand the long-run relationship between product quality and market price and then use this information to develop contractual arrangements, warranties, and price incentives consistent with controlling product quality and improving industry benefits.

FACTORS AFFECTING QUALITY ASSURANCE PROGRAMS FOR PACIFIC WHITING

Three important considerations that can affect the design and effectiveness of a quality assurance program are the name, label, and logo selected to represent the product.

Merluccius productus is harvested from only one geographic region in the world (that is, the Pacific Northwest). For most product forms, *Merluccius productus* is marketed under its legal common name, **Pacific whiting**. Before 1980 the product was marketed under its common name, **Pacific hake**, but the name was legally changed in order to overcome the product's poor reputation in domestic mar-

kets." Note, however, that this name change was not accompanied by improvements in product quality, and the market reputation which had characterized **Pacific hake** now characterizes Pacific whiting.

The other term in the name for Pacific whiting, that is, **Pacific**, refers to the geographical location. Labelling by geographical location or national origin is a feature of most of the **hake**/whittings that compete with **Pacific** whiting for market share, for example, Argentine hake (*Merluccius hubbsi*), Chilean hake (*Merluccius gayi*), and Peruvian hake (*Merluccius gayi peranus*). However, it should be noted that not all of the products processed from Pacific whiting are sold using the common name. For example, **H&G Pacific** whiting is sold retail under many brand names, usually with one or two brands representing each west coast **H&G** processor! Most products, however, especially at the wholesale level, will be associated with the common name, **Pacific whiting**. Using geographical identification as part of the name or label may be advantageous, especially if the regional name connotes some positive characteristic; however, regional identification also has disadvantages. Firms that do not adhere to quality standards not only reduce their own product quality and market opportunities, but also the opportunities of other regional firms targeting or processing the species. For Pacific whiting the name is especially problematic since the identity is already associated with poor product quality.

Individual firms planning to improve and control Pacific whiting quality must consider the potential costs and benefits of firm level and industry-wide strategies. For example, could individual firms which fail to improve product quality limit the potential rewards to firms which make major efforts to control product quality? Should new labels and logos be developed for firms which voluntarily agree to meet certain quality standards? Can a given state or region successfully market Pacific whiting products using its own regional identification? All of these questions need to be addressed before individual firms can decide on

⁵All hakes (*Merluccius* spp.) are known as whiting in the United States but retain the common name **hake** in all other national and international markets.

⁶The potential advantages of multiple brands may be offset by certain disadvantages. See Sylvia and Peters (1991) for a complete discussion.

the type of product quality assurance programs to develop.

Another important issue for developing quality assurance standards for Pacific whiting is related to market destination. Many of the intermediate and final products processed from Pacific whiting (including fillet blocks, minced blocks, individual **fillets**, breaded **fillets**, surimi, surimi-based seafoods, and meal) will be sold and distributed in global markets. As an example, a portion of the Pacific whiting which had been delivered to Polish mother ships during the **joint-venture** era of the fishery were processed **into** frozen blocks, shipped to plants in northern Germany for secondary processing into value-added products (for example, breaded portions), and then sold retail in northern and southern Europe.

The increase in trade of hake/whiting products also coincides with the establishment of economic trade zones. Examples include the consolidation of the European Economic Community (the world's largest market for **hake/whiting** products), the North America Free Trade Agreement, and the proposed consolidation of Argentina, Brazil, Paraguay, and Uruguay into a single economic community. As these agreements become finalized, economic communities will put into effect international product quality standards developed to protect the welfare of regional consumers and reduce the cost of business transactions (and in some cases protect regional industries from outside competition). Quality assurance programs will need to be designed in a manner consistent with these evolving international standards. This does not imply, however, that all quality characteristics for all product forms must be uniform. Rather, it suggests that quality assurance programs will improve market and trade opportunities if they are compatible with these standards.

STRATEGIES FOR PACIFIC WHITING QUALITY ASSURANCE PROGRAMS

Given the product quality and market issues summarized above, the following strategies could be developed as part of a comprehensive quality assurance program for **Pacific** whiting.

(1) **The** National Marine Fisheries Service should evaluate how its regulatory strategies **affect** the variation in product quality characteristics of **Pacific** whiting. Research by seafood technologists and fisheries biologists has demonstrated that characteristics such as product

size and rates of parasitic infestation may vary seasonally, annually, and by geographic location (Dom 1990, Zabata and Whitaker 1985). Regulating where, when, and how the fish are captured can influence the spatial and temporal distribution of these quality characteristics. Even more important, **the** strategies used to control the fishery, and the industry risks associated with policy uncertainties, can constrain the level of investment necessary to profitably control product quality and improve marketing opportunities. These management strategies should be **carefully evaluated** to determine how they affect national, regional, and industry benefits.

(2) Fishermen should be encouraged to capture and handle **Pacific** whiting using methods which optimally control product quality problems. For example, fishermen may need to adjust the design of trawl nets and cod ends and reduce the duration of tows in order to minimize problems related to the relatively soft flesh of Pacific whiting and the presence of protease enzymes. Fishermen may also need to design on-board handling and cooling systems that ensure product quality and which meet national and international standards for hygiene and sanitation.

(3) Hake processors must develop control measures to ensure that the product that enters and exits their plant has a relatively high level of quality. This means developing contractual arrangements that reward fishermen who land quality product. It also means developing methods to off-load, process, inspect, package, and inventory products in a manner that ensures relatively high quality. Methods must be developed to minimize bruising of the **soft** flesh of Pacific whiting, detect parasites, and maintain near freezing temperatures until the product is frozen. Freezing units must be efficient and capable of lowering product temperatures at optimal rates. Processors must develop statistically verifiable performance standards consistent with assuring product quality while cost effectively **minimizing** variation in quality characteristics.

(4) **As a** minimum but necessary requirement, processors must develop production practices that conform to national and **international** standards ensuring product safety and wholesomeness. In the United States these standards will need to be consistent with the regulations being developed by the **FDA**. In Europe they will need to conform **to** the **FAO's** CODEX standards and the standards being developed by the Council of European **Communi-**

ties (1991). However, these guidelines and regulations provide only minimum standards designed to ensure that seafood products are safe and wholesome when they enter domestic or international markets. They do not ensure that the product will have maintained some minimum level of quality by the time it reaches the consumer. Providing this level of quality is a responsibility shared by the entire industry, from fisherman to retailer. It requires the development of product quality standards at every point of distribution and a concern by every firm and public agency that the product have a high level of quality when it is consumed.'

(5) Primary and secondary processors, distributors, and wholesalers must not only develop their own quality assurance programs, but must provide **information** to instruct institutional, food service, or retail sector buyers in properly storing, displaying, or preparing Pacific whiting in a manner which ensures quality products for consumers. In most cases this means minimizing product quality problems related to rancidity or softening of the flesh. Ensuring adequate **shelf life** to final users and consumers is especially important, given the shelf life problems of Pacific whiting compared to other ground&h products! In addition, retailers must provide adequate information to consumers on proper storage and food preparation and cooking techniques. All industry groups should work cooperatively to provide objective information regarding quality issues of **Pacific** whiting. Information about quality assurance programs and product warranties should be used to bolster the confidence of final users and to improve market opportunities.

CONCLUSION

Given the intrinsic characteristics of Pacific whiting and their potential for **affecting** product quality during all phases of production, distribution, and food preparation, quality assurance programs could be of significant value for controlling product quality and improving mar-

Note that Iceland is now proposing to sponsor courses in Total Quality Management (TQM) for integrating the northern European **fishing** industry into a "modern technological society" and to meet and exceed evolving EEC seafood standards (UETP-INTERCOM 1992).

*As one example, the state of Maine has instituted its own seafood quality assurance program for **groundfish** which incorporates expiration dates for all fresh **groundfish** products (Robert Beaudoin, personal communication).

ket opportunities. However, while there may be significant benefits to developing quality assurance programs, there may also be **significant** costs. Individual firms must develop specific strategies and determine the level of responsibility that will be addressed at the firm level and the industry level. For example, will it be in the industry's interests to develop general guidelines or enforceable but voluntary standards? How should the industry handle product quality issues given the diversity of product forms which are processed from Pacific whiting? Do new labels and logos need to be developed? What kind of fisheries regulatory structure is most compatible with assuring product quality?

Addressing these issues is a **difficult** but necessary task. Programs developed for controlling product quality of **Pacific** whiting, however, could provide new insights and opportunities for other fisheries. The industry should look at assuring the quality of Pacific whiting as not only a worthy challenge, but, if their efforts are successful, a model for developing programs for other Pacific Northwest seafoods.

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HAZARD ANALYSIS AND CRITICAL CONTROL POINTS FOR ARGENTINE HAKE (*MERLUCCIVUS HUBBSI*) PROCESSING PLANTS

Enrique Bertullo

Institute of Fisheries Research, University of Uruguay

QUALITY ASSURANCE FOR SEAFOODS

For a number of reasons, it has not been easy to supply seafood products that are of adequate safety and consistent quality. (1) Too often, we rely only on end-product sampling and inspection. (2) Regulations are sometimes confusing or contradictory. (3) We often fail to link existing basic knowledge with sound operational measures at the production level. In addition, producers face the economic and managerial dilemma of trying to offer quality products in an increasingly competitive market at moderate cost. During the last few years, however, interest in seafood quality assurance has expanded into many new areas—the industry itself, government agencies, and consumers. As a result of this growing interest, it is time to redefine our directions and modify procedures in the industry.

The fish industry in many countries (for example, the European Community [EC], Japan, Mexico, and Uruguay) has initiated a new policy aimed at producing quality fish products by following quality assurance concepts. This innovation will affect the export of fish in developing countries and will regulate the fish imports of developed countries. Certainly, the wholesale and retail seafood market of every country will benefit

Quality assurance is not another inspection system; rather, it is a way of producing quality products, and it allows the industry to offer better and safer products while simultaneously improving the economy. Quality assurance is a preventive function that involves planning, organizing, and controlling operations to ensure that seafood products consistently meet requirements. It is an integral part of every management function. The implementation of quality assurance requires that producers establish systematic procedures for all activities necessary to guarantee the quality of raw fish and shellfish, in-process material, ingredients, additives, and finished seafood products. It also requires that harvesting, on-board handling, processing, grading, packaging, labelling, stor-

age, transport, and marketing comply with governmental regulatory requirements and industry and customer specifications. For the U.S. National Marine Fisheries Service (NMFS 1990), quality control is the establishment and maintenance of an optimum process and product through systematic and coordinated efforts, and quality assurance is the sum of all those activities in which one engages to ensure that the information and data generated are correct and reliable.

HAZARD ANALYSIS AND CRITICAL CONTROL POINTS

Hazard analysis and critical control points (HACCP) is a specific, nontraditional, inspectional approach to controlling biological, chemical, microbiological, physical, and economic hazards in seafood (NMFS 1990). In 1977, J. Lee was the first to publish an account of how the technique could be employed for fishery products to decrease risk to consumers (Lee and Hilderbrand 1992).

Lee formulated an operational flow chart that listed each step of processing for a specific seafood commodity. To do this, he had to define the degree of hazard associated with a specific seafood product and with the intended use of the product. Designing an operational flow chart comprising each step of a seafood manufacturing process involves defining the hazards associated with each step and assessing their relative importance. It is necessary to identify the critical control point of the process and determine which preventive measures can be used to reduce the hazard to acceptable levels. It is also essential to monitor the procedures, either by observation or measurement, to determine when a hazard is under control. Careful records of the monitoring must be kept.

HACCP FOR HAKE AND MARKETING OPPORTUNITIES

Hake is processed in different locations. Industries involved in exporting frozen hake to

URUGUAYAN **H**AKE INDUSTRY

TRAWLING FLEET—HACCP ON BOARD

FLOW SHEET	HAZARD	CONTROL
LIVE FISH	POLLUTION (1)	CCP 2: ENVIRONMENT MONITORING
CATCH	MECHANICAL DAMAGE (2)	CCP 1: TRAWLING TIME
HANDLING ON BOARD		
• SEAWATER WASHING		
• SPECIES SORTING	DAMAGED FISH (2)	CCP 1: REJECTION
• ICING AND CHILLING	FISH SPOILAGE (3)	CCP 2: TIME/TEMP.
• TRANSPORT TO LAND		
LANDING ON DECK	FISH SPOILAGE (3)	CCP 1: TIME/TEMP.

HACCP IN FREEZING FACTORY

FACTORY ARRIVAL	FISH SPOILAGE (3) FISH:ICE RATIO (4) FISH BOXES LAID (2)	CCP 1: TIME/TEMP.
RAW FISH CHILLING STORE	FISH SPOILAGE	CCP 1: TIME/TEMP.
PLANT WATER SUPPLY	CONTAMINATION	CCP 1: CHLORINE LEVEL CONTROL
PLANT FISH SORTING	DAMAGED FISH (2)	CCP 1: REJECTION
FISH PROCESSING	BACTERIAL GROWTH/ CONTAMINATION	CCP 1: TIME/TEMP. CCP 1: PLANT/EQUIPMENT HYGIENE
	QUALITY HAZARDS (5)	CCP 1: VISUAL INSPECT.
PRODUCT PREPACKING	BACTERIAL/GROWTH CONTAMINATION	CCP 1: TIME/TEMP. CCP 1: PACKING MATERIAL CONTROL
FREEZING	MINOR POSSIBLE BACTERIAL GROWTH	CCP 1: TIME/TEMP.
FINAL PACKING	MINOR POSSIBLE PACKING MATERIAL CONTAMINATION	CCP 2: VISUAL INSPECT CCP 1: LABORATORY CONTROL
COLD STORAGE	POSSIBLE QUALITY PRODUCT INJURY (5)	CCP 1: TIME/TEMP. CCP 1: VISUAL INSPECT CCP 1: LABORATORY CONTROL
OCEAN VESSEL LOAD	PACKING/PRODUCT MECHANICAL DAMAGE	CCP 1: VISUAL INSPECT
	POSSIBLE QUALITY PRODUCT INJURY (5)	CCP 1: TIME TEMP.

- (1) Government responsibility
- (2) Fresh hake mechanical damage
- (3) **Fish quality: spoilage bacteria/autolysis**
- (4) Temperature
- (5) Dehydration, rancidity
- (6) Quality losses

CCP 1: Complete control of hazard
CCP 2: Complete control of hazard not possible

developed countries need to implement HACCP criteria to achieve a final product of high quality, to ensure its fitness for human consumption, and to reassure consumers. The European countries (EC, Iceland, Finland, Norway, and Sweden) have adopted the ISO (International Organization for Standardization) standards on quality management and quality assurance for the fish industry. Starting January 1, 1993, the EC official veterinary inspection will consist mainly of identifying critical points in the fishery plants of Third World countries on the bases of record keeping and of the processes used for manufacturing, monitoring, and sampling (in an approved laboratory). The U.S. Food and Drug Administration has proposed, with NMFS, a voluntary HACCP program that will be mandatory for imports from Third World countries starting January 1, 1995.

In Uruguay the HACCP program for the frozen Argentine hake (*Merluccius hubbsi*) export industry will be mandatory to ensure that hake processing plants meet with international sanitary and quality requirements. Compliance will be monitored by the National Fisheries Institute of Uruguay Ministry of Agriculture and Fisheries). In 1991 private industry in Uruguay exported more than U.S. \$60 million and 45,000 metric tons of frozen hake products (fishblocks, fillets, breaded, loins, and headed and gutted) to developed countries. Adhering to the HACCP program will improve marketing opportunities and prices for the producer. Regulatory agencies in the importing countries will spend less money on regulatory activities at ports of entry, and consumers will purchase the quality-controlled seafood products with more confidence.

The table on the opposite page shows the HACCP program for frozen hake plants in Uruguay.

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Discussion

Q: What refrigeration system is used for South Atlantic hake by Uruguayan fishermen?

A: (Bertullo) Ice and the plastic boxes pictured on the slides shown are the only system currently used; we have not yet invested in RSW systems.

Q: Is South Atlantic hake the same as Pacific whiting?

A: (Bertullo) Although related to Pacific whiting, our hake has firmer flesh and fewer parasites.

EUROPEAN QUALITY REQUIREMENTS FOR HAKE

Joachim Werner

Werner Consult S.R.L., Assistance Fishing Argentina

Some years ago we had different quality requirements in the European Community (EC), the Iberian Peninsula, and the Eastern European Countries. Now, with the integration of the Iberian countries into the EC and the dissolution of the Warsaw Pact, the influence of the EC is overwhelming. I think that the EC will establish its own standards for quality and that countries in a good economic position will adopt the EC system, or buy "European Standard," while poorer countries will have to buy substandard products or products from plants not approved by the EC. Consumption habits in Europe vary.

In the EC we principally find two different ethnic and religious groups: the northern part (Great Britain, Denmark, Germany, and The Netherlands), which is Germanic and mostly Protestant, and the southern part (France, Italy, Spain, and Portugal), which is predominantly Romanic and Catholic. Not only are race and religion important (for example, the Catholics eat by far more fish in Easter season than do Protestants). There are countries which have a sentimental relationship with the sea, like Spain and Portugal. In the Iberian Peninsula you can find a great variety of fish in the market and the highest consumption per capita (Spain 35 kg) in Europe. Homemakers in Spain still have more time to prepare sophisticated dishes, the family generally eats together in the evening (because of the climate), and the percentage of working women is lower than in the northern EC countries. Furthermore, Spain has more tourists per year than any other European country, even more than it has inhabitants. Many tourists return to the north asking for some exotic fish products like cuttlefish, squid rings, or even whiting.

In Spain whiting (hake) is the most important fish, the species to which the Spaniards compare all other white fish. Spain is the most interesting in its use of hake. It is the only country where the consumer enters a fish restaurant asking for whiting. Besides the normal fillet, the Spanish consumer looks especially for big size

H&G (headed and gutted). That's why South American producers separate the big pieces to gut and bleed thoroughly on board even if they bring all the rest of the catch to port ungutted. It is very important to gut the fish to impede the passage of the nematodes into the edible part of the fish.

In the South Atlantic nearly all big fishes have nematodes (of the Anisakis type) in the abdominal cavity, especially near the liver and the stomach. The presence in the muscle is very rare if you gut it on board. If you do not do this, the parasites attack first the belly flap. Very often these big fish are female. **This** allows you to separate the roe. In the case of hand filleting the whiting, you should cut the fish first on the upper part and then cut with care the lower part to harvest the roe. Each sack should weigh at least 1 1/2 or 2 oz to obtain a good price. The normal packing is **IWP** in 2-kg packages, and on a lower price level there is a market for broken sacks in blocks.

In Spain they defrost this product, put it in salt for some hours to dewater it, and then cold-smoke it (27-29°C). The resulting product is cut in slices and eaten like a snack. Spain is the only country that buys cocochas, which is the part underneath the jaw. The cheek is appreciated as the tastiest part of the fish. Because the H&G and the fillets have to compete in the fresh fish market, the merchandise should not have any odor and should be as white as possible.

In other European countries the best-known fish is cod, and the consumer compares everything with this species. In the northern part of Europe the percentage of working women is higher than in the south, reaching 50% in some countries. Here you can find the same situation as in the United States, which means that the housewife prefers convenience foods because she does not want to use her precious time to clean and scale fish. Because of pressure from trade unions, the shops usually close at 6 or 6.30 in the **afternoon**. **Thus**, buyers have only one or two hours to make their purchases. That is why the quality-minded cook chooses well-known brands.

Big companies usually establish their own quality level, trying to be better than their competitors. It is natural that in this system small companies can hardly survive, even when they have regional importance. Very often you can find blind loyalty to quality-approved brands. I would compare it to the confidence we placed in our mothers as they prepared the family's food in older times.

Nevertheless, the behavior of consumers is amazing; sometimes they even react hysterically to information about risks in their food. The majority have the opinion that fish is a healthy food, even when it doesn't have the same nutritional value as meat and even though, because of the pinbones, it could be dangerous, especially for children. In coastal areas the appreciation for fish is higher than in areas farther away from the coast. Approximately 15% of the consumers in Europe have an aversion to fish, fearing not only the pinbones but also the contamination with mercury, lead, cadmium, DDT, and so on.

Intellectual consumers in particular are very conscious of environmental contamination; they deduce that in contaminated water the fish will be contaminated, too. When in November 1980 an Italian laboratory found tetracycline in fish sticks, a district attorney prohibited the sale of all fish sticks and portions in Italy. This information spread all over Europe. Even when, some days later, this information was rectified, consumption decreased for several weeks, and even now you can find the original (false) information printed in books. In December 1983, a Dutch company imported from South East Asia cooked shrimp contaminated with *Shigella*. The shrimp caused 14 casualties. For years European consumers resisted buying shrimp from this area.

In the summer of 1987, German state-owned TV broadcast a film showing fish fillets infested by living worms (nematodes of type *Anisakis* and *Pseudoterranova*); the reaction of the consumer was tremendous. During the weeks that followed, fresh fish was nearly unsalable, and the government even had to save fish companies from bankruptcy. We are not used to closeups of small animals or insects (fleas, flies, mosquitos), but to see living animals in our food is really disgusting to us.

To kill the nematodes, you should use heat, salt, or acid or deep-freeze the merchandise for at least 24 hours at -18°C. In Western Europe it is not customary to eat raw fish, but anyway the parasites can survive cold-smoking (less than 30°C). They can also survive in mildly salted herring (*matjes*).

Even when there are only 10 to 20 cases of *Anisakis* infection per year in Western Europe (causing epigastric pains and vomiting), it seems that frequency of *Anisakis* infections is increasing, probably because of the protection of marine mammals. In Japan every year there are several hundred cases caused from eating raw fish. In the 1987 German case, German health authorities reacted quickly by publishing a regulation mandating how producers should handle the fish. The producers promised to remove all visible nematodes using candling tables (effective for the greater and colorful *Terranova*) and to remove the belly flap, where the majority of *Anisakis* can be found. The removal of the belly flap represents a loss of yield of 12-15% and even if your fillet is guaranteed parasite free and you deep-freeze it for one month (the time it takes for transport from the U.S. to Western Europe), you are practically obliged to remove the belly flap of interleaved fillets because the consumer is used to seeing the fresh fillet without it.

DISEASES

There are several disease agents associated with seafood:

- a) bacteria, for example, *Vibrio parahaemolyticus* (and nowadays even *V. cholerae*), *Clostridium botulinum*, and *Listeria monocytogenes*
- b) virus, especially Hepatitis A, causing diseases
- c) toxic agents (like paralytic, amnesic, and diarrhetic shellfish poisoning)
- d) parasites, such as nematodes (*Anisakis* [whaleworm] and *Pseudoterranova* [seal worm]); trematodes (usually easily removable because you can see them outside the fish); and myxosporidium (*Kudua*)

CHOLERA

Since the outbreak of cholera two years ago in Peru, more than 70,000 persons have fallen ill (50,000 of them in Peru), and more than 5,000 persons have died. To protect German consumers, the German government prohibited the import of fish and crustaceans from Peru (and later on from Columbia and Ecuador, too). The import is allowed only when the National Authority (in the case of Peru, CERPER) certifies that the production plant is under constant control and that the shipped merchandise is free of *Vibrio cholerae*. This year, responsible German importers have

started asking for a cholerae-free certificate issued by the Argentine authorities even though Argentina isn't under this obligation by law.

We know that cholera **bacteriae** are very sensitive to chlorine. That's why in the fish processing plant higher dosages should be used in your wash water (**10-15 ppm**), even though it may accelerate rancidity and shorten the shelf life of the product.

ESTABLISHING QUALITY STANDARDS

You can see that there are several aspects to establishing quality standards:

1. public health aspect-protection of the consumer through inspection and control of fish products by food inspection authorities
2. the way fish are presented to the public
3. the competition among food companies, who offer guaranteed quality to gain a bigger share of the market

We know that the acceptability of fish is clearly related to price. Products can be replaced only by offering a better quality or a lower price.

Fish compete directly with red meat and pork, poultry and eggs, all products subsidized by the EC. That means that you can't raise fish prices while the prices of competing products are stable. Last year, at least until October, prices went up steadily, and when the producers of fish products tried to pass the increased prices on to the consumer, they noticed a strong resistance. The result was actually a decrease in business, for example, in Germany a decrease of around 20%. Some companies re-read their purchase conditions in order to pass claims back to the fish block producers, trying to bring down their high-value stocks **after** the prices went down again.

A good tool with which to pass claims is the condition of low plate counts, difficult to comply with in merchandise frozen on land. **The** easiest way to avoid those claims is to raise the chlorine level in the wash water with the consequence that the product, because of fat oxidation, has a shorter shelf life. **If** the quality department of a processing plant aims to find failures in order to reduce the price retroactively, it will **find** some **pinbones** or bloodspots it would not otherwise have mentioned.

In January 1993 the whole EC will function as a national market. there won't be controls at the national borders. Until now the national fish inspectors issued a certificate confirming

that the merchandise was produced under hygienic conditions. From 1993 on, every plant or factory ship that is in condition to produce good merchandise will get an official number and will be obligated to supervise production (this translates to self-monitoring by the fish industry). All products must have an official number to identify it in case of claims. The intention is to install an EC procedure for food inspection in Third World countries in the same way as it is planned for the EC, where competent authorities (that is, the central authorities of the member states) will carry out checks and inspections to ensure that the producers comply with the regulations. Each establishment must have responsible persons who carry out their own checks, especially at critical points, taking samples and keeping a written record.

Inside the EC, each member state will notify the commission of its list of approved establishments, and the commission will assign an official number. Commission experts-in cooperation with the national authorities-may **make-on-the-spot** checks to ensure the uniform application of this directive.

For imports from **Third** World countries, the directive foresees inspections carried out by commission experts to verify the conditions under which fishery products have been produced and stored.

Article 10 of the Council Directive **91/493** states that the provisions applied to imports of fishery products from Third World countries shall be at least equivalent to those of community products. This means that the EC urges the **Thdr** World countries to apply the same control system as the EC, **to** me a very reasonable viewpoint.

I'd like to explain a little the above mentioned directive. In chapter V (Health Control and Monitoring of Production Conditions) we find the following under special checks: **organoleptic** checks, carried out by the competent authority at the time of landing and after the first sale of fishery products. The **organoleptic** assessment of fish is the oldest quality control. Most quality control methods use the organoleptic control as a basis for verifying results. On the other hand, although each consumer has his or her own taste, when **qualified** persons give their opinion they represent thousands or even millions of consumers. This taste panel decides what the consumer has to like! We know that taste varies from region to region. For example, a German can't understand why a Spaniard prefers to eat hake, a fish he finds soft and insipid. It is true that hake is

highly perishable and fishing trips are **some-**times too long to guarantee a good product. On the other hand, codfish, which Germans like, has a far firmer texture, thanks to the high density of cell walls, which stop the bacterial spoilage for a while. Even for experienced **per-**sons it is very **difficult** to judge the total **qual-**ity of fish (in this case hake), especially **if it** refers to a defrosted fillet. Fresh fillets are easier to classify by a trained taste panel, but the **pro-**cess is quite expensive and there are always some members indisposed.

For fresh fillets-and, if you know the **his-**tory of the merchandise, for frozen fillets too **it is quite inexpensive to determine freshness** (as laid down in the directive) by measuring the quantity of total volatile basic nitrogen. With this test it is easier to find out "missing freshness" than different levels of freshness. If you have to judge hake fillets, you can hardly find sensorial **difference** under **21/22 mg %** TVB-N.

I **define** merchandise under 25 mg % as good and merchandise up to 30 mg % as acceptable. Even untrained consumers are able to detect off-odors in fillets with higher **TVB-N** levels than 30 mg %. With more than 50 mg %, the fillet is spoiled and smells like a stinky onion. But by measuring the total bases you can cover only one aspect of the quality.

The first impression, which means not only the color but also the total appearance, including the texture, is very important. It can **hap-**pen that the fillet is very **soft** and has gaping problems, but nevertheless is fresh and tasty. This is the case with big fillets (possibly after spawning) caught in summer in relatively warm water. On the other hand you can find firm fillets with an undefinable, "fatty" **off-**odor, even with low TVB-N levels, when the **alimen&ion** of hake consists mainly of **an-**chovy. In this case it is necessary to trim the fillet excessively and wash it much more than normal. Contrary to the principle "**first in first** out," fish like this should be used in the **pro-**cessing plant because it will develop a rancid flavor easily. Obviously, there are a lot of complementary data that **define** quality **be-**sides the official regulation or even besides the quality specification of the buyer (in this case the processing plant).

Referring to microbiological analyses, the commission will propose its measures by **Octo-**ber 1, 1992. Usually the national inspections apply a limit for plate count of **500,000/g** for good merchandise, admitting up to 1 million/g. Nevertheless many companies have their own

limits, not only for plate count but also for **col-**iforms, *E. coli*, and staphylococci. It is normal for the producer of fish blocks or **shatterpack** blocks to try to build up a special relationship with a group of buyers, offering a high-quality product able to satisfy the requirements of **ev-**ery potential buyer in this group. On the other hand, eccentric buyers should pay for their special wishes.

Normal requirements without any tolerance for hake blocks (16.5 **lbs**) are as follows:

1. weight at least 16.5 lbs (7.484 **kg**)
2. not more than 1 mm deviation of the **mea-**surements (482 x 254 x 63 **mm**), **absolutely** square edges and comers
3. not more than one **pinbone** or bone (like spinal chip) per kg
4. not more than one ice or air pocket per block
5. no packaging material imbedded in the block
6. TVB-N under 25 mg %
7. **absolutely** no rancidity, bitterness, staleness, off-flavors, or off-odors
8. no chemical ingredients, such as sodium polyphosphates

There is some tolerance in the matter of blood spots, bruised fillets, black membrane, skin, scales, water content, drip, and salt content.

I have some further suggestions:

1. No metal clip should be used to close the master carton.
2. The label should be big enough to identify the merchandise, even at a distance of 6-8 m (that means 5 or 6 pallets high). For this purpose the label should be on the side of the carton and not on the top, showing a combination of easily understandable letters or numbers.
3. Bed labels should be used for **pinbones** in merchandise and green labels for boneless fillets, symbolizing that these **fillets** can be eaten without any danger.
4. If you sell fish blocks, insist on two or three blocks per master carton. When you use a four-block master carton, it is too easy to staple the cartons with the blocks in a vertical way which separates the liner from the block. When merchandise is sent by container, each carton is handled at least **three times** (and up to seven times if a bulk reefer is used for transportation). The stevedores usually enjoy throwing cartons, causing fissures of the block, a serious handicap in the case of minced blocks.

5. If you sell defatted blocks, you have to define very accurately what the purchase manager means when he or she asks for **semidefatted** fillets. **If you** cut the fat (for example, with a Trio, Jensen, or a Baader machine), you could leave three lines. That means the very deep middle line and the two side lines, which are like waves parallel to the edge. If you remove more fat, you cut the outer lines and the fat will appear in spots. **If you** cut more deeply into the fillet, these spots will disappear, leaving only the middle line, which is nearly impossible to remove. The fat content usually fluctuates between 1.5 and 2%. A semidefatted fillet should bring the fat content under **1.0%**, and a one-line defatted fillet should be below 0.5% fat content.
6. Because of its fat layer, hake should be treated like a fat fish. This means you should cover the interleaved fillets by glazing them. You should not use oxidation enhancers like salt or water-containing metals (especially copper or iron), but use permitted drugs, like sodium erythrobate, to stop the oxidation. Hake has a far shorter **shelf life** than cod or other species with a low fat content
7. The block should always be packed with the fat layer inside, but that means that there will be two fat layers together in the middle of the block. To avoid this problem, you can "buffer" these layers with some defatted fillets. Minced hake has a lower fat content than normal fillets. For example, **if you** have 1.6% fat in the **fillet**, you can get down to 1.1% using only the V-cuts. But when you cut the part containing the **pinbones** a bit generously you can easily reach 1.3%. The reason is that near the neck you have a better relationship of relatively meager tissue to fat layer than near the tail, where it is nearly half and half.
8. To minimize the penetration of vapor, always pack the blocks with an additional PE-bag.
9. In the case of fillets IQF, apply an additional (to the net weight) glazing of 3-5%. Colored PE helps to identify **leftover** pieces of PE film. A blue-colored film emphasizes the white color of the fish. Quick-frozen (or even plate-frozen) fillets always have a whiter appearance than slowly frozen fillets, which have mostly a reddish color with even a hyaline impression.
10. Very often the producer mixes master cartons with plate and **blast-frozen** interleaved fillets, causing a real problem for the stevedores, because the cartons containing the blast-frozen fillets are usually 1 or 2 cm higher. Interleaved fillets should be well covered with PE with not more than two or three fillets per layer (depending on **the** size). The **fillets** should not touch each other, even after being frozen and pressed together in a plate freezer. Even here you should invest in an additional PE-bag. The experts of the joint **FAO/WHO Food Standards Programme** and Codex Alimentarius Commission deliberated more than ten years before publishing their standards. Nevertheless, each company has a lot of individual quality requirements that do not fit in any standard.

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Discussion

Q: (Steven Freese, from the audience) When will the new European Community (EC) standards will go into effect?

A: (Werner) In January 1993.

Steven Freese added that the US government has a commission to develop a memorandum of understanding regarding these standards.

Q: Will the U.S. and less developed countries (LDC) be held to the same standards?

A: (Werner) In theory LDCs have until June 1, 1992 to apply for an exception, which would

allow them three years to meet the new standards.

Q: Aren't these standards so **difficult** to meet that the EC will have leeway to reject any block it doesn't want in an effort to bring down the price?

A: (Werner) This is a definite possibility; price or other factors may cause blocks to be rejected when they wouldn't otherwise be. For example, it is very **difficult** to meet the dual requirements of low bacterial counts and low chlorine levels in the fish, since chlorine is primarily used to keep bacteria down.

THE IMPORTANCE OF QUALITY ASSURANCE FOR THE INTRODUCTION OF PACIFIC HAKE INTO TRADITIONAL FROZEN SEAFOOD MARKETS

Jim Daniels

Richardson International Corporation, Seattle, Washington

Summarized by Ann L. Shriver

International Institute of Fisheries Economics and Trade

I would like to emphasize the importance of quality assurance in introducing Pacific whiting into new markets. Shelf life and quality issues make whiting a second- or third-level choice of buyers. Potential markets for this product include retail outlets, food service, and secondary processors, but each of these markets has specialized quality requirements that will play a role in the successful introduction of new products and species such as Pacific whiting.

Quality assurance involves the following functions:

1. preserving intrinsic quality
2. workmanship
3. meeting market and customer specifications

The most important function of quality assurance is the preservation of safety and wholesomeness. Unfortunately, Pacific whiting and whittings in general have gained a reputation for poor quality and short shelf life in the U.S. market. Overcoming this bias may require an extraordinary effort. Beyond maintaining product quality at its highest possible level, there are some additional considerations that will play a role in the successful marketing of whiting. Workmanship is important because, while it affects aesthetics more than safety, it will determine whether the product is able to meet a customer's specific needs. Workmanship is composed of the skill and accuracy used in the primary processing steps: filleting, boning, and skinning. It will enable the product to fit into particular weight, grading, size, packaging, and labelling niches.

Four primary market outlets exist today for seafood. Although once distinct, the divisions between these areas are now becoming somewhat blurred; however, for our purposes these markets are retail, food service, and secondary processors.

The retail market covers grocery stores as well as seafood specialty stores, including

single outlets, chains, and distributors. Appropriate product forms are those which can be sold either in self service or the fresh case; for the former, fish is trayed and over-wrapped and for the latter, thawed for the display. These product forms include fillets, whole, headed and gutted, steaks, and prepared foods. Quality-assurance concerns for this market focus on both intrinsic quality and workmanship, since visual aspects are important when the product is displayed. Specifications are more flexible than in other outlets. In this market, we accept seasonality and perhaps even expect it. The demand for U.S. Department of Commerce inspection is increasing, and we must pay attention to new requirements for nutritional labelling. In this market, prepared items are of increasing interest, and sauces, breading, and other treatments can be used to cover flaws in appearance.

The food service market includes cafeterias, restaurants, and institutions. This was a steady market throughout the 1980s and has remained strong through the last several years as well. The needs of working couples drives this increasing trend towards eating out, eating school lunches, using cafeterias, and so on. Product forms demanded include fillets, shatter packs, and prepared items (such as breaded portions). Intrinsic quality is less important here than in the retail market; there is a broader range of tolerance for second or third levels of quality. Portion control is relatively more important, since it determines profits, and workmanship will determine how well this is accomplished; weight grades of plus or minus a half ounce are not uncommon. Cooking instructions are often based on cost-control principles. In some areas, such as school lunches, nutritional information is very important. Additional considerations in this market are the need for packaging flexibility, the ease of preparation, and dealing with the seasonality of supply.

Secondary processing markets include breaders, entree preparations, and other converters (such as soup and chowder manufacturers). Product forms of most interest here are fillets, blocks, and surimi. This market has the most demanding product requirements. All quality-assurance factors, including intrinsic quality, workmanship, and contractual specifications, are crucial, since manufacturing systems can tolerate only a small degree of variation in the input product to be efficient. Detailed specifications often include bacteriological tolerances and even pesticide or mercury levels. An additional consideration is the desire for a year-round supply to reduce purchasing costs, including costs associated with switching labels to meet federal requirements when alternative species are used. Shelf life issues become very important in this market, where a **shelf life** in excess of **12 months** is **often** required.

Although this presentation has only scratched the surface of potential market opportunities, I hope I have shown that over and above the classic quality-assurance concerns, the quality-assurance function may be required to tailor processing or other aspects of a processor's operations to specific market needs. For processors investigating a potential market, I advocate an approach which includes the following steps:

1. Identify potential markets, customers, and products.
2. Determine customer quality requirements and product specifications.
3. Match these requirements to your **processing** capabilities.
4. Match the customer requirements and your processing capabilities to species characteristics.

Once this has been done, you should undertake test marketing and sampling and feed the results back into step number 1. Too often, this process is reversed. Following these steps in this order may take longer and cost more, but will result in markets for Pacific whiting that are stable and longer-lasting.

Discussion

Q: (Gil Sylvia, from the audience) Does the technology exist to use extruders on fresh fish, and if so, what could the impact be on whiting?

A: (Daniels) Currently the technology is underdeveloped but there are opportunities in that area, for example in the marketing niche of making fish sticks in shapes attractive to children. Using fresh mince instead of frozen block for this might cut out a middle step and lower costs. However, the use of fresh product would entail much closer matching of opportunities between primary and secondary processors because of the shorter time horizon required.

Q: (Sylvia) Can we really take advantage of seasonality in the way you pointed out in your talk, by giving the product a closer association with the fresh fish market? Hasn't much of our effort been toward reducing the seasonality imposed on the industry by the way fisheries operate?

A: (Daniels) **Seasonality** may be something only the fresh market can really play to its advantage by associating certain products with certain seasons of the year and playing on the freshness aspect. In **the** frozen market we need to increase **shelf life** in order **to** assure higher quality.

Q: (Barry Fisher, from the audience) Can whiting really be a product going directly into grocery stores, given their emphasis on revenue generated per square foot and cash flow?

A: (Daniels) The costs of developing and introducing a new processed product are so high (**my company** estimates \$7 million) that a better bet for whiting might be **to** try to position it for the fresh counter within the grocery store.

Q: What about the problem of consumer unfamiliarity with seafood; should we attempt to counter this by developing and distributing simple, easy recipes at the seafood counter?

A: (Daniels) Yes, this is a potentially useful strategy. Also remember that the easy-to-fix, processed product appeals to the consumer who is unfamiliar with fish and intimidated by the prospect of cooking it.

PANEL DISCUSSION ON QUALITY ASSURANCE

Session leader: *Kenneth Hilderbrand*. Panel Members: *Gilbert Sylvia, David Jincks, Enrique Bertullo, Jaachim Werner, Jim Daniels*

Q: (Session leader) What are the most important elements of quality assurance or quality control for Pacific whiting?

A: Each panel member responded to this question. David Jincks emphasized the need for fishermen to keep the product as cold as possible up to the processing phase, and for processors to follow up by doing their part to keep temperatures down so as not to waste the fishermen's efforts. Jim Daniels highlighted the related problems of rancidity and **whiting's** high fat content, to enable whiting to compete with cod, pollock, or other hakes that have lower fat contents and longer **shelf life**. Enrique Bertullo responded that the problem of competition with cod is resolved through price. Joachim Werner discussed handling problems that can be resolved with a bit of special care. For example, some frozen block sold to Germany had been packaged with the fat side out, increasing the danger of oxidation of the fat and leading to rancidity. Had the simple measure been taken of packing the block with the fat side of the fish inward, this problem could have been reduced. Only two or three boxes should be packed per carton. Metal clips should not be used. On the other hand, extra polyethylene packing should always be used.

Gil Sylvia responded that management **affects** the **quality** of a product. **The** fact that the Pacific whiting fishery is currently a "pulse" fishery, with all of the product being caught in a very short period of time, makes it risky for the industry to invest in the capital equipment needed for optimally controlling product quality. The current **management** scheme allows fishing early in the season, when intrinsic product quality may be relatively low (postspawning condition results in high moisture and low fat ratios). For surimi, as prices rise, higher-priced fish will become relatively more attractive as ingredients. However, as supplies build, prices begin to decrease. Therefore, it may be wisest to develop a whole portfolio of product forms that allows the producer to switch between pro-

cessed products as prices fluctuate. Contracts are another important factor; they should be written so that improved handling is reflected by a better price. Finally, there is the need for additional research, especially on the variability of product attributes. **The** entire industry needs to have a philosophy of improving quality, to improve the reputation of this fish.

Werner emphasized that when one seller makes an inferior product, the whole industry suffers. Sylvia observed that it is interesting that hakes on the whole are identified by geographical location, so that the problem becomes one of inferior fish being associated with an entire region. Ken **Hilderbrand** summed up by remarking that a bottom-up approach was needed in the industry; you can't produce a superior product with poorly trained, temporary labor. Quality control people should be management, not production people.

Q: (Session leader) What is the effect of seasonal closures on a company like Mrs. Paul's? How much of the year must a product be available for it to be feasible to use in a processed product?

A: (Daniels) It is not as much a question of the length of the availability as it is of the volume available. That being said, a six-month availability might be adequate and a two-month availability probably would not be.

Q: (Session leader) What treatments are available to solve oxidation problems?

A: (Daniels) My company has used a water soluble treatment that had to be dropped because it colored the fish. **They** switched to sodium **erythroate**, but this is **difficult** to distribute in a frozen block unless it is minced. My company is currently receiving Polish whiting products and has been surprised at the good quality of the seven-month-old product.

Q: (Session leader) What is the market for mince, and would it help to develop a stabilizer that could be used in mince?

A: (Daniels) The consumer says that mince is as good as fillets; and yes, a stabilizer would make the product more usable. Using sugars, Mrs. Paul's has been able to reduce **formaldehyde** formation, too; there may be other options as well.

A: Daniels observed that this hasn't proven feasible because a several-month inventory of stocks is needed. Sylvia suggested that **contract** arrangements could be adjusted to implement such a system for whiting and reduce the need for long **shelf life**.

Q: (Gil Sylvia, from the panel) Has Mrs. Paul's experimented with management methods such as "**just in time**" delivery?

PANEL DISCUSSION ON THE COOPERATIVE EFFORTS OF FISHERMEN AND PROCESSORS TO IMPROVE PRODUCT QUALITY OF PACIFIC WHITING

Session leader: *Bob Jacobsen (OSU Sea Grant Extension)*. Panel members: *Terry Rosaaen (Castle Rock Seafood)*, *Kurt Cochran (commercial fisherman)*, *David Jincks (commercial fisherman)*, *Tom Libby (Point Adams Packing Company)*, *Jerry Bates (Arctic Alaska Fisheries Company)*, and *Barry Fisher (commercial fisherman)*.

No formal presentations were made by this panel. Members responded to a set of questions from the session leader and from the floor.

Q: (Session leader) How can fishermen and processors cooperate in assuring consistent quality in Pacific whiting products?

A: The responses of the panelists can be collectively summarized as follows. Some of the most important issues related to maintaining the highest quality in this product revolve around communication and coordination between fishermen and processors. The more that fishermen understand what will happen to their fish on shore, and how it is turned into the final product, the better they will handle the fish at sea. Handling is more important with this product than with any other; processors need to take a stand and refuse product from fishermen that is handled improperly. It is necessary to match catching activity with freezing activity so that fishermen can turn over their landings every day. Even those who own both catching and processing facilities find this challenging, and it is even more difficult when ownership is separate. Radio communication between fishermen and processors is important to ensure that facilities are available at the dock for immediate unloading of catch. Processors need to be ready to process and freeze catch within a few hours of landing. There are also a number of catching and handling procedures which need to be followed on board with Pacific whiting to ensure that the flesh does not begin to soften. They include using champagne ice or refrigerated seawater systems, constant monitoring of storage times and temperatures, shortening the length of tows so that the amount of fish in the cod end when emptied is less, reducing **fish**, and using cod ends with zippers in the

bottom rather than dumping fish on board. A storage time of 12 to 16 hours is acceptable; anything longer than 16 hours on board results in softening of the fish. On the plant side, careful handling will include using pumps rather than manually offloading, and freezing as quickly as possible. The headed and gutted form can take the most abuse.

Barry Fisher turned away from technical issues to address institutional concerns. He pointed out that the Oregon Department of Agriculture, at the urging of the fishing industry, has done a good marketing job, making use of the Coastal Oregon Marine Experiment Station (COMES) and its economist to gather and analyze market data. Grants and low-interest loan programs have also been provided. Fisher introduced the concept of a fishermen's association for Pacific whiting, which would have certain voluntary standards. Everyone interested should be involved in the planning, needs of an economic, technical, and political nature could be identified, and the potential members would have to agree on a framework they could all live with. The Oregon whiting industry is fortunate that the Astoria Seafood Lab began to work on whiting characteristics when it did. Fishermen could organize to have input into this process. Such a group or institute could coordinate the efforts of various government groups. Alaska had a hard time with the Alaska Fisheries Development Foundation and the Alaska Seafood Marketing Institute until industry began working together. With all of its problems, whiting needs an organized industry. The primary issue is voluntary standards with some kind of quality label, to establish some kind of discipline in the market. Fisher asked for responses to this concept from the other panel members and the audience. Terry Rosaaen responded that such an organization is a good idea; the industry

needs a lobbying group given the current activities of the Pacific Fishery Management Council. He pointed out, however, that even though he owned both boats and processing facilities, it was a big challenge to get them to work together. How can we get such a contentious industry to work together? It would require a great deal of cooperation, for example, in determining which quality of fish can be used in which product form. Kurt Cochran agreed with the need for an industry standard, but wondered how it would be policed. The industry should not limit itself to aiming for a lower-quality product such as that required by surimi. David Jincks commented that this is the year to set standards; the industry needs them but he wasn't sure how they could be set. Tom Libby also agreed to the need for standards from the moment of catch through all processing levels. If the market comes to perceive whiting as a low-quality product, the Oregon fisherman and processor will be in serious trouble. Much of the data needed to establish the parameters are probably available from the Astoria laboratory; they would include temperature ranges, acceptable tow lengths, mesh size, and cod end sizes among other things. Processors will have to take a firm stand to ensure that the quality standards are met. Jerry Bates pointed out that although the idea for standards is a good one, the market really establishes standards, through pricing. The market will push you right out of business if you don't comply, and each market has its own standards.

Fisher responded that what he had in mind were voluntary standards, developed from, by, and for industry. How are we going to get into EC markets, he inquired? Answering his own question, he replied: only with a set of unified and very strict standards. He claimed never to have gotten a dime for delivering "premium" fish, and that the factory trawler fleet had no internal standards and delivered a lower-quality product; no price premium currently exists based on quality. The cod shortage won't last forever, he emphasized, and we live in a very competitive world.

A suggestion came from the floor that a state agency could establish a quality seal of approval with some set of standards attached to it. Another individual pointed out that the rapid change in the industry argues for denied the possibility of shoreside production

of surimi a very few years ago and now it is commonplace. Discussion continued around the concept that if a certain quality of product wasn't good enough for one product form, it could be used for other forms. Some felt that minimum standards should be set and others felt there should be a range of different qualities, perhaps grades. It was proposed that a set of standards be drafted with input from the group, and assistance from both COMES and the Astoria Seafood Lab. Suggestions for the standards included that they begin as guidelines, be profit driven, establish a range of different qualities, take advantage of price and quality market information being developed from the whiting study done by Gil Sylvia, and use data from processing firms which use time and temperature monitors on the boats delivering to them.

The discussion turned to the issue of who should be in charge of developing and enforcing the standards. Dalton Hobbs, from the Oregon Department of Agriculture, offered to help. Bob Jacobsen nominated Gil Sylvia to gather the information needed and function as coordinator for this effort, suggesting that anyone who wanted to be involved "sign up with Gil."

With this, the group returned to a technical issue: the problem of inadequate ice supplies. Ken Hilderbrand asked why processors could not simply provide ice to fishermen who supply them, directly from the plant. It was pointed out that the quantities needed are enormous and that first priority was usually given to the shrimp boats. Some fishermen had switched over to RSW systems because of the irregularity of the ice supply. This provides yet another area where cooperation and coordination between fishermen and processors would be to their mutual benefit, particularly with this species and its special handling requirements.

At the end of the session, the following question was put to the audience: would it be worthwhile to hold another such conference next year? The response was positive, with the suggestion that the next conference focus more on fish buyers. It was also suggested that a quarterly newsletter on whiting would be useful, and Mike Morrissey agreed that this would be an appropriate task for the

