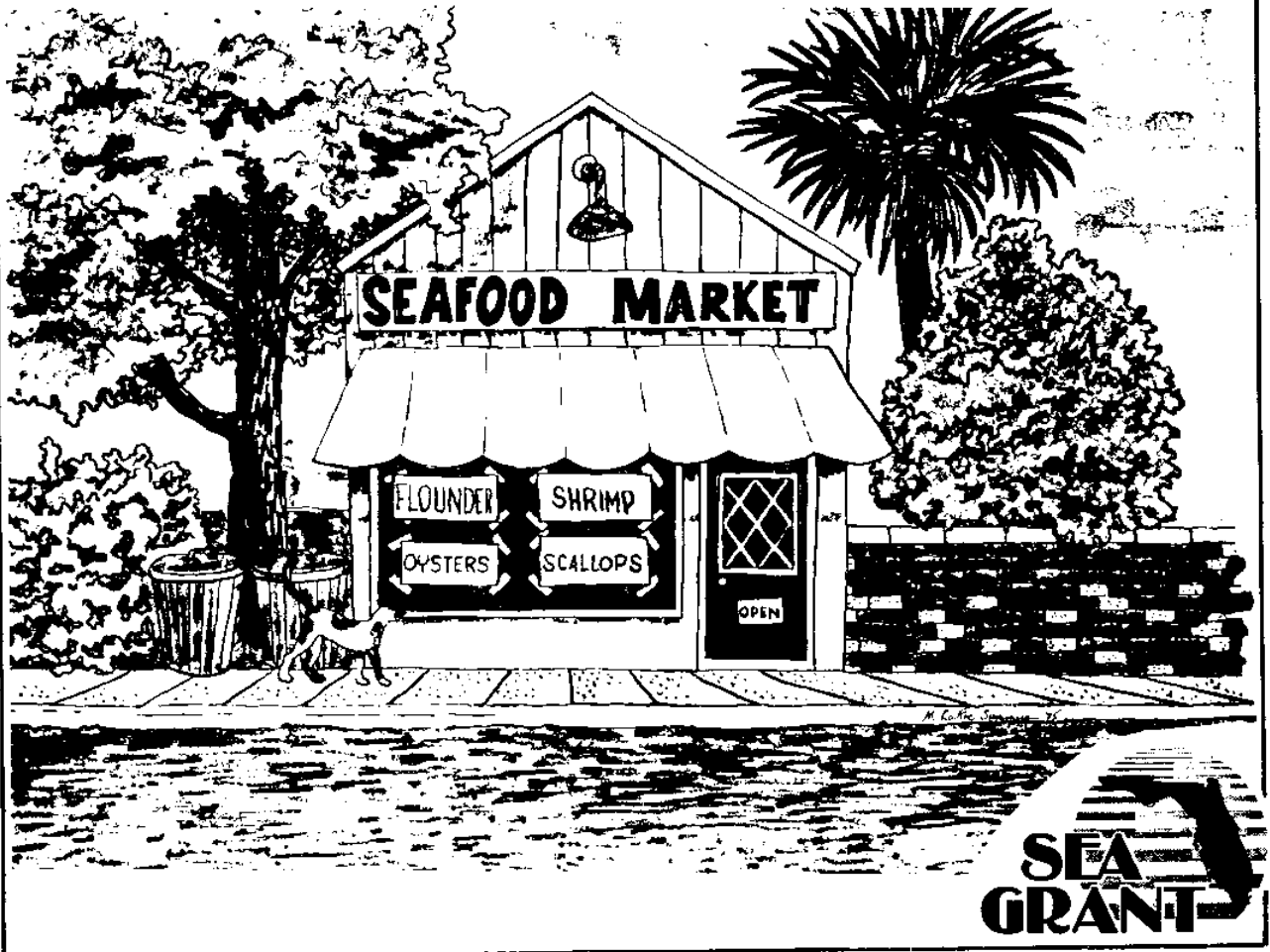


November 1985

Buying Seafood for Retail

W. Steven Otwell, Frank J. Lawlor, III,
John M. Stevely, Donald E. Sweat and
Derek S. Busby



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BUYING SEAFOOD FOR RETAIL

by

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BUYING SEAFOOD FOR RETAIL

Proper purchasing of seafoods for a retail market can only be learned from experience. The experience comes from actual work in the market to observe product quality, customers, and sales. The retail buyer must learn to select and judge product quality that will assure the best and safest product, while predicting what and how much is needed to suit customer preferences and demands. If an individual is purchasing for more than one store, a common practice for supermarkets utilizing central warehouse distribution, that individual must allot time to observe product performance and to interact with responsible management from each store. Although sales records can indicate product turnover and consumer demand, there is no substitute for actual store experience.

Regardless of the buying philosophy, product quality should remain paramount in all decisions. This is particularly true for seafoods because most consumers are leery of purchasing a commodity which they do not understand or trust. Their suspicions become more pronounced as the sale price increases. Consistent quality is the only assurance to building consumer confidence.

VALUE IN QUALITY

How can the buyer measure the value in product quality? Customer satisfaction and repeat purchase is the ultimate measure, but often this is not immediately evident. Another explanation is to examine the expected shelflife of the products. For example, for a fresh fish fillet taken from a whole fish less than two days out of water, the total acceptable shelflife can range from 4 to 14 days depending on the handling and storage temperatures (Figure 1). Longer shelflife is common for certain warmwater, lean fish species (i.e. grouper, snappers, etc.), but a 14 day maximum shelflife is a fair average considering most fish species. Obviously refrigeration temperature has a dominant influence on fresh quality by retarding bacterial growth and other spoilage phenomena.

The acceptable shelflife means the product is still fit, or acceptable for human consumption. Realizing the consumer may store the fish fillet for one or two days at home, a good definition for shelflife must distinguish between fit for purchase versus fit for consumption. In reference to the theoretical situation in Figure 1, Table 1 can be used to calculate the retail value in buying and maintaining quality. Recognizing the various temperature fluctuations during harvest and distribution, an average handling and storage temperature of 35° F (1.7° C) is most realistic. Note that only a 5 degree

Figure 1. Influence of refrigeration temperature on the acceptable fresh shelflife for most common fish fillets.

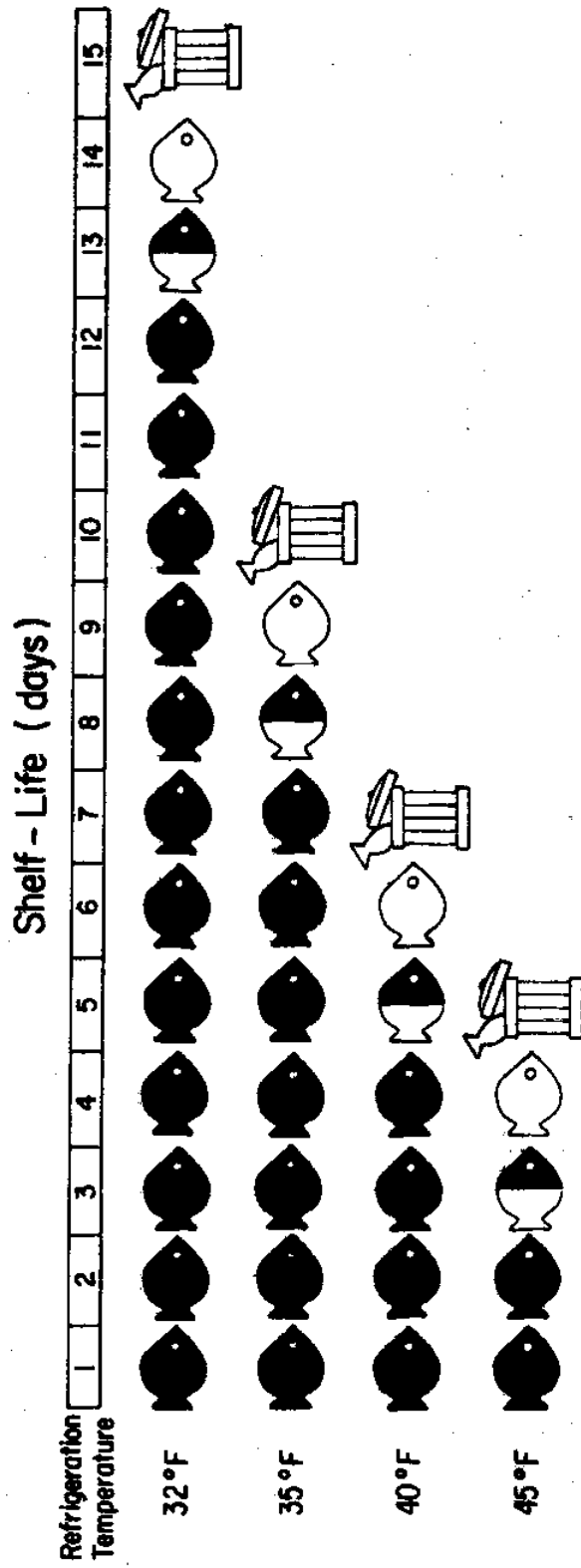


Table 1. Saleable days for a common fish fillet in a retail market as a consequence of remaining fresh shelflife at different refrigeration temperatures. This theoretical situation does not consider any time the product is on the vessel.

Refrigeration Temperature	Total Expected Days Shelflife	Days in Processing and Distribution	Days in the Home	Saleable Days in Retail
32°F	14	2	2	10
35°F	9	2	2	5
40°F	6	2	2	2
45°F	4	2	2	0-1

difference in temperature, 35°F versus 40°F (4.4°C), can more than double the retail shelflife. This means at 35°F the retailer has a better product and more time to sell it. To sell 100 pounds of fillets at 35°F the retailer must sell 20 pounds per day versus 50 pounds per day at 40°F. The required sales per day at 40°F increased 150 percent. What would be the financial commitment for advertising, display and salesmanship to boost sales 150 percent? On the other hand if the retailer feels he can sell 50 pounds of a particular fillet per day, then at 35°F he would only need to buy one 250 pound delivery per week as compared to three 100 pound deliveries at 40°F. Frequent deliveries are not always available and they require more labor and management. Also noting shelflife in Figure 1, frequent deliveries do not necessarily assure better quality. Remember, fresh product quality continues to diminish daily regardless of the storage temperature, and the spoilage rate varies by temperature. Although a two day saleable shelflife is possible at 35°F or 40°F, the second day of retail shelflife at 35°F is better than the second day of retail shelflife at 40°F.

FRESH SHELF LIFE

Although a simple, theoretical illustration of fresh shelflife can indicate the value of quality, actual commercial situations are far more complicated. Table 2 has been prepared in reference to fresh shelflife studies and from actual experience in retail markets. This information illustrates more involved quality considerations which may influence the buyer. Realizing the time spent on the vessel will vary with species, the recommended guideline for retail shelflife is limited to assure more consistent quality. The buyer may extend the shelflife if he learns to select a higher quality incoming product.

When selecting fish the buyer must consider the composition of the fish flesh and the method of harvest. Certain fatty species (i.e. mullet, mackerels, etc.) are caught in large nets producing large volumes in a short time, as opposed to individual hook-n-line catches of individual lean species (i.e. grouper, snapper, etc.) further from shore. Although Table 2 indicates the harvest of certain fatty species (typically fish with a fat content in excess of 5 percent by weight) may require less vessel time, the total shelflife can be less than for a leaner species. This is due to the higher fat content and associated darker flesh which can undergo oxidation that contributes to the early development of stronger, off-flavors. The leaner species are more stable in refrigerated storage, but for the species illustrated the common vessel time can range from 2 to 14 days. With a necessary vessel running time of two days from dock to harvest and return, the whole, lean fish can be unloaded 2 to 12 days after harvest. Thus after immediate butchering the

Table 2. Fresh shelflife of various seafood products commonly produced in Florida.

Items	Days on Fishing Vessel or Processed	Possible Shelflife off Vessel or After Processing	Days in Processing and Distribution	Days in Home	Retail Shelflife Possible	Shelflife Recommended
Fish Fillets (lean) snapper/grouper	2-14	2-12	2	2	1-8	3-4
(fatty) Mackerel	1-2	6-8	2	2	2-4	2-3
Smoked Fish	Smoked	7-10	2	2	3-6	3-6
Shrimp, Frozen	7-14	Frozen	Frozen	Frozen	Thaw	Thaw
Shrimp, Fresh	7-14	2-12	2	2	1-8	3-4
Blue Crab, fresh meat	Cooked/Picked	7-10	2	2	3-6	3-4
Oysters	Shucked	14	2	2	10	5-6
Scallops	Shucked	12-15	2	2	10-15	4-8

estimated shelflife of the fillets can range from 2 to 12 days which converts to 1 to 8 days at retail (one day means product must be sold on day of delivery). This range in shelflife can complicate direct purchasing decisions. Usually selective purchasing of the fresher, 'younger' catch is not always practical or permitted. The experienced buyer with quality commitments and product specifications will eventually develop an understanding with his supplier to encourage selective purchasing. This agreement usually requires fair and continuous purchasing. Overall, the best rule of thumb to assure consistent quality is to expect a retail shelflife between 3 to 4 days.

For shrimp the situation differs in that it is common for shrimp to be purchased frozen. If properly packaged, frozen and thawed, headless shrimp (Penaeid species) can have a 'fresh' retail shelflife of 3 to 4 days. The buyer may insist on using fresh shrimp. From the moment of harvest, properly handled and iced shrimp can have a total acceptable shelflife of 12 to 14 days, but the buyer must compare the value of extended shelflife versus the costs and availability of fresh purchase. Again the retailer can expect an average in-store shelflife of 3 to 4 days.

Special considerations are required for a previously cooked product. A cooked product can spoil more rapidly than the same clean, fresh uncooked product. Prior to cooking the product may have undergone some initial spoilage, and although cooking removes bacterial and some off-flavors, the cooked product is more susceptible to further bacterial spoilage, dehydration, toughening, etc. Fresh blue crab meat is a good example of a more stable cooked product with a refrigerated shelflife of 7 to 10 days; whereas, a cooked fish fillet would have limited shelflife less than 3 days. Smoked fish can have an acceptable shelflife of 7 to 10 days, but smoked fish should still be treated as a perishable product requiring constant refrigeration and monitoring to check quality.

In some cases special regulations have been adopted to enforce a specific fresh shelflife. For example, in Florida every container of fresh, shucked oysters and clams must be labeled for sale within 14 days after shucking (Figure 2). This special requirement is unique because oysters and clams are commonly consumed raw, thus they could contain bacterial contaminants that pose a health risk. Regulatory measures controlling harvest help prevent health risks, and the 14th day sale requirement is additional assurance to consumers that the oysters and clams will be of safe and top quality. Actually, the 14 day requirement is lenient as most retail firms sell their oysters within 5 to 6 days after purchase. Oysters and clams which exceed the 14th day sale requirement must be discarded. Freezing 14 day oysters is illegal and freezing 10 to 13 day oysters only preserves inferior quality.

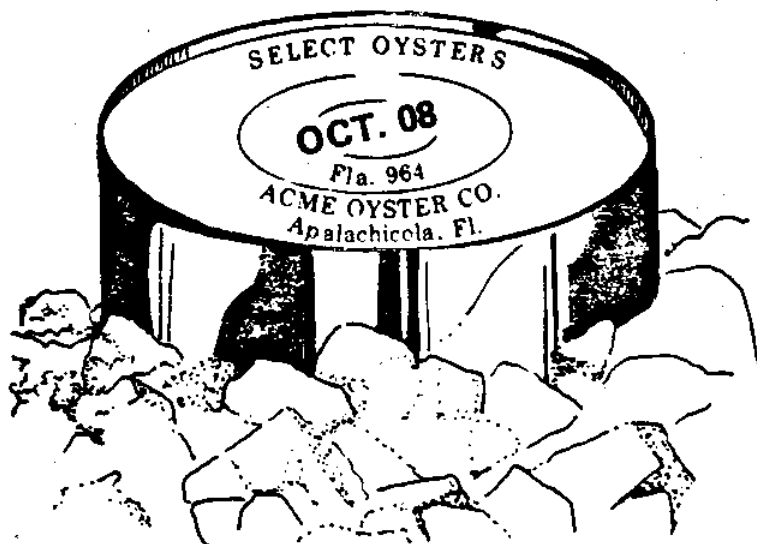
Figure 2. Public notice issued by the Florida Department of Natural Resources indicating the 'Last Sale Date' rule pertinent to marketing shucked oysters and clams.

LAST SALE DATE assures FRESHNESS

Florida law now prohibits the sale of fresh oysters 14 days after shucking. Each container is now labeled with a LAST SALE DATE, just like milk cartons. These must not be sold after the date shown.

Each container is labeled by the first letters of the month followed by two numerical digits indicating the day. Even if purchased on the last day shown on the container, there is still time for the consumer to safely use the product at home days later.

The SHIPPING DATE tag on sacks of unshucked oysters should be clearly visible and never removed before the sale. This Florida law is designed to protect both the retailer and the consumer.



Finally, calico scallops is an example of a fresh product which has a broad shelflife depending on packaging. Experience has shown that fresh, properly pre-chilled and packed scallops can be stored in adequate amounts of ice beyond 14 days if the original container is not opened and temperatures do not fluctuate above 35°F. If the container is opened to remove a portion of meats for display, the resulting temperature fluctuation and unavoidable bacterial contamination can decrease retail shelflife to 4 days. Likewise, this decreases the shelflife of the scallops remaining in the original container. This is typical for most fresh seafoods packaged in sealed containers or units. The packs should be sized and opened such that the entire contents can be marketed as one unit. There is no advantage to prolonged storage in the original container. Also, the contents of a fresher unit should not be mixed with a previously opened unit. Mixing products with differing shelflife only compromises quality of the entire mix.

FROZEN SHELF LIFE

Extension of retail shelflife is not used to judge value in quality for frozen seafood. Value in quality for frozen products is measured by a quick turnover. Frozen product is frozen capital. Also, the customary freeze and defrost cycles used by most retail equipment is not designed to provide long term frozen storage. Thus most buyers want to select frozen products which are in high demand, thus minimizing time in the freezer. An inexperienced buyer should under-buy until he can better predict consumer demand and product quality.

By employing the best conditions and with proper packaging most seafoods can be stored frozen for 6 to 12 months. Shorter frozen shelflife can be expected for some high fat species which are usually susceptible to oxidation and development of rancid flavors. Again, the buyer should have some knowledge of product composition. Assuming the buyer selects lean fish fillets, the frozen shelflife can be 13 months. If the consumer is expected to store this product less than two months, then at least 10 months of frozen shelflife remains. The buyer wants to share a minimum amount of this time and wants to purchase the product soon after the initial freeze. Although the frozen product may have extensive shelflife, slow product deterioration continues in the frozen state. Frequent defrost cycles can promote further deterioration, initially obvious as dehydration or 'freeze burn' and weepage.

Naturally the consumer considers freezing as one additional process that alters a food from its original, natural condition. Recent national surveys have demonstrated consumers are actually leery of all frozen meats, but particularly leery of frozen seafoods (Table 3). This is understandable if one could view

Table 3. Gallup survey (Aug. 1982) of customer preference for restaurant entrees identified as prepared from fresh or frozen items.

Items	Ordered when described as:		Percent increase Fresh/Frozen
	Frozen	Fresh	
	-----percent-----		
Fried jumbo shrimp	8	15	88
Seafood platter	6	13	117
Stuffed flounder	3	6	100
Shrimp scampi	3	6	100
Fillet of flounder	3	5	67
Broiled scallops	3	5	67
Broiled bluefish	2	4	100
Total Seafood	28	54	93
Total Meat	45	71	58
Total Poultry	15	22	47

Source: Seafood Business Report. Spring 1983. Vol. 81/2, 22.

seafood menus across the United States, most of which will state 'Fresh' or 'Catch of the Day'. Menus, promotions, advertisements and individual salesmen have traditionally abused the 'fresh' seafood concept. The consequence is evident as a lack of consumer confidence in fresh and frozen seafoods. The skepticism for frozen items is reinforced by inferior packaging techniques which result in a visual display of ice crystals, dehydration, shrinkage, freeze burn, discoloration, etc.

No segment of the seafood industry is without fault. Since the price for fresh seafoods is generally higher than for the same product frozen, the motivation is to extend the fresh shelflife. Freezing is an additional expense resulting in a less valuable product. Unfortunately, some firms, desperate to recover costs, freeze the unsold 'fresh' product when no sale is expected and spoilage is imminent. Thus inferior quality is preserved to inflict more damage on consumer confidence.

An investment in inferior quality frozen seafoods is an investment in failure. When possible, the buyer should have access to information on the product condition prior to freezing, when frozen, how long, and methods of freeze. The buyer should prefer a rapid freezing method for the freshest product. The frozen product should be wrapped and packaged to prevent air contact which can cause dehydration and oxidation. The recommended warehouse storage temperature for bulk products is below -10°F (-23.3°C), but 0°F (-17.8°C) is common.

A quality commitment in frozen seafoods should be accompanied by an informative sales approach. The seafood retailer can play a major role in educating the consumer to the advantages of freezing. In addition to lower prices, the retailer can explain how proper freezing at home can indeed preserve quality. Proper thawing is also essential. Consumers can not be expected to understand the various requirements for harvesting and processing, but they can appreciate the quality difference between fish fillets properly frozen immediately after catch as opposed to so called 'fresh' fish stored on ice for 14 to 20 days. Also, frozen selections can offer product diversity relative to processed forms, i.e. breaded, stuffed, minced, etc., noting that further processing usually requires large product volumes which can yield affordable prices. Thus, consumer education can increase frozen as well as fresh sales.

CONSIDERATIONS BEFORE ORDERING

Product requirements will differ for each store depending on location, type of customers, market size, and season. The buyer should always strive to obtain a variety of products. Product diversity in items and price is a unique, attractive feature for seafood markets. Often available supply relative to current

production and value will direct selection. Thus, the buyer must continually assess supply and demand.

As previously noted customer demand can best be learned through actual in-store experience. In addition to sales records, a subconscious survey is learned through conversation and sales performance. This experienced survey requires time and can be influenced by personal opinions. A customized questionnaire could be used to collect more specific information (Figure 3). This questionnaire can be designed to learn general customer knowledge and preference in seafoods, and customer opinions on certain items, packaging, uses, etc. Properly designed, a questionnaire can reflect your commitment to product quality and customer satisfaction. Also, the questionnaire can be used to advertise and attract sales with promotional information. Coupons can be used to encourage survey returns.

Available supply is best learned through advanced communication with the processor or distributor. The buyer should try to develop a confident, reliable working relationship built on the mutual success of all participants. Any savings a buyer may attempt to gain by shopping amongst suppliers with no loyalty to any one firm usually results in costly consequences. This is particularly true for the seafood industry for which unpredictable fluctuations in supply and price are inherent, unique characteristic of this commodity. The buyer and supplier both depend on success through satisfied customers. The best arrangement would be a loyal buyer from a supplier that will take an interest in the welfare of the retail firm. For example, this arrangement can be effective for introducing new products if the supplier offers a minimal cost that assumes a portion of the buyers risk, and an effective retail effort initiates a new product demand.

Numerous market newsletters and magazines are available to report and predict supply trends in volume and price (Table 4), but an understanding of supply is more than a review of volume and price. To assure quality and value in purchase the buyer should attempt to learn the actual supply scheme from harvest to delivery. Often the fishermen and processors are most concerned with their product quality at the point of sale and give little forethought to subsequent shelflife and quality as perceived by the consumer. Some retailers buy through some form of brokerage without knowledge of harvest methods or prior handling. When possible a visit to observe vessels and/or processing facilities is recommended in order to establish a better understanding of the producer's and supplier's situation and concerns for quality. The buyer may wish to share this knowledge with the public through handouts, pictures, video, etc., as a means of advertising truly "fresh" products.

STEVE'S SEAFOOD MARKET

(Plans to have the "Best" seafood in town)

This questionnaire has been prepared to help Steve's Seafood Market better serve your taste. We realize our success depends on satisfied customers and we want to be fair in providing the seafood of your choice. Help us by completing and returning this form. All completed forms can be returned for a 10 percent discount on a single days purchase.

Questions:

1. How often do you eat seafood?
 - once a month
 - once every two weeks
 - once a week
 - other _____

2. On which day of the week do you prefer to buy seafoods? _____

3. Do you prefer to prepare the seafood on the same day of purchase? yes no sometimes

4. List your 3 most preferred seafoods.
 1. _____
 2. _____
 3. _____

5. Which of these seafoods would you purchase?

<input type="checkbox"/> Clams	<input type="checkbox"/> Shark	<input type="checkbox"/> Live Blue Crabs
<input type="checkbox"/> Conch	<input type="checkbox"/> Catfish	<input type="checkbox"/> Mussels
<input type="checkbox"/> Smoked fish	<input type="checkbox"/> Black Sea Bass	<input type="checkbox"/> Squid
<input type="checkbox"/> Swordfish	<input type="checkbox"/> Crab Cakes	Other _____

6. Number your 3 most favorite methods of preparation.

<input type="checkbox"/> Baking	<input type="checkbox"/> Frying	<input type="checkbox"/> Microwave
<input type="checkbox"/> Broiling	<input type="checkbox"/> Grilling	<input type="checkbox"/> Steaming

7. Would you purchase frozen seafood if you could be sure it was of good quality? yes no

8. What further information would you like Steve's Market to provide?

<input type="checkbox"/> how to cook (recipes)	<input type="checkbox"/> how to select	<input type="checkbox"/> how to can
<input type="checkbox"/> how to freeze & thaw	<input type="checkbox"/> how to smoke	other _____

Figure 3. Customer questionnaire for seafood retail market.

Table 4. Helpful Supply and Market Information Provided By the National Marine Fisheries Service.

Market News Reports

Fishery Market News Reports, daily landings, and market receipts, weekly and monthly cold-storage holdings, daily exvessel prices, for fresh and frozen products, foreign trade data, current market developments, and other information for major fishery trading centers in the United States. Reports at costs are issued from:

Common Wealth Pier, Rm. 10
 Boston, MA 02210
 (617) 542-6070

P. O. Box 3266
 300 S. Ferry St.
 Terminal Island, CA 90731

201 Varick St., Rm. 1144
 New York, NY 10014
 (212) 620-3405

7600 Sand Point Way, N.E.
 BIN C 15700
 Seattle, WA 98115
 (206) 527-6128

546 Carondelet St., Rm. 412
 New Orleans, LA 70130
 (504) 589-6151

Phone Market Messages

Boston, MA	(617) 542-7878
Chicago, IL	(312) 353-2260
Gloucester, MA	(617) 293-1101
Hampton, VA	(804) 723-0303
New Bedford	(617) 997-6565
New York, NY (fresh)	(212) 620-3577
New York, NY (frozen)	(212) 620-3244
Portland, ME	(207) 780-3340

Quality control on the vessel begins with the attitude of the captain. A clean, well maintained vessel usually indicates a quality conscious attitude. The observer must remember a fishing vessel is a workboat intended to be efficient, not attractive, but efficiency should include quality considerations. Attempts to maintain cleanliness should be evident on the deck, about the butchering and processing areas, and in holding facilities.

The buyer should question the method of harvest, how the product is processed and iced, and length of trips. The type of fishing method can tell the amount of stress and physical damage the product encounters during harvest. Selective purchasing relative to catch method is usually not practical, but knowledge of the methods could influence purchase schedules and handling decisions. For example, a larger fish caught with hook and line or traps, (i.e. snapper and grouper) encounters less damage and can be attractively displayed as whole fish or skin-on fillets; whereas, bottom species caught by trawling would be best displayed as skinless fillets. Likewise, differences in shelflife can be expected as a consequence of harvest methods. Fish caught by gill nets which soak overnight would not have the initial quality and expected shelflife as for fish removed immediately after gill netting (i.e. Florida mullet and mackerels).

No matter which fishing gear is used, onboard handling and storage have a dominant influence on quality. In Florida, onboard processing is usually limited to removing shrimp heads and fish viscera. This butchering should be done immediately after catch and with standard quality considerations. For example, the air bladder and kidney (located in the upper portion of the visceral cavity, along the vertebra; often called the 'blood line') requires extra care to remove from most fish. Complete removal of the viscera is necessary to prevent potential contaminants which can enhance spoilage and detract from the appearance of the fish carcass. If the fish has been bruised or gouged by careless handling, the meat in the fillets can appear discolored, soft and gaping.

Similar considerations apply to crustaceans and mollusks. Buyers should never purchase lethargic or dying lobsters, crabs, clams, oysters or mussels. These species spoil rapidly after death, and if eaten raw they could cause health problems. If purchased as butchered parts (i.e. headless shrimp, crab sections, lobster tails, etc.) the buyer should check closely for black discoloration (black spot or melanosis) commonly found along the shell edges or exposed surfaces. Black discoloration can be a sign of improper handling.

After primary handling the usual storage method for fresh seafoods is icing. The buyer should question how the product is iced. Common problems are product exposure to accumulating

melted water, damage from an excessive weight of ice and product, or not enough ice. The cooling capacity of ice is calculated on a weight basis (Table 5). The best fishermen use greater than a 2 to 1 ratio of ice to product weight. In the future, southern fishermen may adopt additional storage methods, i.e. icing in boxes, chilled and refrigerated seawater systems, brine freezing, and more advanced freezer systems. Regardless of which method is used the buyer should always be concerned about elapsed time between catch and storage, physical abuse during handling and storage, and the length and temperature of storage. These are important concerns, because the product quality will never be better than at the moment of harvest.

Once assured a quality product has been brought to the dock, then similar considerations must continue through processing. Processing should continue without delay and product temperature should never be allowed to increase over 40°F (4.4°C). Temperatures below 35°F (1.7°C) are preferred. Elevated processing temperatures can shorten fresh shelflife (Figure 1 and Table 1). If the product is frozen, the recommended long term bulk freezer temperature should be below -10°F (-23.3°C), or at least never above 0°F (-17.8°C). Whenever possible efforts to maintain cleanliness and sanitation should be evident about the processing plant.

Packaging should be specified by the buyer within the capabilities of the supplier. Each product should be packaged to suit the particular use intended in the retail store. Bulk packaging should be of a convenient size for handling and stacking in the store, and sturdy enough to protect the product and prevent leaks and odors. Individual packs should be sized as saleable units (see "Fresh Shelflife"). Custom packaging, overwrap, vacuum packs, sealed tubs, snap on lids, etc. should be designed to attract sales and protect the product. Regardless of which packaging is used all containers should include a complete description of the supplier and contents (Table 6). The descriptive label should be a permanent part of the packaging materials rather than stick-on labels which can be lost, misplaced or replaced. Finally, guidelines to assure seafood quality during distribution are the most commonly overlooked. A warm truck and long trip can negate all previous work to maintain quality. The buyer can best judge truck performance as the product is received, but in fairness to the trucker the retail buyer should inquire about trucking methods before shipment. This is particularly true for supermarkets depending on central warehouse distribution which involves trucking-in, reloading and trucking-out. The truck should always be cleaned prior to loading and after unloading, and trips to retail outlets should be as short and as cold as possible. Refrigeration trucks are designed to maintain cold temperature, not to decrease the temperature of loaded product. The product and truck must be pre-chilled before loading, and loaded in a manner to allow cold

Table 5. Theoretical explanation of the required amount of ice to chill fresh fish.

Heat Constants

Specific Heat of Water= 1 BTU/lb./°F, amount of heat required to change the temperature of one pound of water one (1) Fahrenheit degree (F°).

Specific Heat of Fish= 0.9 BTU/lb./°F, amount of heat required to change the temperature of one pound of an average whole fish one (1) Fahrenheit degree (F°).

Latent Heat of Fusion (ice)= 144 BTU's/lb., amount of heat required to melt one pound of freshwater ice.

Theoretical Example

How much ice is needed to cool 250 pounds of fish from 80°F to ³²32°F?

Heat to remove = weight of fish x Temperature change x Specific heat of fish

$$\begin{aligned} \text{Heat to remove} &= 250 \text{ lbs.} \times 480^\circ \times 0.9 \text{ BTU/lb./}^\circ\text{F} \\ &= \frac{108000}{10800} \text{ BTU's} \end{aligned}$$

Ice required to remove heat = Amount of Heat/Latent Heat of Fusion

$$\begin{aligned} \text{Ice Required} &= \frac{10800}{144} \text{ BTU's/lb.} \\ &= \frac{75}{25} \text{ lbs.} \end{aligned}$$

The ⁷⁵75 pounds of ice is only the theoretical amount to cool the fish after which more ice will be necessary to maintain the cool temperature. Typically fishermen must use at least twice the amount of ice as to the weight of the fish. The rate of cooling will depend on additional factors.

Further Considerations

This is only a theoretical example which only accounts for the ice just to cool the fish irrespective of further considerations which include:

- arrangement of fish thickness and shape of individual fish, and fish size.
- cooling the storage area and packaging, insulation, and ambient temperatures.
- length of time in storage, etc.

Table 6. Label information which should be listed on packaging in-coming to a seafood retail store. Information listed is required according to Florida's Statute 500.11, Misbranding.

<u>Common and Usual Name of the food product</u>	SPANISH MACKEREL FILLETS
<u>Net Weight of actual food contents</u>	5 lbs. (pounds)
<u>Name and Place of Business of manufacturer, packer, or distributor</u>	STEVE'S SEAFOOD HOUSE Neptune, FL

air circulation about the packages. Realizing the potential damage from elevated temperature and product contamination (i.e. bacteria, odors, etc.), a review of the trucking schedule and route could influence the buyers decision to work with a particular supplier.

ORDERING

Assuming the buyer has calculated the amount and diversity in product needed and is sure the product will be handled in a conscientious manner, then he is now ready to specify his order. Communication in ordering seafoods can be confusing. Unlike most food commodities, seafoods offer the most diverse selection of species, sizes, grades, forms, etc. Traditional and regional nomenclature and lingoes further complicate the orders. For example, an order for 'flounder' could mean any one of a variety of flounder species, i.e. summer flounder or fluke (Paralichthys dentatus), winter or blackback flounder (Pseudopleuronectes americanus), yellowtail flounder (Limanda ferruginea), or even interpreted to mean other various flat fishes; i.e. sand sole (Psettichthys melanostictus), dab (Hippoglossus platessoides), or arrowtooth (Atheresthes stomias). Compare this diversity with an order for beef. Rarely does the butcher order Bos tarus (British cattle; i.e. Angus, Herefords, etc.) or Bos indicus (Indian cattle; i.e. Brahma).

Misinterpretation of seafood orders is not necessarily intentional. The buyer ordering saltwater trout from North Carolina may get their locally named weakfish or gray trout (Cynoscion regalis); whereas, the same order in Florida could result in spotted sea trout (Cynoscion nebulosus) or sand trout (Cynoscion arenarius). Naturally this confusion offers opportunities for abuse. A common violation is to mimic or substitute a less expensive fish (i.e. porgies, perch, tilefish, shark, barracuda, etc.) for a popular, valuable selection (i.e. red snapper or grouper). This practice is possible because species identification can be difficult when size and skin colors are similar, especially for skinless, boneless fillets. For this reason proper labeling on your packages is essential to assure purchase and/or to establish fault. Advanced analytical techniques are available to assist in species identification. By Federal and State law a seafood must be labeled with its "common and usual name" (Table 6). One source for some common names is "A List of Common and Scientific Names of Fishes from the United States and Canada", Fourth Edition, 1980, American Fisheries Society, Special Publication No. 12.

Unfortunately, there are only a few laws which specify standard sizes and grades for most seafood products (Table 7). Again the buyer must learn the common sizes and grades associated with various selections. An order for large shrimp could be

Table 7. Requirements for specific standardized fish and shellfish are listed as of April 1, 1985 in the Code of Federal Regulations, Title 21, Part 161 - Fish and Shellfish.

Grades of Fresh Shucked Oysters (Crassostrea virginica)

Name	Individual oysters per	
	gallon	quart
Extra Large	less than 160	less than 44
Large	160-210	36-58
Medium	210-300	46-83
Small	300-500	68-138
Very Small	more than 500	more than 112

Grades for Fresh Shucked Pacific,
Olympia Oysters (Ostrea lurida)

Name	Individual oysters per gallon
Large	less than 64
Medium	64-96
Small	96-144
Extra Small	more than 144

Breaded Shrimp

Product Name	Percent Shrimp Material
Breaded Shrimp	not less than 50%
Lightly Breaded	not less than 65%

filled with the "largest" shrimp available that day. Likewise, a retail sale of large shrimp could be two different sizes on different days. Consumers are not ignorant to this practice. If their concept of large is violated they may not shop in that retail store again.

The same concept applies to frozen and breaded products. The buyer should insist on net weight labeling on all packages, especially packs which contain frozen water. Water can be useful as a surface glaze to protect seafoods (i.e. shrimp, lobster tails, etc.) from dehydration and oxidation. The amount of glaze can vary depending on the amount deemed necessary without being excessive. The amount used is irrelevant by law as long as the label indicates an accurate and clearly visible net weight of the actual seafood contents. A buyer does not want to pay seafood prices for water. Similarly, the buyer wants to avoid buying breading. The buyer should know the amount (weight percent basis) and type of breading (Table 7). The best insurance for the buyer is to establish a list of product specifications (Table 8). The list should be customized to the product performance in a particular retail store. Specifications can include species, sizes, and amounts, as well as packaging and quality standards. Larger firms may be able to afford actual bacterial standards, but most retail firms will depend on subjective sensory evaluations, counts, net weights and sizes. Specifications help assure you receive what you order.

RECEIVING

Receiving consists of three basic steps: 1) getting ready to receive, 2) inspecting incoming product, and 3) storing the new product. Before the order arrives the existing inventory should be checked and rearranged to allow proper storage of the new products. Dating and arranging older products is helpful in establishing a 'first in, first out' plan. The storage area should be clean and accessible. Prior planning will minimize thermal abuse and handling of the incoming product.

Inspecting the order begins with a temperature check. What is the actual temperature of the incoming product? A simple thermal probe can be used to check fresh product temperatures, and frozen products should remain solid with minimal to no visible drip or condensation. Although the interior truck temperature may indicate a conscientious attitude, the actual temperature of the product is the primary concern. Remember truck refrigeration is only designed to maintain product temperature. Fresh products should never exceed 40°F (4.4°C), and are best at 32°F (0°C) (see Figure 1 and Table 1). All products above temperature specifications should be rejected.

Table 8. Typical product specifications which could be selected for a particular seafood retail store.

FISH	SPECIES	SIZE/GRADE
Bluefish (whole)	<u>Pomatomus saltatrix</u>	2.0 - 4.0 lbs.
Catfish, channel (H & G skin'd)	<u>Ictalurus punctatus</u>	0.5 lbs. and 0.5 - 2.0 lbs.
Flounder (whole) (fillets)		2.0 - 4.0 lbs. 4.0 - 8.0 oz.
Gulf	<u>Paralichthys albigutta</u>	
Southern	<u>P. lethostigma</u>	
Summer	<u>P. dentatus</u>	
Grouper, (gut'd)		
Black	<u>Mycteroperca bonaci</u>	10.0 - 15.0 lbs.
Gag	<u>Mycteroperca microlepis</u>	4.0 - 10.0 lbs.
Nassau	<u>Epinephelus striatus</u>	4.0 - 10.0 lbs.
Red	<u>Epinephelus morio</u>	4.0 - 10.0 lbs.
Yellowfin	<u>Mycteroperca venenosa</u>	10.0 - 15.0 lbs.
Mullet (whole)	<u>Mugil cephalus</u>	1.5 - 2.0 lbs.
Mackerel, King (whole)	<u>Scomberomorus cavalla</u>	6.0 - 10.0 lbs.
(steaks-frozen)		6.0 - 10.0 lbs.
Mackerel, Spanish (whole)	<u>Scomberomorus maculatus</u>	2.0 - 4.0 lbs.
(fillets-frozen)		6.0 - 10.0 oz.
Progies (whole)	(Various species)	over 1.0 lb.
Seatrout (whole)		
Sand	<u>Cynoscion arenarius</u>	2.0 - 4.0 lbs.
Spotted	<u>C. nebulosus</u>	
Gray	<u>C. regalis</u>	
Snapper (gut'd)		
Gray (Mangrove)	<u>Lutjanus griseus</u>	1.0 - 3.0 lbs.
Lane	<u>L. synagris</u>	1.0 lbs.
Mutton	<u>L. analis</u>	4.0 - 10.0 lbs.
Red	<u>L. campechanus</u>	4.0 - 10.0 lbs.
Yellowtail	<u>Ocyurus chrysurus</u>	1.0 - 1.5 lbs.

Table 8. Continued

Swordfish (body sections, 'logs') (Steaks-frozen)	<u>Xiphias gladius</u>	25.0 - 50.0 lbs. 6.0 - 10.0 oz.
Tilefish (gut'd) Gold	<u>Lopholatilus</u> <u>chamaeleonticeps</u>	5.0 - 10.0 lbs.
Gray	<u>Caulolatilus</u> <u>microps</u>	

<u>SHELLFISH</u>	<u>SPECIES</u>	<u>SIZE/GRADE</u>
Shrimp (raw, headless)		Jumbo over 15 ct.
Brown	<u>Penaeus aztecus</u>	Large 21 - 25 ct.
Pink	<u>P. duorarum</u>	Medium 31 - 35 ct.
White	<u>P. setiferus</u>	Small 50 - 60 ct.
Rock	<u>Sicyonia brevirostris</u>	Large 21 - 25 ct. Medium 31 - 35 ct.
Lobster		
Spiny (frozen tails)	<u>Panulirus argus</u>	6.0 - 8.0 oz.
Northern (alive)	<u>Homarus americanus</u>	1.0 - 3.0 lbs.
Blue Crab	<u>Callinectes sapidus</u>	
(fresh body meat)		16 oz.
(fresh claw meat)		12 oz.
(fresh pasteurized b. meat)		16 oz.
(whole, alive)		over 6 inch. males
(soft)		Jumbo 5.0 - 5.5 inch Prime 4.5 - 5.0 inch Medium 3.5 - 4.0 inch
Stone Crab (claws)	<u>Menippe mercenaria</u>	over 2.75 inch
Hard Clams (shellstock)		
Northern	<u>Mercenaria mercenaria</u>	
Southern	<u>M. campechiensis</u>	
Littlenecks		500 - 650 ct/bshl.
Cherrystones		300 - 350 ct/bshl.
Chowders		125 - 150 ct/bshl.

Next the products should be checked for quality and ordered specifications. The common sensory assessment remains the best quality control inspection method for any seafoods (Table 9). More than one attribute should be used to assess quality and these attributes may vary for certain species. For example, eye clarity, the most common quality attribute for fresh fish, should not be used as the only indicator. Experience has shown that direct contact with ice or ice water can cloud the eyes even in some of the freshest fish. If closer examination reveals sunken eyes, slimy gills, off-colors, or odors, then quality is questionable. Likewise, fading and altered skin colors are not unusual for certain southern fishes, especially varieties from the tropical and subtropical waters. Again, communication with a reliable supplier can be helpful in learning the best sensory judgements for seafood quality.

Checking product specifications begins with an examination of the package labels. Do the requested package labels state all the required information (Table 6)? Does this information relate to your actual order? Further verify the order by checking counts, product sizes and net weights. The inspection need not include every package, but should include enough spot checks to be confident. Be prepared to allow some tolerance. This practice should be standard procedure, especially when initiating a new supplier. For examples, do the 100 count calico scallops actually yield 100 individual meats per pound? Do the bushels of hard clams contain 250 individual clams as promised? Are there between 160 and 210 extra select oysters per gallon? Is the container of backfin lump crabmeat full of large chunks and lumps or is it packed with lump on top and smaller pieces in the bottom (deceptive practice referred to as 'strawberriying')?

When determining net weights it is wise to make sure your scale (or balance) has been certified by the local authorities for weights and measures. Net weight is the weight of product in the package and does not include weight of the packaging materials or water. Frozen products covered with glaze must be partially thawed just to remove the surface water glaze before accurately determining net weight. Guidelines have been established for this procedure (Table 10) and it must be done with care since frozen product can lose a small portion of interior water when thawed, and excessive thawing and refreeze can be detrimental to product quality.

Any product discrepancies should be immediately communicated to the supplier. When possible, personal explanation with product and package in hand is most effective. Often the supplier can only be reached by phone. The buyer should always have the right of refusal. Also, he can request new product or a price change. The option of a price change should never be acceptable if product quality is in question. Can price change compensate for discrepancies in size, amount, etc.? Strength of

Table 9. Sensory Guidelines for Quality Assurance.

FRESH FISH		
	ACCEPTABLE	QUESTIONABLE
ODOR	Fresh, neutral, faint sour odor sea smell	Putrid, ammonical strong sour odor, rotten smell
GUT	Clean, kidney removed, flesh adheres to ribs	Flesh soft, loose, ribs free
GILLS	Red-pink color, no excessive slime, mild odor	Brown-grey color, excessive slime, strong sour odor
EYES	Clear, full bright	Dull, sunken, cloudy
FLESH	Firm, elastic, soft for some fish	Soft, indents, flabby
FRESH FILLETS AND STEAKS; same as whole fish plus:		
FLESH	Clean, white to off-white-grey, firm no discoloration or spots	Dirty, off-colors-yellow, brown, soft spots and discoloration
CUT	Clean, smooth uniform	Ragged, sawing marks, loose ends

Table 9. Continued

FROZEN FISH & SHELLFISH

	ACCEPTABLE	QUESTIONABLE
FLESH or PIECES	Solidly frozen, glossy appearance, clean appearance frozen uniformly	Noticeable softness, chalky dehydrated spots or edges, frozen blood, discolorations (i.e., black spot, wounds, blood)
ODOR	Neutral, mild	Strong, rancid
PACKAGE	Tight fit, clear of transparent. air fit, 'dry'	Loose, soaked from thaw or previous thaw, ice crystals inside, drip
GLAZE	Adequate to cover product, intact	Excessive, not intact
FRESH SHELLFISH		
	ACCEPTABLE	QUESTIONABLE
OYSTER MEATS	Plump, mild color liquor smells fresh	Pronounced odors, thick liquor, shell fragments
CLAM MEATS	Plump, clear liquor, mild color and odor	Strong odor, shell fragments
SHRIMP &	Firm, shell intact, mild odor, clean	Soft, loose shell pieces, 'black spot'

Table 9. Continued

CRAB MEAT	Clean, mild odor, pieces	Dirty, shell fragments, soft-mush, strong odor
CRAB CLAWS	Firm, mild odor	Soft, loose meat, strong odor
SCALLOPS	Clean, firm, mild odor, white	In excessive fluids, soft, strong odor, discoloration, viscera attached
LIVE SHELLFISH		
OYSTERS	Shell closed or closes when tapped or momentarily exposed to warmth	Permanently open shell
CRABS	Noticeable leg movement, tail curled	No movement, Lax condition

Table 10. Recommended guidelines for determining net weight frozen raw headless shrimp.

1. Place frozen shrimp in container of flowing water (6 gallons/minute) at a water temperature of 75° to 85° F (preferably near 85° F at the start).
2. Deglazing time should allow removal of surface ice noticeable by eye or touch. Deglazing time should not exceed 15 minutes. Remaining product should remain hard and frozen.
3. Drain deglazed product 2 minutes on a 45-degree angled sieve. Sieve with 20 mesh will hold water by surface tension, and the tare weight should be obtained of the empty but wet sieve, after draining at the same angle for 2 minutes.
4. Net weight of shrimp equals deglazed weight of shrimp and wet sieve minus weight of wet sieve.
5. Acceptable limits:

<u>Container Size</u>	<u>Allowable Limit</u>
Less than 2 pounds	10 percent or 1 ounce
2 - 10 pounds	5 percent
Greater than 10 pounds	2 percent or 8 ounces

Source: National Marine Fisheries Service, Inspector's Instructions for Grading Frozen Raw Headless Shrimp.

the buyer's position will depend on reference to any initial documentation or prior discussion of product specifications. This emphasizes the importance of clear, distinct product specifications prior to purchase. If the supplier is reputable he will appreciate your attention and he should attempt to trace the source of the problem. Too often, the trucker or period of delivery, when the product is not in the direct control of the supplier or buyer, is the common scapegoat. This again emphasizes the importance of prior assessment of the trucking methods, schedules, and receiving temperature of products. If the discrepancy can not be explained and no one excepts fault, an unprepared buyer could pay for the loss. If he does not pay, he runs the risk of tainting his reputation amongst other suppliers. Thus, seafood purchasing is a system of trust. Prior planning and distinct product specifications are the retail buyer's best protection.

RECORDS

Product specifications and orders should always be recorded on a daily basis. Most smaller retail firms consider records an unnecessary, extra burden. They do not realize the advantages of monitoring trends in product quality, price and availability. This information could be extremely important in determining supplier performance, purchases for various types and amounts of seafood, and seasonal availability. These records need not be complicated (Table 11). A standard rating system and/or one individual should be used to record incoming product quality. This system could be as simple as E-excellent, G-good, S-satisfactory, or R-reject; or more involved with an expanded quality scale and color coding to accompany packages while in the store. Also, the records could be designed in conjunction with an inventory (Table 12) which can be used to formulate orders and check product performance in the store.

Finally after the product has been inspected, accepted and recorded, it must be immediately placed in proper storage. The maximum limit for exposure to room temperature is 15 to 20 minutes. Dating the incoming product (and/or use of color codes as previously mentioned) is useful in assuring the best product rotation plan--first in, first out.

CONCLUSION

As has been stated previously, the quality of those products sold by the retail outlet will have a pronounced effect upon the reputation of the seafood establishment. Considerations regarding the quality of products being sold should override other competing concerns including diversity of product line and even price. The integrity of the retail establishment will

Table 11. Simple receiving records for a seafood retail firm

RECEIVING									
Individual									
Incoming									
Date	Item	Source	Net Weight	Weight	Size	Count	Temp., °F	Quality	

E = Excellent
 G = Good
 S = Satisfactory
 R = Reject

Table 12. Simple inventory sheet for a seafood retail firm.

INVENTORY						
Date	Item	Sold	Remaining		Purchased	
			Amount	Quality	Amount	Quality

ultimately rest upon the quality of the seafood offered and the consistency (through time) of that quality.

Developing a quality assurance program may prove to be the most important factor in obtaining maximum profits from the retail business. This program does not need to be elaborate or overly complex. In fact, the best programs are those which can be understood and maintained by every worker from the manager to the laborer at the unloading platform. The importance of the individual worker's role to the overall success of the business should be stressed at all times.

The topics covered here, including pre-ordering considerations, ordering and receiving practice and record keeping, may serve as a good starting point, but should not be viewed as an absolute guide to structuring such a program. Each establishment is different and must experiment to find the overall system best suited to its business environment and personnel. However, one basic precept should overrule other considerations and that is to sell the best, freshest product possible to create satisfied, repeat customers.

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