AN ABSTRACT OF THE THESIS OF

Heidi Marie Hadlett for the degree of Master of Science in Foods and Nutrition presented on April 11, 1988.

Title: Fresh Fish Quality: Consumer Perceptions and Need for Indicators

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A sample of 398 rural and urban homemakers who participate in the Oregon State University Extension Home Economics study group program were surveyed to identify their perceptions of quality in fresh fish purchased for home use. The need for quality indicators on labels of fresh fish, and household practices pertaining to quality maintenance, were also assessed. Forty-six percent of respondents indicated disappointment with the quality of purchased fresh fish. Satisfaction with the quality of fresh fish was unrelated to frequency of consumption, participation in a prior seafood course, or knowledge regarding the storage and preparation of fresh fish. A significant relationship was identified between frequency of consumption and knowledge regarding the storage and preparation of fresh fish. Frequency of consumption was also significantly related to participation in a prior seafood course.

Respondents rated indicators of quality (freshness, smell, appearance) as important considerations when purchasing fresh fish, but note limited ability to assess quality. Fifty-four percent of respondents agree that labels on fresh fish were a good way to provide information about quality.

Guaranteed freshness was considered information most important for labeling on fresh fish.

Findings suggest that efforts to market fish should emphasize correct storage and handling techniques for retailers and consumers, and cooking instructions for consumers. The fishing industry and retailers are encouraged to accept responsibility for quality assurance.

Fresh Fish Quality: Consumer Perceptions and Need for Indicators

by

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FRESH FISH QUALITY: CONSUMER PERCEPTIONS AND NEED FOR INDICATORS

INTRODUCTION

Statement of the Problem

More than 550,000 Americans die annually from coronary heart disease (CHD), the leading cause of death in the United States (1). Research has shown that certain risk factors increase the likelihood of heart disease. Elevated serum cholesterol and dietary saturated fats have been identified as two of the risk factors which are strongly associated with CHD (1,2,3).

Additional research in the diet and heart disease relationship has focused on the significance of omega-3 fatty acids (3). These unique long chain polyunsaturated fatty acids (PUFA) are found primarily in marine oils (4). Dietary studies of fish consumption and heart disease indicate that these fatty acids, and possibly other constituents in fish, appear to exert protective benefits against heart disease (5,6). With this background, fish are being promoted as "heart-healthy" food: low in saturated fat and cholesterol and a primary source of omega-3 PUFA (7,8). Yet, seafood (fish and shellfish) consumption is limited compared to beef and poultry. In 1985, U.S. per capita consumption of all seafood was a record 15 pounds (9). In comparison, per capita poultry consumption was 49 lbs. and that of red meats was 121 lbs. (9). (These edible weight figures exclude game fish, game meats, and edible offals, but include 1/4 to 1/2 inch fat trim on

red meats.) In the United States, seafood is primarily consumed away from home at fast food and family restaurants (10). It is estimated that less than one pound of the per capita consumption of fish represents the purchase of fresh fish for at-home consumption (11).

Quality, an important factor affecting seafood consumption, has been identified by consumers and the fishing industry as a concern (12,13). In response to consumer interest and foreign competition, the U.S. fishing industry is making efforts to upgrade the quality of its product (11,12). In some parts of the country fresh (unfrozen) fish is successfully marketed with labeling to indicate a grade or quality guarantee (11,12,14,15). The quality of fresh fish is important, not only to the consumer, but also to the retailer, the wholesaler, the distributor, and the fisherman.

Purpose of the Study

The purpose of this study was to identify consumer perceptions of quality in fresh fish purchased for home use. In addition, this study explored consumer desire for quality indicators on labels for fresh fish. Household practices pertaining to quality maintenance were also assessed.

Hypotheses

The following hypotheses were tested:

Hypothesis 1: Frequency of fresh fish consumption will be unrelated to place of residence (Western Oregon vs. Eastern Oregon).

Hypothesis 2: Satisfaction with the quality of fresh fish will be unrelated to frequency of consumption.

Hypothesis 3: Satisfaction with the quality of fresh fish will be unrelated to prior participation in a seafood course.

Hypothesis 4: Knowledge regarding the storage and preparation of fish will be unrelated to prior participation in a seafood course.

Hypothesis 5: Frequency of consumption will be unrelated to knowledge regarding storage and preparation of fish.

Hypothesis 6: Satisfaction with the quality of fresh fish will be unrelated to knowledge regarding storage and preparation of fish.

Definitions

Good Quality: To be fresh and wholesome, without evidence of spoilage; also clean and safe.

Fresh fish: Raw, not frozen.

Fish: Fin fish.

Seafood: Fin fish and shellfish.

Limitations

The limitations of this study include testing a non-random population which is predominantly older and female. Respondents were participants in Extension study groups for less than 1 year to over 50 years. Eighteen percent had participated in a previous seafood course or workshop. In addition, this study is non-experimental and descriptive in nature. It describes only two distinct areas in a geographically diverse state. Because fish consumption may vary by season, this study is limited by sampling in only two of the months that fish are available.

REVIEW OF LITERATURE

Characteristics of Quality Fish

The overall appearance of the eyes, gills, skin, and flesh are indicators of quality and freshness in fresh whole fish (16). In general, the skin should be bright and shiny, the eyes clear and bright with a black pupil and translucent cornea, and the gills bright red and free from slime. The flesh should be firm, moist, and elastic to touch. Fresh fish possess a mild ocean or fresh seaweed scent. Poor quality fresh fish is identified by faded skin color, sunken pupils and cloudy cornea, gray to brown gills, soft flabby flesh, and a strong offensive ammonia or putrid odor.

Quality indicators used for fresh whole fish are also used to identify quality and freshness in gutted and/or headed fish. In addition, a gutted and/or headed fish should be completely eviscerated with a clean and neat cut, avoiding any cutting into the body cavity wall. The body cavity and head-gill area should be washed and clean and free from blood. The rib bones of a gutted fish should adhere to their flesh and not separate.

In the marketplace the consumer often purchases fresh fish as a steak or boneless fillet. Quality indicators (e.g., eyes, gills, skin) are missing and cannot be examined. However, the consumer can still determine quality and freshness by general appearance. A fresh fish steak or fillet should exhibit flesh which is clean cut, moist, firm, and elastic, with a bright shiny color and a fresh mild seaweed odor. Fresh fish fillets or steaks which appear dried, with ragged edges or soft flesh, discoloration,

and a strong ammonia odor, exhibit poor quality. Fish which is prepackaged in trays should be free of drip or excess liquid.

Inspection and Grading

Voluntary seafood inspection was authorized in 1946 by the Agricultural Marketing Act (AMA) (17). The purpose of the AMA was to support development of efficient marketing practices and "to develop and improve standards of quality, condition, quantity, grade, and packaging" of agricultural products, including fish and shellfish. The AMA provided authority to the U.S. Department of Agriculture (USDA) to develop and promulgate grade standards, inspection, and certification for seafood. The provision of the AMA relating to fish and shellfish was moved from the USDA to the Department of the Interior in 1956, and in 1970 the program was transferred to the U.S. Department of Commerce (USDC) (18).

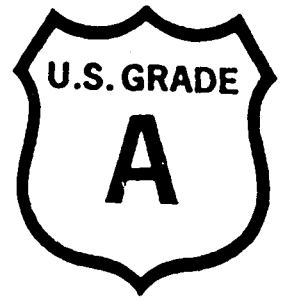
Presently, the National Marine Fisheries Service (NMFS) of the USDC is responsible for a voluntary seafood inspection program on a fee for service basis (19). Inspection services are divided into three types. Type I--Official Establishment and Product Inspection includes plant sanitation and product and processing methods inspection from raw material to finished product on a contract basis. (The term "processed" is defined as any step in the preparation of a product and includes receipt of raw materials, packaging, storage, and delivery (18)) Any type of product form from whole fish to a reconstructed product can be inspected and certified according to established specifications (19). Inspection services are available to any interested party, including harvester, foodservice distributor, importer, and exporter.

Products processed under Type I inspection services may be labeled with the "Packed Under Federal Inspection" (PUFI) mark, signifying the product is safe, wholesome, properly labeled, and produced under inspection. Product grading services are available to processors receiving the PUFI service and who process products for which there are U.S. Grade standards. Grade standards are established for fresh and frozen whole or dressed fish, steaks, fillets, frozen fish blocks, and shellfish. In general, evaluation is based on appearance and workmanship. Products packed under federal inspection where the plant, product, and label are approved may carry the U.S. Grade A shield or PUFI mark and may be advertised as being federally inspected (Fig. 1).

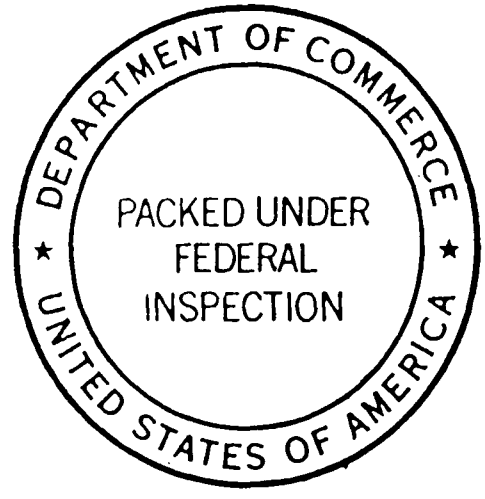
Type II--Lot Inspection--documents product quality and condition at the time of inspection for wholesomeness and safety, but does not attest to the sanitation or processing condition under which the product was produced. A lot inspection determines whether products comply with purchase agreement criteria and are generally requested by brokers or parties with a financial interest in the product (19).

Type III--Miscellaneous Inspection and Consultative Services--includes plant and vessel sanitation inspection, evaluation, and technical advice to improve sanitation practices. Product inspection, certification, or grading is not included in Type III services.

Less than 13 percent of domestically produced seafood is voluntarily inspected and that percentage is declining each year (20). This is occurring at a time when seafood consumption is increasing and is projected to continue increasing. There is discussion in government and in the industry



U.S.D.A. Grade A Shield



Packed Under Federal Inspection (PUFI) Mark

Figure 1. U.S.D.A. Grade A Shield and Packed Under Federal Inspection (PUFI) Mark.

about a mandatory fish inspection program (20,21). Mandatory seafood inspection is not a new idea, and many consumers incorrectly assume that seafood is inspected (20).

Fish Consumption Data

Data on fish consumption in the United States are available from several sources (22). The USDA publishes the annual average consumption of commodities, including fish (9). Production data for commercially harvested fish are reported weekly and summarized annually by NMFS (22). Federal surveys which provide information on U.S. food consumption include: National Food Consumption Survey conducted by the USDA; National Health and Nutrition Examination Survey conducted by the Department of Health and Human Services; and the Food Usage Survey conducted by the Food and Drug Administration (23). Proprietary surveys also provide fish consumption data (24,25). In a review of the available data sources, Wagstaff et al. (22) concluded that the different estimates of per capita intake were "fairly close" despite differences in methodology and deficiencies in obtaining and documenting data on fish consumption.

Seafood Consumption Surveys

National Marine Fisheries Service Survey

An extensive and detailed consumer seafood consumption survey was conducted in 1981 by Market Resource Corporation of America (MRCA) under contract to the National Marine Fisheries Service (24). The survey was conducted to guide the development of marketing and advertising strategies to increase seafood consumption. A nationwide panel of 3,863 U.S. households recorded the amount of fish and shellfish consumed at home and away from home. Each occasion of serving and eating fish, fish products,

or dishes including fish, was recorded. Seafood consumption diaries were maintained for 1 month per quarter for a 12-month period. Detailed data on demographics and attitudes toward seafood were collected from each individual in the household. The survey concluded that consumers have positive attitudes toward fish and shellfish, but consume it infrequently (an average of 2.5 times a month at home and away from home). With an estimated 60 lunch and dinner occasions each month, seafood is described as "an opportunity waiting to be exploited" (24).

In half of all households fish was served "just as a change" from meat and poultry, according to MRCA researchers. Only one in three of those surveyed planned a weekly seafood meal and less than one in five purchased fish on impulse. Distribution and price did not appear to be barriers to increased seafood consumption. Consumers perceived supermarket fish to be government inspected and safe to eat. Non-users of seafood expressed dissatisfaction with quality, while most heavy and medium users were satisfied. Both non-users and users of seafood at home and away from home describe taste as the most important consideration which they look for when purchasing seafood. There was agreement that fresh fish taste good with a mild and sweet flavor.

Promoting seafood consumption via nutrition education was described as "unlikely to succeed" by MRCA. Both non-users and users were aware that fish was nutritious and low in fat, cholesterol, and calories. With respect to advertising,

> "the key to successfully increasing seafood consumption in America does not lie in changing consumers perceptions, beliefs, or attitudes toward fish and shellfish, but rather in changing consumers perceptions of themselves from non eaters of seafood to seafood consumers . . . . A critical barrier to increasing seafood consumption appears to be consumers general lack of knowledge, familiarity and self-confidence in preparing fish and shellfish." (24, pp. 26-27)

Providing consumers with a variety of simple recipes and ideas was identified as a solution to increasing knowledge, familiarity, and confidence in seafood preparation. The survey data also suggest an opportunity to effectively influence consumers in a more subtle and emotional way. Heavy users of seafood are described as being well educated, upscale professionals and managers with "characteristics of leaders and models which most consumers aspire to." It is suggested that future seafood advertising show seafood consumers as sophisticated, intelligent, and modern so that non-users will identify with seafood consumers.

In their final report, MRCA researchers recommended that marketing and advertising to increase seafood consumption be a consistent, long-term project with the primary focus on the heavy seafood users. This group, representing 23% of the population and 28% of all seafood users, consumes 62% of all seafood at home and 66% of all seafood away from home. However, this heavy user group is a relatively light consumer, eating seafood an average of 7 times a month. Because this group has the most positive attitudes toward seafood, it is felt that they will be most sensitive to marketing and advertising.

Better Homes and Gardens

Better Homes and Gardens surveyed 500 members of their national consumer panel in November, 1985 to determine: frequency of seafood consumption at home and away from home; reasons for purchase; and the importance of quality, price, availability, species familiarity, and ease of preparation (25). Sixty percent of the 425 respondents indicated that they served fish or shellfish in their homes "several times a month" or more often. For the 38% who served seafood once a month or less, the primary

reasons were: don't like smell (36%); don't have good recipes (23%); don't know how to cook (20%); and too expensive (20%). Taste, quality, and health-nutrition were identified as the most important factors when purchasing seafood.

The consumer panel was asked if they were familiar with the health benefits of seafood and if they were eating more or less seafood in the past six months. Overall, 56% reported eating more fresh seafood in the past six months than one year ago and 65% believed that the reported health benefits of including seafood in the diet influenced their purchase decision. In answer to the question, "what assistance would help you to increase your consumption of seafood at home?", consumers identified recipes (50%), cooking instructions (47%), product familiarity (38%), quality guarantee (37%), microwave directions (29%), more convenience (25%), and handling knowledge (23%).

Cornell University

Bisogni et al. (26) recently surveyed New York consumers by mail to determine perceptions of quality in fresh fin fish and use of quality indicators. The 359 respondents were described as "highly motivated individuals" reflecting the views of a "self-selected group of consumers who frequently buy fish and are interested in fish and fish quality" (26). Demographic characteristics revealed a majority of respondents were female, over 50 years of age, educated beyond high school, and did not have children under age 18 in their household. Respondents were from upstate New York (82%) and New York City (18%).

The 19-page survey requested the following information regarding the purchase of fresh fin fish: frequency of consumption; place of purchase;

species of fish; and packaging or form of fish purchase. Respondents were asked to rate the importance of six factors when purchasing fresh fin fish. Freshness, quality, and taste were considered most important by nearly all respondents. Other important, but not critical, factors included household preference, nutrition, and price.

Respondents were also asked how often they used a variety of methods to evaluate quality. For the majority trust and confidence in the retailer were important considerations when judging the quality of fresh fin fish. Product turnover time and the use of ice for fish displays were retailer characteristics identified by respondents as indicators of quality. A majority of respondents evaluated quality by appearance and odor. "Use-by" or "sell-by" dates on prepackaged fish were also used by a majority to judge quality, while fewer than half looked for a Grade A label. Traditional indicators of quality--clear eyes, firm flesh, gill color, temperature, seasonal availability, origin of fish, date of harvest, and method of capture--were used by relatively few.

Respondents were asked to identify information desired when purchasing fresh fin fish. Age of the fish (i.e., length of time since caught, market arrival date and time in display case) was most important. Temperature was important, but not as important as time. Method of capture or harvest was least important. Respondents expressed interest in cooking instruction, characteristics, and seasonal availability of different species.

In this study, consumers' perceptions of quality in fresh fin fish were influenced by the retailer. Positive or negative images of quality were conveyed to the consumer via fish salesperson, retail display, and product packaging. The study concluded that even experienced and enthusiastic fresh fin fish buyers demonstrate limited abilities to assess quality

and are in need of information regarding fish type, species, storage, and quality.

Industry Efforts to Improve Quality

Within the industry, quality has been identified as the single most important factor which governs the consumption of seafood (12). The absence of assured quality has been identified as the most important impediment to the growth of seafood consumption (12). The perishable nature of fish and the many links in the distribution chain compound the problem of maintaining quality. Hasselback (27) has identified a variety of practices within the distribution chain which affect the quality of the end product.

Time and temperature are critical factors affecting the shelf-life of fresh and frozen fish (14). Ultimately, the quality of the consumer's fish is dependent upon the rate of decomposition (autolysis and bacterial), oxidation, and hydrolysis (28). A number of factors influence this: the type of fish (fat or lean), size, condition of fish (pH, rigor mortis, method of capture), bacteria from environment (method of capture, boat, plant, and handler sanitation), temperature, and use of antibiotic-treated ice or dip (28). Characteristic odor, flavor, and texture changes occur as the quality of the fish declines. Fresh and frozen seafood exhibiting poor quality is readily discriminated by consumers at the point of consumption (29).

Ronsivalli (14) has described handling procedures for fisherman, processor, retailer, and consumer to assure a U.S. Grade A quality fish fillet. Implementing his concept and procedures, Ronsivalli (30,31) reported the cooperative efforts of a processor, retail markets, federal inspectors, and marketing personnel to successfully market U.S. Grade A quality fish.

The U.S. Grade A concept of quality control for fish was widely accepted by consumers, processors, and sellers. At the end of the 20-week experiment consumers requested U.S. Grade A inspected fish and were willing to pay a higher price for guaranteed quality. The State of Maine has also experimented with "guaranteed fresh" fish marketing. Using NMFS standards, a voluntary inspection program was established for participating plants. A "Certified Fresh Maine Fish" seal was awarded to eligible plants (32). Consumers identified this symbol with quality fish and specifically requested it. In Oregon the Salmon Commission and fishermen work together to promote "Quality-Tagged" salmon. These troll-caught Coho and Chinook salmon are marketed with a tag, or label, to identify a hook and line-caught salmon which has been handled in a prescribed manner to assure a quality product (33).

International competition is an important factor motivating interest in improving quality during harvesting (14). It is reported that on-board bleeding and boxing of bottomfish off the northeastern American coast has resulted in dramatic improvement in appearance, yield, shelf-life, texture, and overall quality compared to traditional handling methods (34). A large east coast supplier successfully markets fresh and frozen Grade A fish. The fish are received, processed, and packaged the same day, with a "sell-by" date and Grade A label, for sale to retail markets (34).

Seafood Promotion

The demand for seafood is strong and is expected to grow (35,36, 37). The popularity of seafood is attributed to economics, changing lifestyles, population growth, and a concern for health (35). The development

of convenience foods, such as frozen seafood dinners, has encouraged consumers to include seafood more often in their diets (35).

Educating the supplier, processor, retailer, and consumer is viewed as an important marketing tool to increase seafood consumption (27,32,38). By all indicators, marketing and promoting quality fresh fish appear to be good business. From coast-to-coast, trade associations and retailers are promoting seafood and educating consumers via in-store demonstrations, informative ads, newsletters, point of purchase materials (including videos), and a new consumer-oriented seafood magazine (39,40). Marketing seafood to reach its potential also includes accepting responsibility for assured quality and providing consumers with the full value of their purchase (41).

METHODS

Development of the Instrument

A questionnaire with a structured response format was developed after a review of literature (including market research surveys) (24,25), and in consultation with the Extension Food and Nutrition Specialist and the Survey Research Center at Oregon State University (OSU). The questionnaire solicited the following information regarding fresh fish: (1) frequency of consumption; (2) reasons for not consuming; (3) place of purchase; (4) length of storage; (5) frequency of discard; (6) rating of factors influencing purchase; (7) rating of importance of labeling information; (8) knowledge regarding preparation and storage; and (9) attitudes regarding fresh fish quality. Time restrictions necessitated about a 15-minute period for completion.

The preliminary draft was presented to graduate students and faculty members in the Department of Foods and Nutrition (OSU). This draft was modified as suggested and reviewed by the Survey Research Center. The revised questionnaire was pilot-tested during February, 1987, at a scheduled meeting with 13 Extension homemaker leader-teachers in Polk County, Oregon.

The final draft included 11 questions about fresh fish purchase, preparation, and consumption, as described above, and 6 demographic questions,

including: sex, age, education, number in household, length of time in Extension, and previous seafood education. A copy of the final questionnaire is included in the Appendix.

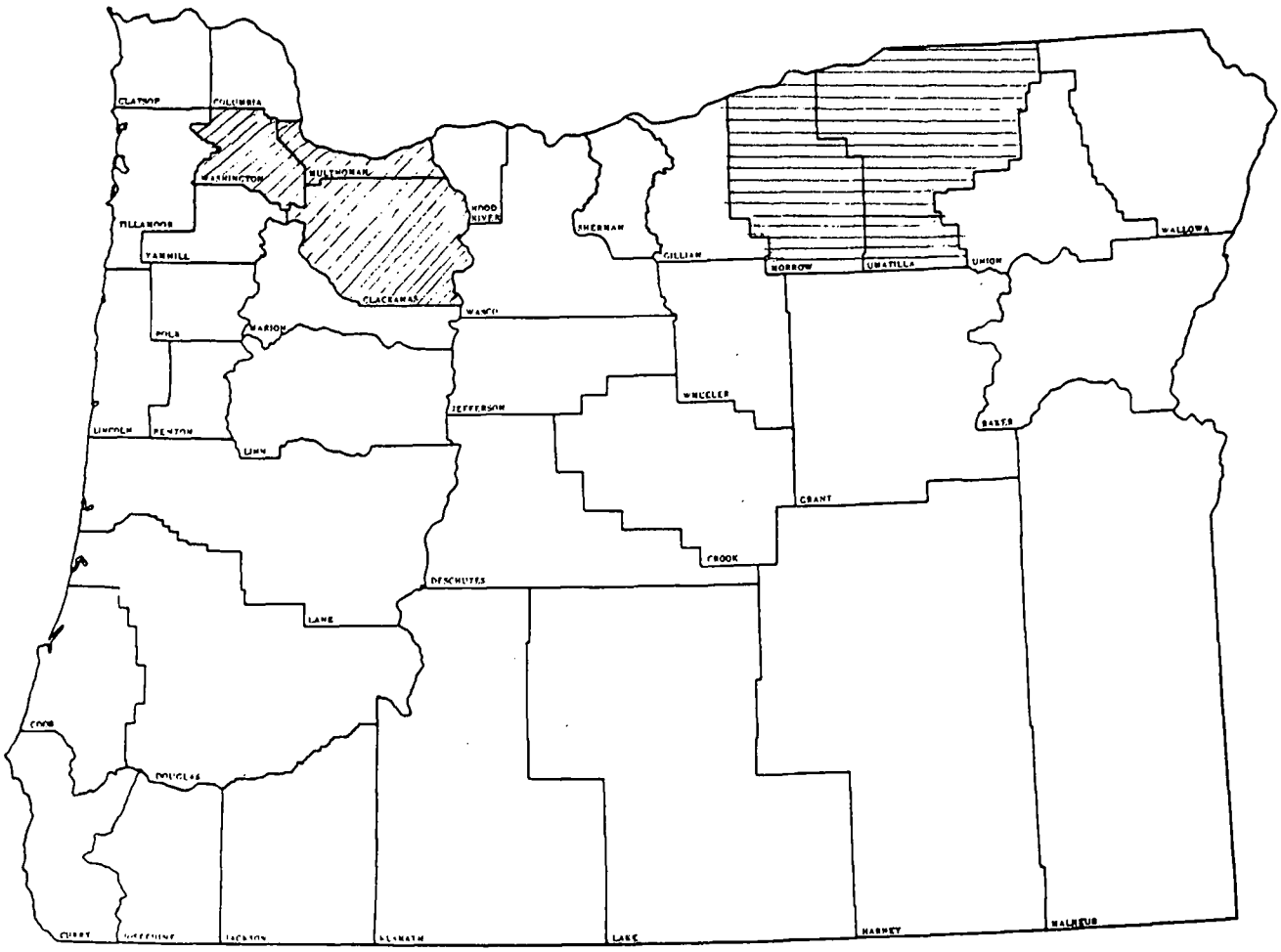
Selection of the Sample

The study population was homemakers who participate in the OSU Extension Service Home Economics study group program. Homemakers meet monthly for a planned home economics program taught by a trained volunteer leader-teacher. Study groups in Washington, Multnomah, and Clackamas Counties were chosen to represent western Oregon and an urban population. Additional study groups were chosen in Umatilla and Morrow Counties to represent the rural, eastern Oregon population (Figure 2).

Administration of the Questionnaire

The questionnaire was administered in March, 1987, by the researcher to 40 leader-teachers in Washington, Multnomah, and Clackamas Counties prior to a planned leader-training on seafood taught by Washington and Multnomah County Extension home economics agents. In addition, verbal and written instructions (see Appendix) were provided to leader-teachers who would administer the questionnaire to their own study groups during the following month. A total of 250 questionnaires was distributed for administration to study groups in Washington, Multnomah, and Clackamas Counties.

An additional 250 questionnaires were administered in Umatilla and Morrow Counties. In this sample, 30 leader-teachers completed the questionnaires in March, 1987, prior to training by the Umatilla County Extension home economics agent. They were also provided with verbal and written



Key

= Washington, Multnomah, & Clackamas Counties

= Umatilla & Morrow Counties

Figure 2. Map of Oregon Counties.

instructions for administering the remaining 220 questionnaires to their study groups during the following month.

Questionnaires administered to leader-teachers in Washington, Multnomah, and Clackamas Counties were collected by the researcher immediately upon completion. Those completed by leader-teachers in Umatilla and Morrow Counties were collected immediately by the Umatilla County Extension home economist and mailed directly to the researcher. Questionnaires provided for administration to study groups were collected by leader-teachers in all counties after completion and mailed directly to the researcher by each group.

The collection of data occurred over a period of about eight weeks during April and May, 1987.

Treatment of the Data

Data from questionnaires were coded and verified by the Survey Research Center (OSU). Statistical analysis was completed by the Milne Computer Center at OSU, using the Statistical Package for Social Sciences (42) on the Cyber 170/720. Statistical techniques used to evaluate data included: descriptive statistics (frequency distribution, percent, mean, range), one-way analysis of variance (ANOVA), t-test, Chi square, and cross tabulation. Statistical tests were conducted at the five percent (.05) significance level. Reported frequencies were adjusted to eliminate missing responses from the total.

RESULTS AND DISCUSSION

Response to Questionnaire

Questionnaires were distributed to study groups in Washington, Multnomah, and Clackamas Counties and 167 questionnaires (representing 19 study groups) were returned. The 40 questionnaires administered to Washington, Multnomah, and Clackamas County leader-teachers by the researcher brought Western Oregon response to 207 returned questionnaires.

Questionnaires were distributed to study groups in Umatilla and Morrow Counties and 161 questionnaires (representing 21 study groups) were returned. An additional 30 questionnaires administered to Umatilla and Morrow County leader-teachers by the Umatilla County Extension home economist brought the Eastern Oregon response to 191 returned questionnaires.

A total of 398 questionnaires were returned representing Western and Eastern Oregon.

Description of the Sample

All of the Western Oregon respondents were female. In the Eastern Oregon sample, 98% were female. The mean age for the combined sample was 59 years. Demographic characteristics of Western and Eastern Oregon respondents are outlined in Table 1.

The modal level of education was high school graduation, reported by 38% of respondents in both Western and Eastern Oregon. For all respon-

dents, high school graduation, some college, and college graduation accounted for 86% of the response. These figures are similar to those reported by the National Marine Fisheries Service (NMFS) survey, where 38% reported 12 years of schooling and 43% reported 13 or more years (24). In the Cornell study, 95% of the respondents were high school graduates or had some post-secondary education (26). Education levels were not reported in the *Better Homes and Gardens* survey.

The mean household size for the combined sample was reported as 2.4 persons. This finding is not unexpected, considering that the mean age of the respondents was 59 years of age. In the NMFS study, 49% of the homemakers reporting were over 45 years of age and 56% of the households were composed of adults only (24). For the Cornell study, 61% of the respondents were 50 years of age or older and 77% of all households reporting had no children under age 18 (26).

Oregon respondents reported a long-term involvement with Extension study groups: a mean of 16 years for the entire sample. In the Western Oregon sample this mean was higher, consistent with the older mean age of this group (Table 1).

Frequency of Consumption

For all respondents, 60% reported serving fresh fish at home two to three times a month or more often (Table 2). In general, fresh fish were served at home with greater frequency in Western Oregon than in Eastern Oregon. Of the Western Oregon respondents, 75% served fish two to three times per month or more often, compared to 44% in Eastern Oregon.

Table 1. Demographic Characteristics of Extension Homemaker Survey Respondents.[1]

	Western Oregon	Eastern Oregon
	Percentage	
Sex (n=398)		
female	100	98
male	0	2
TOTAL	100	100
Highest Level of Education (n=392)		
no formal education	1	0
grade school	2	2
some high school	9	10
high school graduate	38	37
trade school	3	3
some college	35	26
college graduate	10	18
graduate school	2	4
TOTAL	100	100
	Number	
Age (n=367)		
mean and standard deviation	62 ± 14	54 ± 16
Number in Household (n=398)		
mean and standard deviation	2.2 ± 1.1	2.5 ± 1.4
Years in Extension (n=390)		
mean and standard deviation	19 ± 13	13 ± 13

[1]Respondents were a self-selected sample of Extension homemakers in Washington, Multnomah, and Clackamas Counties in Western Oregon and Umatilla and Morrow Counties in Eastern Oregon.

Table 2. Frequency of Fresh Fish Consumption at Home Reported by Survey Respondents (n = 398).

Frequency of at-home fresh fish consumption	Percent
more than three times a week	1
two or three times a week	16
once a week	23
two or three times a month	20
once a month	12
less than once a month	21
never	7

The preference for fresh fish in the Western Oregon sample may be explained by the location of major food brokers and distributors in the Portland area, and the close proximity to coastal fish markets. The perishable nature of fresh fish may also limit distribution, especially for a limited market.

In comparison, 61% of the *Better Homes and Garden* survey respondents reported serving seafood (including fish and shellfish) several times a month or more often (25). In the Cornell survey of seafood consumers, 69% reported purchasing fish three times a month or more often (26). Of the NMFS survey respondents, 28% were defined as heavy seafood users, consuming seafood once a week or more often, and 48% consumed seafood once every two to four weeks, or more often (24). In this study, 7% never served fresh fish, equalling the 7% of the *Better Homes and Gardens* survey respondents who also reported never serving seafood (25).

Reasons for not Serving Fish Often

Respondents were asked to select from listed reasons why they might not serve fish often (Table 3). "Cost too much" received the greatest response, with over 50% of all respondents noting this reason. That fish were not available locally was an important reason in Eastern Oregon (57%), compared to Western Oregon (8%). Except for availability, responses were similar for Western and Eastern Oregon. Quality, recipes, and family preferences were important reasons for about one-third of the respondents. Not liking the taste or touch of fish were not important reasons. The sample size indicates that the question or format may not have been clear.

Table 3. Reasons For Not Serving Fish Often Reported by Survey Respondents.

Reasons for not serving fish often	n	Percent
costs too much	320	51
not available locally	281	34
don't like quality	260	33
don't have good recipes	275	31
don't like smell	280	30
family doesn't like	283	28
don't know how to cook	270	18
don't like taste	259	12
don't like touching	262	5

In the *Better Homes and Gardens* survey, respondents who served fish infrequently (once a month or less often) noted the primary reasons as: "don't like smell" (36%), "don't have good recipes" (23%), "don't know how to cook" (21%), and "too expensive" (21%) (25).

Where Fresh Fish Were Purchased

Respondents were asked where they purchased fresh fish most often. For all respondents, fresh fish were purchased most often at a supermarket or local market (71%) (Table 4). Fish were obtained by personal catch twice as frequently in Eastern Oregon than in Western Oregon (23% and 11%, respectively) and were purchased at specialty markets almost twice as frequently in Western Oregon than in Eastern Oregon (10% and 6%, respectively). These findings are not surprising, given the urban and rural population characteristic differences between the two samples. Those respondents obtaining fish in the "other" category noted family members catching fish or receiving gift fish. The low response rate to this question (n = 312) suggests the question, or possible response categories, may not have been clear. One's local market may also be a supermarket, which may even have a specialty fish market. In addition, those respondents who selected more than one category invalidated the entire response.

Length of Fresh Fish Storage

Respondents were asked how long they stored fresh fish at home before cooking it. The majority of all respondents (83%) reported one day or less (Table 4). Responses were similar for Western Oregon and Eastern Oregon, except in the four days or more category. Of the Eastern Oregon respondents, 7% reported storing fish four days or longer, compared to 3% in Western Oregon. It is possible that this question may not have been

Table 4. Sources of Fresh Fish, Length of Storage, and Frequency of Discard Reported by Survey Respondents.

Sources of Fresh Fish (n=312)	Percent
supermarket	57
local market	14
personal catch	17
speciality fish market	8
other	4
butcher	0
Length of Fresh Fish Storage at Home (n=363)	
less than one day	37
one day	46
two days	11
three days	2
four or more days	5
Frequency of Discarding Fresh Fish (n=364)	
never	81
sometimes	18
frequently	1

clear. Respondents may have reported storage of frozen rather than fresh fish.

Frequency of Discard

Respondents were asked how often they might discard fish without preparing it. Eighteen percent (18%) of all the respondents reported sometimes discarding fresh fish (Table 4). When asked to briefly describe the reason for discarding fish, all respondents noted "smell." Response to this question indicates that the fish purchased by consumers may have been of suspect quality at the point of purchase, was perhaps held at an inadequate

temperature prior to preparation, or was simply stored too long at home prior to use.

Considerations Affecting Fresh Fish Purchase

Respondents were asked to rate the importance of nine considerations when purchasing fresh fish (Table 5). Response categories were "very important," "somewhat important," "not too important," or "not at all important."

Freshness was considered "very important" by most all respondents (Table 5). Other considerations rated as "very important" by more than half of all respondents were taste, smell, appearance, availability, and nutrition. Price was very important to 50% of all respondents, consistent with the 51% who stated that price was a reason for not serving fish often (Table 3). Responses were similar for Western and Eastern Oregon. The response to this question indicated that factors of quality (freshness, taste, smell, and appearance) are important considerations when purchasing fresh fish. Response to a similar question in the Cornell (26) and *Better Homes and Gardens* (25) surveys supported the importance of consumer perceptions of quality. In the Cornell study, odor was rated as the most important criteria for evaluating quality.

The only consideration which received any response over 3% as "not at all important" was the state or country of origin (15%). In the State of Oregon, agricultural commodity commissions are responsible for the promotion and marketing of Oregon fish and shellfish and they place emphasis upon freshness and quality (43). While "state or country fish is from"

Table 5. "Very Important" Considerations When Purchasing Fresh Fish.

	n	Percent
Freshness	364	96
Taste	356	92
Smell	339	74
Appearance	338	73
Availability	342	64
Nutrition	330	57
Price	326	50
Ease of preparation	324	39
State or country of origin of fish	321	28

received the lowest rating as a "very important" consideration, over one-quarter of the respondents indicated an awareness of this consideration.

Knowledge About Fresh Fish Storage and Preparation

Respondents were asked if they "agree," "disagree," or were "not sure" about five knowledge statements (Table 6). There was general agreement (77%) that smell is an indicator of freshness. Other research has noted that consumers can discriminate sensory attributes of fish quality, including smell (29), and rate smell as an important criteria for evaluating quality and freshness (26).

Many respondents (71%) correctly agreed that cooking fish too long makes it tough. While cooking fish too long is not the only cause of toughening in fish muscle (44), it is a factor which is under the consumer's influence. Toughness in cooked fish has been identified as an undesirable characteristic (14,29).

Table 6. Response to Statements About Fresh Fish Storage and Preparation Reported by Survey Respondents (n = 365).

	Agree	Disagree	Not Sure	Total
		Percent		
It is easy to tell if fish is fresh by smell	*77	9	14	100
Cooking fish too long makes it tough[1]	*71	14	15	100
Raw fish can be refrigerated the same length of time as raw poultry without affecting quality[1]	19	*47	34	100
The best temperature to store raw fish is 32°[1]	*44	21	35	100
Raw fish is required to be government inspected	43	*13	44	100

[1]Scored as a measure of knowledge.
*Correct answer.

Almost one-half of all respondents (47%) correctly disagreed that fresh fish can be refrigerated the same length of time as raw poultry without affecting quality. In general, raw fish has a shorter shelf life and is considered more perishable than raw poultry (28). The enzymes and bacteria of fish are adapted to the cooler temperature of refrigerated storage and may hasten spoilage. It is recommended that fresh fish be prepared as soon as possible after purchase (8,14).

Forty-three percent (43%) of all respondents correctly identified 32°F as the best temperature to store raw fish. While 32°F is the recommended temperature for storage of fish, home refrigerators may not be this

cold. For this reason, it is recommended that fish be stored in the coldest part of a refrigerator and packed in crushed ice if available (8,14).

Only 13% of the respondents knew that raw fish is not required to be government inspected. As described in the "Review of Literature," seafood inspection is a voluntary fee-for-service program (19). Less than 13% of domestically produced seafood is voluntarily inspected and that percentage is declining each year (20). *Better Homes and Gardens* also queried respondents regarding government inspection of seafood, asking "what amount of fish and shellfish sold in the store is government inspected?" Response included "all" (31%), "most" (29%), "some" (17%), and "none" (7%) (25).

Response to these statements indicates that knowledge of storage and preparation of fresh fish is lacking and there are areas of uncertainty. Almost one-third of all respondents were not sure or did not know that cooking fish too long makes it tough. Over one-half of all respondents were not sure or did not know the best temperature to store raw fish, or the optimum length of time for at-home storage.

Attitudes Regarding Fish Quality, Purchase, and Preparation

Attitudes about the quality, purchase, and preparation of fish were measured by asking respondents how strongly they agreed or disagreed with six statements (Table 7). Four of these six statements assessed respondents' perceptions of the freshness and quality of fresh fish. Two-thirds (66%) of the respondents agreed or strongly agreed that it was difficult to tell freshness by appearance; 46% were often disappointed in the quality of purchased fresh fish; and almost as many (44%) agreed that most fish taste

fishy. Two-thirds of the respondents (67%) also agreed that they would buy fish more often if they knew it was really fresh.

There was agreement by 54% of the respondents that labels are a good way to provide information about fresh fish quality. There was almost unanimous agreement (94%) that fish are quick and easy to prepare. In comparison, 73% of the *Better Homes and Gardens* survey respondents agreed that it was easy to prepare good tasting fish dishes (25).

Table 7. Response to Attitude Statements About Fresh Fish Quality, Purchase, and Preparation Reported by Survey Respondents (n = 353-365).[1]

	SA	A	D/A	D	SD
			Percent		
I am often disappointed in the quality of fresh fish that I buy	14	32	32	21	2
In general, most fish tastes "fishy"	9	35	16	36	4
It is difficult to tell by appearance how "fresh" raw fish really is	17	49	14	17	4
Labels on fresh fish are a good way to provide information on quality	15	39	28	16	2
I would buy fish more often if I knew it was really fresh	30	37	22	11	1
Fish is quick and easy to prepare	43	51	5	2	-

[1]SA = Strongly agree; A = Agree; D/A = Neither agree or disagree; D = Disagree; SD = Strongly disagree.

Information on Labels for Fresh Fish

Respondents were provided with a list of information appropriate for a label on packaged fresh fish. They were asked to identify which information they felt was most important, second most important, and least important.

Guaranteed freshness received the greatest response as "most important" (Table 8). Other information considered important by the respondents included cooking instructions, a "use by" date, and nutrition information. The least important information was the state or country of origin of the fish; the class of the fish, including fat, medium fat, or lean characteristics; storage information; and the name of the fish.

Table 8. Rating of Label Information Considered Most Important by Survey Respondents (n = 342).

Label Information	Percent
Guaranteed freshness	42
Cooking instructions	16
"Use-by" date	15
Nutrition information	12
Name of fish	6
Storage information	5
Class of fish: fat, medium fat, or lean	3
State or country of origin of fish	1
TOTAL:	100

Respondents in the Cornell study were asked to indicate their interest in different types of product information regarding the purchase of fresh fish. In a hypothetical question, respondents were provided with one dollar to purchase any of 22 types of information. The cents allocated to each

type of information was used as an indicator of the importance of that information (26). The Cornell respondents were most concerned with indicators of fish age as measured by time. They wanted to know when the fish was caught, when it arrived at the market, and how long it had been in the display case. The temperature at which the fish was kept was less important than time. Other information considered important by the Cornell respondents included preparation instructions, characteristic odor when fresh, taste when cooked, and season. Less important information included where and how the fish was caught, calorie and nutrient content, storage, nomenclature, and number of servings.

The findings of this Oregon study are consistent with the generally recognized needs of the consumer for information regarding the purchase and preparation of fresh fish. Precisely what type of nutrition information the respondents might be interested in is less clear. Many more respondents were interested in nutrition information than the class of fish and fat, medium fat, or lean characteristics. Yet, knowing the class of fish and whether it is fat, medium fat, or lean provides information about calories and nutrition.

Sources of Consumer Information

Respondents (n=277) were asked to identify the one best way to provide them with future information about the storage and preparation of fresh fish. Six choices were provided. The low response to this may indicate a non-response due to confusion about the question, or the selection of more than one response and the resulting invalidation of the response.

Thirty-eight percent (38%) of all respondents chose the Extension Services as the one best way to provide them with future information. This response was slightly higher in Eastern Oregon (42%) compared to Western Oregon (34%). Other sources of information included: retail store display or handout (20%); newspaper (14%); food labels (12%); magazines (7%); and TV (7%). In addition, 18% of all respondents reported participation in an Extension seafood correspondence course or other seafood workshop prior to participation in this study group. In comparison, 13% of the *Better Homes and Gardens* respondents reported observing or participating in a seafood cooking class (25).

While this study asked respondents from what source they would like to receive future information about fish, the Cornell survey asked respondents from what source they had received past information about fish. The Cornell respondents selected from a choice of 20 possible information sources. The most frequent sources of past information included trial and error, parents, cookbooks, fish salespersons, spouses, newspapers, and travel. Extension was rated 14th on the list of 20 and 79% reported receiving little or no information about fish from Extension (26).

Testing of Hypotheses

Hypothesis 1: Frequency of fresh fish consumption will be unrelated to place of residence (Western Oregon vs. Eastern Oregon).

Chi-square analysis showed frequency of consumption (Q1) varied significantly with place of residence (Western vs. Eastern Oregon). Fresh fish were reported purchased and consumed with significantly greater frequency in Western Oregon than Eastern Oregon ($p \leq .001$; Chi-

square = 46). The preference for fresh fish in the Western Oregon sample may be explained by availability, the location of major food brokers and distributors in the Portland area, and close proximity to coastal markets. The perishable nature of fresh fish may also limit distribution, especially for a limited market. Fresh fish consumption varies by season, and this survey is limited by sampling in only two of the months that fish are available.

Hypothesis 2: Satisfaction with the quality of fresh fish will be unrelated to frequency of consumption.

Satisfaction with the quality of fresh fish was measured by response to a five-point agree-disagree statement, "I am often disappointed in the quality of fresh fish that I buy" (Q-8a). Chi-square analysis did not show a significant difference between satisfaction and frequency of consumption (Q-1). In general, respondents at all consumption frequency levels agreed that they were often disappointed in the quality of purchased fresh fish.

Quality and the absence of assured quality have been identified as important considerations governing the consumption of seafood (12). In the Cornell study, researchers concluded that even experienced and enthusiastic consumers of fresh fish demonstrated limited abilities to assess fresh fish quality (26). In the NMFS survey, non-users of at-home seafood expressed dissatisfaction with the quality of seafood, while the majority of seafood consumers appeared satisfied with quality (24).

Hypothesis 3: Satisfaction with the quality of fresh fish will be unrelated to prior participation in a seafood course.

Participation in a previous course or workshop about seafood (Q-17) showed no significant relationship to satisfaction with quality (Q-8a) as

measured by Chi-square analysis. These findings appear to support the difficulty of assessing quality in fresh fish by the consumer, even experienced and enthusiastic consumers, as noted by Cornell researchers (26).

Hypothesis 4: Knowledge regarding the storage and preparation of fish will be unrelated to prior participation in a seafood course.

Household knowledge regarding the storage and preparation of fresh fish was measured by the agree-disagree-not sure response to the following three statements (Q-7b,c,e):

1) The best temperature to store raw fish is 32°F.
2) Cooking fish too long makes it tough.
3) Raw fish can be refrigerated the same length of time as raw poultry without affecting quality.

A mean knowledge score was determined by assigning one point to each correct answer and a t-test was used to test the relationship between knowledge scores and participation in a previous seafood course. This relationship was significant ($p \leq .002$). Respondents who participated in a prior seafood course had a mean knowledge score of 1.8 and a standard deviation of .09. Respondents without the experience of a previous seafood course had a mean knowledge score of 1.4 and a standard deviation of 1.0.

It appears that respondents who participated in a previous seafood course have gained knowledge specific to the storage and preparation of fresh fish. However, respondents who participate in a seafood class and exhibit an interest in seafood may have gained information from a variety of sources.

Hypothesis 5: Frequency of consumption will be unrelated to knowledge regarding storage and preparation of fish.

A one-way ANOVA was used to test the relationship between frequency of consumption (Q-1) and mean knowledge score. The mean knowledge score was measured by the agree-disagree-not sure response to question 7b, c, and e.

There was a significant relationship between frequency of consumption and mean knowledge score ($p \leq .001$). Respondents who consumed fish with greater frequency also correctly identified those statements related to the storage and preparation of fresh fish (Figure 3).

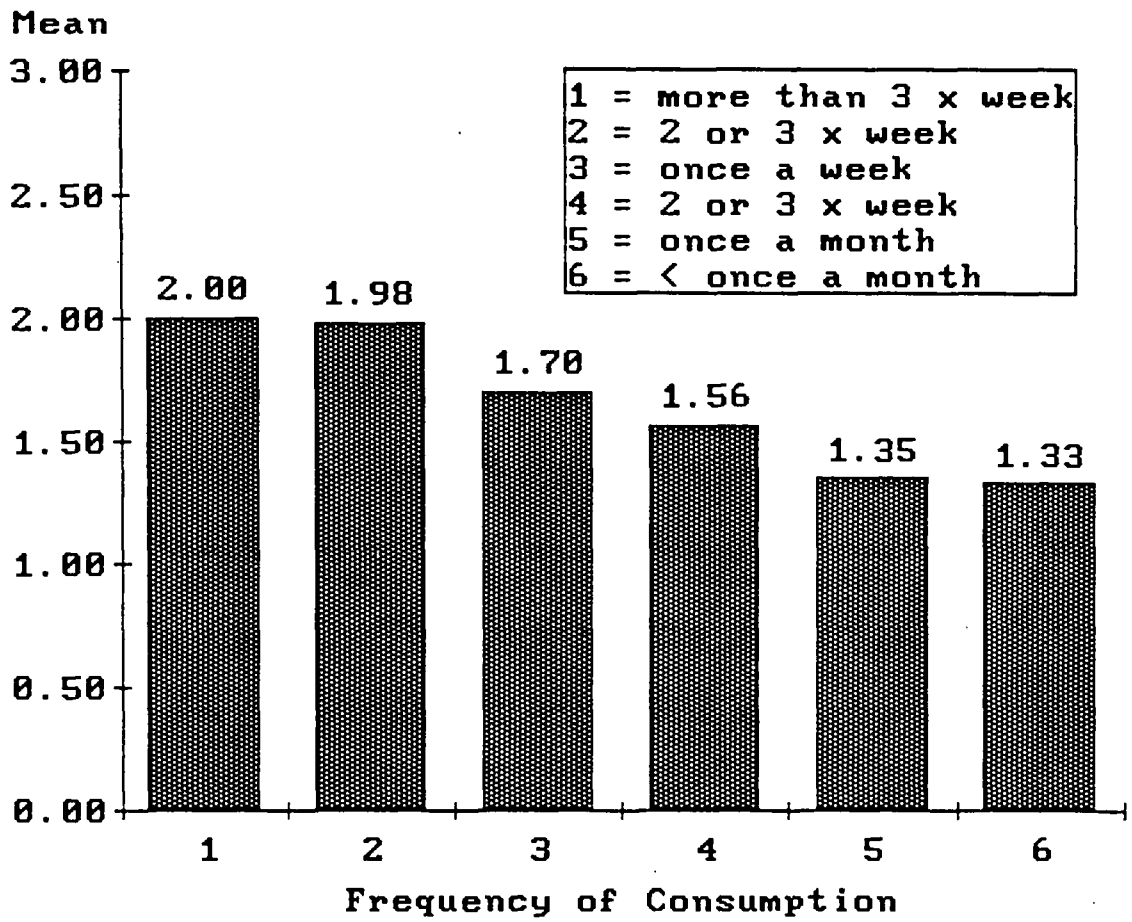


Figure 3. Relationship Between Frequency of Consumption and Mean Knowledge Score (n=369; $p \leq .001$)

It appears that respondents who consume fresh fish often also exhibit an interest in learning about fish. In the Cornell study, respondents reported that their information about fish came most frequently from trial and error, parents, cookbooks, and fish salespersons (26). It appears that all respondents would benefit by learning more about fish. Knowledge about the correct procedures for the storage and preparation of fish may serve to improve satisfaction with the quality of fresh fish.

Hypothesis 6: Satisfaction with the quality of fresh fish will be unrelated to knowledge regarding storage and preparation of fish.

The one-way ANOVA was used to test the relationship between satisfaction with the quality of fresh fish (Q-8a) and mean knowledge score. The mean knowledge score, measured by the agree-disagree-not sure response to questions 7b, c, and 3, has been described.

There was no significant relationship between mean knowledge score and satisfaction with quality. Respondents who expressed satisfaction or dissatisfaction with the quality of fresh fish had almost identical mean knowledge scores.

Discussion

Fish offers a versatile and healthy addition to American diets. Most consumers view fish as quick and easy to prepare. Yet, seafood consumption is limited in comparison to red meats and poultry. In this study frequency of fresh fish consumption was significantly related to knowledge regarding storage and preparation of fresh fish. These findings support the need to provide consumers with information.

This study found that consumers need information regarding basic techniques for at-home storage and preparation of fresh fish. In addition, consumers need information to assist them in the identification of good quality fresh fish. Further, consumers were receptive to labeling on fresh fish as a means to provide this information.

Respondents were aware of quality and agreed that freshness, taste, smell, and appearance are important considerations when purchasing fresh fish, yet many expressed disappointment with the quality of fresh fish purchased for home use. Satisfaction with the quality of fresh fish was unrelated to frequency of consumption, a prior seafood course, or knowledge regarding the storage and preparation of fresh fish.

Findings suggest that dissatisfaction with the quality of fresh fish may occur at the point of purchase. Retailers are responsible for the provision of quality fresh fish to the consumer and the importance of educating the retailer should not be overlooked. The provision of quality fresh fish should be the cornerstone for the promotion and marketing of fresh fish. Currently, the absence of standards or quality assurance places responsibility for identifying good quality fish on the consumer. Providing the consumer with information is important, but it cannot rescue poor quality fish.

Providing consumers with information at the point of purchase educates consumers and promotes fish. Labeling fish is an opportunity to identify quality and educate consumers with at-home storage and preparation information. Labeling information could be printed on stickers which attach to pre-packaged fish or on disposable plastic or paper bags. The potential of videos at the fish counter is exciting. This study supports the importance of the retailer as a source of consumer information.

The role of the Extension Service and its home economics agents as educators is also an important aspect of consumer education. These home economists have the opportunity to provide informal education programs that are responsive to the needs of Oregonians. This research supports the need for consumer education as a prerequisite to promoting the consumption of fish.

Finally, an unrelated finding of this study suggests that consumers perceive fish as expensive. For many, cost was a reason to limit their consumption of fresh fish. It is suggested that future consumer education address this concern by emphasizing less expensive fish, the edible nature of fish, and the absence of bones, skin, and fat.

Recommendations For Future Research

Research to identify the type of information most useful to consumers is needed. A randomly sampled population might provide insights in comparison to the self-selected samples cited in this research. Further, an experimental study to analyze the effectiveness of quality assurance and at-home storage and preparation information on labels might provide some answers to the question: do labels make a difference? A survey of fish quality and fish handling practices at the retail level would serve to identify improvements needed to assure that quality fresh fish are available to the consumer.

SUMMARY

The purpose of this study was to identify consumer perceptions of quality in fresh (i.e., raw) fish purchased for home use. In addition, this study explored consumer need for quality indicators and labeling on fresh fish. Household practices pertaining to quality were also assessed.

The study population consisted of homemakers who participate in the Oregon State University Extension Home Economics study group program. Study groups in Washington, Multnomah, and Clackamas Counties were chosen to represent Western Oregon and an urban population. Study groups in Umatilla and Morrow Counties were representative of the rural, Eastern Oregon population.

Information from homemakers was obtained via questionnaire with a structured response format. The questionnaire solicited the following information regarding fresh fish: (1) frequency of consumption; (2) reasons for not consuming; (3) place of purchase; (4) length of storage; (5) frequency of discard; (6) rating of factors influencing purchase; (7) rating of importance of labeling information; (8) knowledge regarding preparation and storage; and (9) attitudes regarding fresh fish quality.

The response to this research represents the perspective of homemakers who participate in the OSU Extension Home Economics study group ($n = 398$). They were predominantly female and older, with a mean age of 59 years. As such, they represent many years of consumer and homemaking experience. They were educated, with 83% reporting at least a high

school degree. Of the total number of respondents, 18% reported participation in a prior seafood workshop, indicating an interest and desire to learn new information. Participants appear supportive of Extension study groups insofar as the mean length of involvement was 16 years. The mean household size of 2.4 is consistent with an older homemaker population.

Of all respondents, 60% reported serving fresh fish at home two or three times a month, or more often, with greater frequency in Western Oregon; in contrast, 7% never served fish in their homes. The primary reasons for not serving fish often were: costs too much (51%); not available locally (34%); don't like the quality (33%); don't have good recipes (31%); and don't like the smell (30%). Fresh fish were purchased most often in supermarkets (57%) and were stored at home one day or less by 83% of the respondents.

The most important reasons given by almost 75% of the respondents for the purchase of fresh fish were freshness, taste, smell, and appearance. The least important reason for purchase was the state or country of origin of the fish. Two-thirds (66%) of the respondents agreed that it was difficult to tell by appearance how "fresh" fish really is and a nearly identical number (67%) agreed that they would buy fish more often if they knew it was really fresh. Seventy-seven percent (77%) agreed that smell was an indicator of freshness. One in five respondents (18%) reported sometimes discarding fish before preparation.

Over one-half of all respondents did not know the best temperature at which to store fresh fish or the optimum length of time for at-home storage. Almost one-third did not know that cooking fish too long makes it tough and only 13% were aware that fish are not required to be government inspected. Nearly equal numbers of the respondents agreed and disagreed,

44% and 40%, respectively, that most fish taste fishy. Almost all of the respondents (94%) agreed that fish are quick and easy to prepare.

A significant portion of the respondents (54%) agreed that labels on fresh fish were a good way to provide information about quality. When asked to rate information considered most important on labels, 42% chose guaranteed freshness, 16% cooking instructions, 15% a use-by date, and 12% chose nutrition information. Respondents chose Extension (38%), retail store displays (20%), newspapers (14%), and food labels (12%) as the best way to provide future information.

Data analysis identified a significant relationship between frequency of consumption and knowledge regarding the storage and preparation of fresh fish. A significant relationship was also identified between knowledge and participation in a prior seafood course. However, satisfaction with the quality of fresh fish was unrelated to knowledge, participation in a prior seafood course, or frequency of consumption.

In this study respondents rated indicators of quality (freshness, smell, appearance) as important considerations when purchasing fresh fish, but appear to demonstrate limited ability to assess quality. The response to this survey supports the need to provide consumers with information about the storage and preparation of fish. Providing the consumer with quality fresh fish, together with information about at-home storage and preparation techniques, may be the most important aspect of marketing fish.

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APPENDICES

Appendix A

Memo to Extension Study Group Leader-Teachers

EXTENSION SERVICE
Home Economics

Oregon State University

Milam 161
Corvallis, Oregon 97331-5106

(503) 754-3211
(503) 754-3684 EFNEP and
Family Community Leadership

MEMO

To: Extension Study Group Leader-Teachers

From: Heidi Hadlett, Graduate Student
Carolyn A. Raab, Extension Foods and Nutrition Specialist

Subject: Instructions for Extension Homemaker Survey

Date: March 17, 1987

A cover letter and six page survey is provided for each homemaker in your study group. The cover letter and survey should be distributed at the beginning of your study group meeting. Homemakers should be instructed to read the cover letter before completing the survey. About fifteen minutes should be allowed to fill out the survey.

The completed surveys should be collected by the leader-teacher after everyone has finished answering all six pages. As you collect each survey place it immediately into the addressed and stamped envelope which has been provided. This is very important to show respect for, and to maintain, the homemakers confidentiality. Only the surveys should be collected; the cover letter is for the homemaker and should not be collected.

Homemakers who are interested in receiving a summary of the survey results should write their name and address on the form "Results Requested". This form is included with the surveys and should be returned with the surveys.

A stamped and addressed envelope is provided. Each envelope has enough postage for ten surveys. As the surveys are collected and placed into the envelope, it is important to make sure that there are no more than ten surveys per envelope. As soon as the surveys are collected and placed into the envelope the envelope should be sealed. On the envelope, in the return address corner, is a place to write in your study group name. The envelope is now ready to be mailed and can be placed in any mail box.

We would be happy to answer any questions that you might have. Thank you for your assistance.

Appendix B

Letter Accompanying Questionnaire

EXTENSION SERVICE
Home Economics

Oregon State University

Milam 161
Corvallis, Oregon 97331-5106

(503) 754-3211
(503) 754-3684 EFNEP and
Family Community Leadership

April 1987

Dear Homemaker:

We are conducting a survey to identify information which will benefit consumers when purchasing fresh fish for "at home" consumption. This survey asks questions about fresh fish (or fish which is raw and not frozen when purchased) which you buy and prepare for home. We are interested to learn how often you might eat fresh fish at home and other questions about your use of fish.

The study groups in your county have been asked to participate in this survey. Your participation is voluntary but your response is important and will help us to plan future Extension programs. The survey should take no more than fifteen minutes. Information from the survey is confidential. Your name cannot be identified with the survey or the results. If you are interested in receiving a summary of the results, please give your name and address to your leader-teacher, on the form "Results Requested".

We would be happy to answer any questions you might have. Thank you for your assistance.

Heidi Hadlett
Graduate Student

Carolyn A. Raab
Extension Foods and Nutrition Specialist

OREGON STATE UNIVERSITY EXTENSION SERVICE

Agriculture, Home Economics, 4-H Youth, Forestry, Community Development, Energy, and Extension/Sea Grant Programs. Oregon State University, United States Department of Agriculture, and Oregon Counties cooperating.

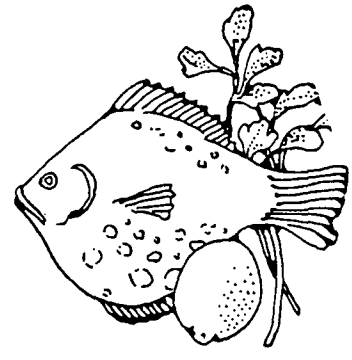
Appendix C

Questionnaire

EXTENSION HOMEMAKER SURVEY

This survey asks questions about fresh fish, (or fish which is not frozen when purchased), which you buy and prepare for home use. We are interested to know how often you might eat fresh fish at home and other questions about your use of fish.

Your participation in this study is important and will help us to plan future Extension programs.



Please return your completed questionnaire to your study group leader.

Thank you for your help.

Heidi Hadlett
Graduate Student

Carolyn A. Raab
Extension Foods and Nutrition Specialist

1. About how often do you serve fresh fish at home? (Circle one number)

   1 MORE THAN THREE TIMES A WEEK
   2 TWO OR THREE TIMES A WEEK
   3 ONCE A WEEK
   4 TWO OR THREE TIMES A MONTH
   5 ONCE A MONTH
   6 LESS THAN ONCE A MONTH
   7 NEVER (please answer 2., then skip to question 12)

2. Below is a list of reasons why people might not serve fish often. Please indicate whether or not each is a reason for you. (Circle one number for each)

		YES, A REASON	NO, NOT A REASON
a.	Don't have good recipes	1	2
b.	Costs too much.	1	2
c.	Don't like touching	1	2
d.	Family doesn't like	1	2
e.	Don't know how to cook	1	2
f.	I don't like quality	1	2
g.	Not available locally	1	2
h.	I don't like taste	1	2
i.	I don't like smell	1	2
j.	Other _____ (please specify)	1	2

3. From which of the following places do you buy fresh fish most often? (Circle one number).

   1 LOCAL MARKET
   2 SUPERMARKET
   3 BUTCHER
   4 SPECIALTY FISH MARKET
   5 PERSONAL CATCH
   6 OTHER _____
   (please specify)

4. After purchasing fresh, unfrozen fish, about how long do you usually store it at home before cooking it? (Circle one)

   1 LESS THAN ONE DAY
   2 ONE DAY
   3 TWO DAYS
   4 THREE DAYS
   5 FOUR DAYS OR LONGER

5. Below is a list of considerations which may or may not be important to you when buying fresh fish. For each one please indicate if it is very important, somewhat important, not too important, or not at all important. (Circle one number for each)

	VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT TOO IMPORTANT	NOT AT ALL IMPORTANT
a. Taste	1	2	3	4
b. Appearance of fish .	1	2	3	4
c. Nutrition	1	2	3	4
d. Freshness	1	2	3	4
e. Ease of preparation .	1	2	3	4
f. Price	1	2	3	4
g. Availability.	1	2	3	4
h. Smell.	1	2	3	4
i. State or country fish is from.	1	2	3	4

6. How often do you buy fresh fish for home use and then discard it without preparing it? (Circle one)

   1 NEVER
   2 SOMETIMES
   3 FREQUENTLY

   → 5a. Briefly describe why you discard the fish.

7. Below are some statements that have been made about fish. As you read each one please indicate if you agree, disagree, or are not sure. (Circle one number for each)

	AGREE	DISAGREE	NOT SURE
a. Raw fish is required to be government inspected	1	2	3
b. The best temperature to store raw fish is 32° F.	1	2	3
c. Cooking fish too long makes it tough	1	2	3
d. It is easy to tell if fish is fresh by smell	1	2	3
e. Raw fish can be refrigerated the same length of time as raw poultry without affecting quality.	1	2	3

8. Below is another list of statements often made about fish. As you read each one please indicate how strongly you agree or disagree. (Circle one number for each)

	STRONGLY AGREE	AGREE	NEITHER AGREE OR DISAGREE	DISAGREE	STRONGLY DISAGREE
a. I am often disappointed in the quality of fresh fish that I buy . .	1	2	3	4	5
b. In general, most fish tastes 'fishy'	1	2	3	4	5
c. It is difficult to tell by appearance how 'fresh' raw fish really is . .	1	2	3	4	5
d. Labels on fresh fish are a good way to provide information on quality.	1	2	3	4	5
e. I would buy fish more often if I knew it was really fresh	1	2	3	4	5
f. Fish is quick and easy to prepare . .	1	2	3	4	5

9. Consumer information about the storage and preparation of fish is available from a variety of sources. Please indicate the one best way to get information to you in the future. (Circle one)

1 TV SPOTS
2 FOOD LABELS
3 NEWSPAPERS
4 MAGAZINES
5 RETAIL STORE DISPLAY OR HANDOUT
6 EXTENSION WORKSHOP
7 OTHER _____
(please specify)

10. If the following information were provided on the label of packaged fresh fish would it encourage you, or not encourage you, to buy and prepare the fish at home? (Circle one number for each)

	YES ENCOURAGE	NO, NOT ENCOURAGE
a. Nutrition information	1	2
b. Cooking instructions	1	2
c. Storage instructions	1	2
d. Guaranteed freshness	1	2
e. A 'best if used by' date	1	2
f. Name of fish.	1	2
g. State or Country fish is from	1	2
h. Class of fish: fat, medium fat, or lean.	1	2
i. Other_____ (please specify)	1	2

11. Now, if the following information were provided on the label of packaged fresh fish which information do you feel is MOST important, which is SECOND most important, and which is LEAST important? (Put the letter of your response in the appropriate box)

☐ MOST IMPORTANT

☐ SECOND MOST IMPORTANT

☐ LEAST IMPORTANT

A Nutrition information
B Cooking instructions
C Storage instructions
D Guaranteed freshness
E A 'best if used by' date
F Name of fish
G State or country fish is from
H Class of fish: Fat, medium fat, or lean
I Other_____ (please specify)

Finally, we would like to ask a few questions about yourself to help us interpret the results.

12. Are you: (Circle one)

    1 FEMALE
    2 MALE

13. How old were you on your last birthday?

    _____ YEARS

14. What is the highest level of education you have completed? (Circle one)

    1 NO FORMAL EDUCATION
    2 GRADE SCHOOL
    3 SOME HIGH SCHOOL
    4 HIGH SCHOOL GRADUATE
    5 TRADE SCHOOL
    6 SOME COLLEGE
    7 COLLEGE GRADUATE
    8 GRADUATE SCHOOL

15. How many people are living in your household (including yourself)?

    _____ NUMBER OF PEOPLE INCLUDING SELF

16. How long have you been involved in Extension study groups?

    _____ YEAR(S)

17. Have you taken the OSU Extension Seafood Correspondence course or participated in a seafood workshop before today? (Circle one)

    1 YES
    2 NO

Are there any comments you would like to share about how Extension can best provide information about fish to you? Please use the space on the back of this page.

Appendix D

Frequency Response to Questionnaire

Q1: About how often do you serve fresh fish at home?

(n = 398)	East %	West %
MORE THAN THREE TIMES A WEEK	1	2
TWO OR THREE TIMES A WEEK	11	21
ONCE A WEEK	16	30
TWO OR THREE TIMES A MONTH	17	23
ONCE A MONTH	15	9
LESS THAN ONCE A MONTH	31	11
NEVER	10	5

Q2: Below is a list of reasons why people might not serve fish often. Please indicate whether or not each is a reason for you.

	YES, A REASON	
	East %	West %
Don't have good recipes (n=275)	27	34
Costs too much (n=320)	54	50
Don't like touching (n=262)	4	7
Family doesn't like (n=283)	31	26
Don't know how to cook (n=270)	17	19
I don't like quality (n=260)	34	31
Not available locally (n=281)	57	8
I don't like taste (n=259)	10	14
I don't like smell (n=280)	27	34

Q3: From which of the following places do you buy fresh fish most often?

(n = 312)	East %	West %
LOCAL MARKET	11	19
SUPERMARKET	57	57
BUTCHER	0	1
SPECIALTY FISH MARKET	6	11
PERSONAL CATCH	23	11

Q4: After purchasing fresh, unfrozen fish, about how long do you usually store it at home before cooking it?

(n=363)	East %	West %
LESS THAN ONE DAY	36	37
ONE DAY	47	46
TWO DAYS	8	13
THREE DAYS	2	2
FOUR DAYS OR LONGER	7	3

Q5: Below is a list of considerations which may or may not be important to you when buying fresh fish. For each one please indicate if it is very important, somewhat important, not too important, or not at all important.

	VERY IMPORTANT		SOMEWHAT IMPORTANT		NOT TOO IMPORTANT		NOT AT ALL IMPORTANT	
	East %	West %	East %	West %	East %	West %	East %	West %
Taste (n=356)	89	94	11	6	0	0	0	0
Appearance of fish (n=338)	71	75	26	22	3	3	0	0
Nutrition (n=330)	57	57	35	32	7	10	1	0
Freshness (n=364)	94	99	5	2	1	0	0	0
Ease of preparation (n=324)	42	36	41	48	14	14	3	2
Price (n=326)	56	44	34	46	9	9	2	1
Availability (n=342)	64	63	28	29	6	8	3	1
Smell (n=339)	62	63	28	29	6	8	3	1
State or country of origin (n=321)	25	31	26	31	31	26	18	13

Q6: How often do you buy fresh fish for home use and then discard it without preparing it?

(n=364)	East %	West %
NEVER	85	77
SOMETIMES	14	22
FREQUENTLY	1	1

Q7: Below are some statements that have been made about fish. As you read each one please indicate if you agree, disagree, or are not sure.

	AGREE		DISAGREE		NOT SURE	
	East %	West %	East %	West %	East %	West %
Raw fish is required to be government inspected (n=365)	51	36	12	15	37	49
The best temperature to store raw fish is 32°F (n=366)	41	45	20	23	39	32
Cooking fish too long make it tough (n=365)	70	73	14	15	16	13
It is easy to tell if fish is fresh by smell (n=365)	71	82	9	10	21	7
Raw fish can be refrigerated the same length of time as raw poultry without affecting quality (n=364)	18	20	39	54	43	26

Q8: Below is another list of statements often made about fish. As you read each one please indicate how strongly you agree or disagree.

	STRONGLY AGREE		AGREE		NEITHER AGREE OR DISAGREE		DISAGREE		STRONGLY DISAGREE	
	East %	West %	East %	West %	East %	West %	East %	West %	East %	West %
I am often disappointed in the quality of fresh fish that I buy (n = 352)	16	11	28	36	34	30	20	22	1	2
In general, most fish tastes "fishy" (n = 353)	9	9	38	32	14	18	37	35	2	6
It is difficult to tell by appearance how "fresh" raw fish really is (n = 362)	18	17	52	46	12	15	16	18	4	4
Labels on fresh fish are a good way to provide information on quality (n = 356)	20	12	37	41	23	31	19	14	1	2
I would buy fish more often if I knew it was really fresh (n = 353)	31	28	37	37	20	25	12	9	1	1
Fish is quick and easy to prepare (n = 365)	38	46	56	46	4	6	2	1	0	0

Q9: Consumer information about the storage and preparation of fish is available from a variety of sources. Please indicate the best way to get information to you in the future.

(n=277)	East %	West %
TV SPOTS	7	8
FOOD LABELS	12	12
NEWSPAPERS	12	17
MAGAZINES	6	7
RETAIL STORE DISPLAY OR HANDOUT	19	21
EXTENSION WORKSHOP	42	34

Q10: If the following information were provided on the label of packaged fresh fish would it encourage you, or not encourage you, to buy and prepare the fish at home?

	YES, ENCOURAGE East %	YES, ENCOURAGE West %
Nutrition information (n=321)	66	73
Cooking instructions (n=351)	84	89
Storage instructions (n=334)	78	86
Guaranteed freshness (n=344)	94	97
A "best if used by" date (n=333)	93	95
Name of fish (n=325)	78	92
State or country fish is from (n=326)	52	62
Class of fish: fat, medium fat, or lean (n=331)	76	78

Q11: Now, if the following information were provided on the label of packaged fresh fish, which information do you feel is MOST important, which is SECOND most important, and which is LEAST important?

	MOST IMPORTANT (n=342)		2ND MOST IMPORTANT (n=338)		LEAST IMPORTANT (n=326)	
	East %	West %	East %	West %	East %	West %
Nutrition information	11	14	10	11	12	13
Cooking instructions	14	18	21	17	14	11
Storage instructions	7	2	16	9	18	9
Guaranteed freshness	45	39	12	20	3	5
A "best if used by" date	14	16	20	15	7	7
Name of fish	5	8	12	16	8	8
State or country fish is from	1	1	3	3	23	23
Class of fish: fat, medium fat, or lean	3	2	7	10	24	24