

Consumer Analysis of and Business Network Development for Ethnic Live Seafood Markets of in the Northeast Region

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Abstract

Selling live fish, shellfish, and other seafood products is popular among ethnic markets, traditionally centered in urban areas catering to persons of East Asian descent. Asian populations are growing rapidly in the Northeast and expanding to non-urban areas; however, these retail outlets are not well described and even less is known about purchasing habits and preferences of customers who frequent these markets.

During February through August of 2006, we visited 193 ethnic markets and restaurants that sell live seafood in the Boston area through the Washington D.C. area, inclusive. We conducted a survey, in which we asked the market operators to answer basic information about their business with respect to live seafood, such as demographics of their consumers, seasonality, most popular varieties, approximate sales volume, number of suppliers, and the relative importance of live seafood sales to their overall business. The response rate for markets was 26.6% (n=34) and 9.2% for restaurants (n=6).

The markets we surveyed have been in business for median of nine years. Asians are the predominant ethnicity in most of these locations. Sixty-three percent receive more than one live fish shipment per week. Fifty-five percent of markets sell over 500 pounds of live seafood per month, and 45% sell between 100 and 500 pounds.

Almost all prefer freshness and quality (97% and 94%, respectively) over price, availability (79% and 65%, respectively). The winter months are popular months for live fish sales and the summer months were identified as periods of weak live fish sales. Surprisingly, nearly as many markets indicated no seasonality for live fish sales as those who indicated seasonal trends in sales. Tilapia and hybrid striped bass account for 58% of the live fish interest, with crab (mostly blue, stone, and Jonah or Dungeness), buffalo (*Ictiobus* sp.), and lobster also being popular varieties. Sixty-two percent of market operators view the live fish section as very important to the overall sales to their store. No stores that we interviewed planned to reduce the size of their live seafood section in their market, and 24% actually planned to increase the size of this area in the next two years.

During September through November of 2006, we completed a total of 250 in-store intercept surveys of consumers who buy live seafood in five retail markets located in New Jersey, New York, and Pennsylvania.

As seen in the market survey, consumers prefer tilapia (75%) and hybrid striped bass (46%) over many other varieties. Consumers believe that physical appearance (79%), not price (38%), is the highest "Very Important" attribute. Consumers have a slight preference for "Product of the USA" (16%) over imported (6%), but there is overwhelmingly no preference for either (78%). Although slightly more consumers prefer wild-caught (36%) over farm-raised (12%), the majority have no preference (52%). Although 31% had no preference whether their fish was alive or dead before leaving the store, 60% preferred that their fish was stunned and nine percent preferred that their fish not be killed or stunned. Consumers also preferred to have their fish gutted

or filleted (80%) over leaving the store with an unprocessed fish (12%) and only (8%) had no preference. Consumers prefer shellfish submerged in water (44%) over shellfish placed on ice (26%), but 29% percent have no preference for either display method of shellfish. Consumers generally prefer to purchase live seafood during the winter months (45%) and on either a Friday (34%) or Saturday (25%).

The average live seafood consumer makes 6.2 visits per month, spends \$14.80 per visit on live seafood, travels 7.8 miles mainly by car, and is purchasing for 3.7 people in their household. The greatest majority of those interviewed were female (57%) in the 36-50 age range (44%), with either a high school (27%) or post-graduate degree (35%), are employed full-time (66%), and earn under \$25,000 annually (34%). Chinese (82%) was the most common language spoken in these households.

Other project deliverables include a market operator survey, a multilingual consumer directory of retail live seafood locations and a business network directory to link producers and buyers. These resources are available at www.jerseyseafood.nj.gov, and in print by contacting the Fish and Seafood Program in the New Jersey Department of Agriculture.

Background

Live markets for fish, shellfish, and other seafood products are traditionally located among supermarkets and restaurants that cater to an East Asian (Cambodian, Chinese, Japanese, Vietnamese, Korean) clientele. (Zimet and Zajicek 2000). In the United States, these markets are generally found in urban centers and specific ethnic communities. The culinary traditions of these groups place a high importance on the freshest possible seafood. This often requires that the fish be kept alive until just prior to preparation, but customers who demand live products are willing to pay a premium. Asians have a higher per capita consumption 21.6 kg/yr in Florida (Degner et.al 1994) and 32.5 kg/yr in King County, Washington (Sechna et.al 1999) than the average of 7.5 kg/yr (NMFS 2007) for all Americans.

For aquatic farmers and commercial fishermen, live seafood markets present a viable outlet for their products. In addition to the price premiums that can be obtained, selling to live markets allows a producer to begin selling his/her product without investing significant dollars in post-harvest equipment, training, and labor. It also eliminates the need to adhere to costly regulatory procedures that apply to seafood processing operations. For small-scale producers, which include family farms, lower post-production costs and premiums paid make live markets and other niche opportunities, more attractive than traditional seafood outlets that seek processed product.

However, to develop and sustain viable opportunities in the ethnic live fish market, the producer must identify geographically accessible live markets, understand cultural differences in business practices, establish and maintain a long term relationship with owners and operators, and maintain market share in the face of local and national competition.

According to the 2006 population estimate using percentages from the 2000 US Census, approximately 1.38 million Asians live in New York City and the surrounding counties and 206,000 Asians live in Philadelphia and the immediately surrounding counties. From 1990 to 2000, the Asian population in New Jersey nearly doubled (95%), exceeding population growth for Asians nationwide (13%) (AAFNY 2004). The Asian population in New Jersey consists of Asian Indians (39.5%), Chinese (20.5%), Filipino (17.3%), Korean (11.9%), Other Asian (6.9%), and Vietnamese (2.1%). New Jersey's Asian population accounts for 28.5% of the total Asian population of the New York metropolitan area and 26.0% of the total Asian population of the Philadelphia metropolitan area.

In addition to traditional ethnic markets, increasing numbers of white tablecloth and gourmet restaurants are featuring live seafood (Castle 2000). Although live fish markets are often described within the industry as saturated, demographic information alone suggests that these marketing channels will continue to be a viable market option for aquaculturists and commercial fishermen in the region.

Initial conversations with aquaculture producers were positive about the need for, and willingness to participate in a project that would gain insight into regional live markets. Those producers who are actively involved in live marketing channels are sometimes less enthusiastic about greater disclosure of information on live markets. Reasons for their reluctance are likely due to fears that greater transparency of these markets may invite competition and depress prices. However, those producers who currently sell into live markets acknowledge that efforts are needed to help grow markets for live fish and shellfish.

Little formal organization exists between owners and operators of supermarkets and restaurants that sell live seafood, perhaps due to cultural differences within the Asian community. Adding to fragmentation, live markets, which were in the past located almost exclusively within large cities, are being established in suburban areas to serve growing Asian populations outside of major metropolitan centers.

This project seeks to overcome these suspected barriers to market expansion by 1) surveying market operators on basic information about their businesses in the Northeast, 2) researching the attributes and demographics of consumers that frequent these markets; 3) assembling a retail directory for consumers of live markets across the region; and 4) developing and strengthening networks between producers and wholesalers through the development of a directory listing of these businesses. The goals of this project are to help the producer community understand consumer attributes, increase demand for both traditional and novel live seafood products by increasing customer awareness about locations of live markets and the variety of products available, and increase greater awareness among the various aspects of live fish sales and distribution. The increased demand and greater distribution efficiency will likely lead to increased sales and greater profitability for not only the owners and operators of live markets in the Northeast region, but also for producers in the Northeast and surrounding regions.

Methods

We began by searching various information sources and listings that include ethnic markets. These include yellow page and on-line listings of Asian groceries and ethnic supermarkets. We also benefited from a project conducted by Massachusetts Institute of Technology Sea Grant on proper handling and disposal of live seafood products to prevent accidental introductions of exotic species. We placed a phone call to all of the markets and groceries we identified to confirm if they sold live fish.

With this list, we planned visits to each of the following metropolitan and surrounding areas: Boston, New York, Philadelphia, and Washington D.C. Visits to other areas were made whenever possible. Toronto, Canada is also a large and important market for live seafood sales for U.S. producers, but timing and budget constraints precluded us from making a visit to Toronto. Visits were conducted from December 2005 to August 2006, but the bulk of the visits to ethnic live seafood markets were made from March 2006 to May 2006 (Table 1). We learned that Saturday morning is a busy time for the managers of these markets. In order to get more face-to-face time with the managers, we decided

the best time to visit is early in the week. During the course of our visits, we noted seafood suppliers in the live fish business. This information was collected and passed along to the University of Delaware for creation of the business network directory. In total, we visited over 130 live fish markets and over 60 restaurants that offer live fish.

Market Operator Survey

Prior to conducting the market visits, and with input from the producer community, we developed a survey for live market operators (Appendix 1). All of the markets visited during site visits that either have live or fresh fish were given a survey to complete and a postage-paid return envelope. After all visits were made, a second mailing was made to non-respondents and those to whom visits were not practical. The purpose of these surveys was to collect basic information on how market operators view live seafood sales in their stores and to confirm their willingness to be listed in the multilingual consumer market directory.

Using information collected from the market surveys, we developed a first draft of the consumer survey in June 2006. All participants in the project decided that an in-store intercept survey would be the most cost-effective means of data collection.

Of the nearly 200 visits we made to retail and dining establishments across the Northeast region, only thirty-five markets responded to our survey. Only six restaurants responded. Based on low response rate and a relatively low volume of live fish sold, we eliminated restaurants from our data analysis.

Consumer Research

We also used the results of the markets survey to identify locations in which we could perform our in-store intercept survey (Appendix 2). We first identified all stores that had the highest sales volume (greater than 500 pounds per week). Of these markets, we focused on those that were within an hour drive. Funding did not allow us to include markets in the Boston or Washington DC areas. To obtain a representative sample, we selected two markets in New York (Flushing, Staten Island), two markets in New Jersey (Edison, Franklin Park), and one market in Philadelphia, Pennsylvania. Each market was personally visited to solicit their permission in hosting the surveys.

The goal was to collect fifty completed surveys from these five stores for a total of 250 surveys. A team of two postgraduate students performed the surveys. Each participant received a \$10 coupon for any in-store purchase. Each survey lasted between 8-10 minutes. In order to finance the coupons, each store was paid \$500 prior to performing the surveys. The surveys were conducted from mid-September through the end of October. In two stores, all 50 surveys were completed by the team of two interviewers on Friday evening. Three required the team to return and complete the remaining surveys on Saturday morning.

During the surveys at each store, researchers noted the total time required to administer 50 surveys. We assessed the amount of traffic in each store. We counted the number of family units entering the store and the number of family units making a live seafood purchase during a minimum twenty-minute time period. Family units were counted instead of individuals because a purchaser of live seafood is normally purchasing for a group of people rather than themselves alone. Some of these individuals may be accompanying the purchaser, so each group was termed a family unit, which more accurately reflects how live seafood is purchased. Each participating market was furnished with a tabular summary of the results for their specific store.

Results

The multilingual consumer directory, which is titled, “Live Seafood: The Best Test of Quality - Directory of Live Seafood Markets and Restaurants in the Northeastern United States”, is available at www.jerseyseafood.nj.gov. The directory includes 50 markets and restaurants, their full contact information and the varieties of live seafood they sell. To attract consumers across as many ethnicities as practical, the title and subtitle is translated into Mandarin Chinese, Spanish, Hindi, Russian, Polish, German, French, and Portuguese Korean, Vietnamese, Japanese, Arabic, Hebrew, and Greek. An introduction and other information are available in English, Mandarin and Spanish, the three major languages encountered at the markets.

The business network directory, designed to link producers of live seafood with buyers of live seafood is also available at www.jerseyseafood.nj.gov. This directory includes 52 producers and distributors, their full contact information and the varieties of live seafood they produce and handle.

Market Operator Survey

The markets we surveyed have been in business for median of nine years ($n = 34$, $\bar{x} = 10.3$, $min = 1$, $max = 80$, $s = 13.9$). Fifty-nine percent of market managers considered themselves located in an urban area, while 35% felt they were located in a suburban area (Figure 1).

As one would assume, Asians are the predominant ethnicity in most, but not all, of these locations. In 32% of the stores, market managers said that Asians constituted greater than 80% of their customer base, another 32% said that Asians constituted between 50%-80% of their customer base, and another 32% said that Asians were 20%-50% of their customer base. No other ethnic/racial group constituted greater than 80% of the customer base of any market, but one market did report that Whites constitute 50-80% of their consumer base. Eighteen percent of markets reported that Hispanics constitute 20%-50% of their customer base. Fifteen percent of markets reported that Whites constitute 20%-50% of their customer base, and 12% of markets reported that African/African Americans constitute 20%-50% of their customer base (Figure 2).

Thirty-eight percent of seafood markets use between one and three vendors of live fish (Figure 3). Half of these live seafood suppliers are from within state, 44% come from out-of-state, and 6% of suppliers are from foreign countries (Figure 4). Ninety-one percent of market operators become linked with a supplier by word of mouth or some other reason, such as a vendor visiting the store (Figure 5). Sixty-three percent receive more than one live fish shipment per week (Figure 6). Fifty-five percent of markets sell over 500 pounds of live seafood per month, and 45% sell between 100 and 500 pounds (Figure 7).

Almost all prefer freshness and quality (97% and 94%, respectively) over price, availability (79% and 65%, respectively), and other attributes (Table 2). The months of November, December, and January are popular months for live fish sales and June, July, and August were identified as months for weak live fish sales (Figure 8). Surprisingly, nearly as many markets indicated no seasonality (consistent sales throughout the year) for live fish sales as those who indicated seasonal trends in sales. Only 24% of markets sell more than ten varieties of live seafood (Figure 9). Tilapia and hybrid striped bass account for 58% of the live fish interest. Crab (mostly blue, stone, and Jonah or Dungeness), buffalo (*Ictiobus* sp.), and lobster are also popular varieties (Figure 10). Sixty-two percent of market operators view the live fish section as very important to the overall sales to their store (Figure 11). No stores that we interviewed planned to reduce the size of their live seafood section in their market, and 24% actually planned to increase the size of this area in the next two years (Figure 12).

Consumer Research

For the in-store intercept surveys, we were able to construct the profile of an average live fish consumer (Table 3). The average live seafood consumer makes 6.2 ($n = 246$, $min = 0.5$, $max = 30$, $s = 7.2$) visits per month, spends \$14.80 ($n = 246$, $min = 3.5$, $max = 60$, $s = 10.5$) per visit on live seafood, travels 7.8 ($n = 250$, $min = 0.1$, $max = 70$, $s = 8.5$) miles mainly by car, and is purchasing for 3.7 ($n = 240$, $min = 1$, $max = 8$, $s = 1.4$) people in their household. Across all stores, we administered a total of 250 surveys at a rate of 42.1 surveys per hour (Table 4). The number of family units entering the store during these times was 161.7 per hour, and 23.8 family units per hour purchased live fish.

The greatest majority of those interviewed were female (57%) (Figure 13), Chinese (Table 5), in the 36-50 age range (44%, but 42% were in the 21-35 age range) (Figure 14), with either a high school (27%) or post-graduate degree (35%) (Table 6), are employed full-time (66%) (Table 7), and earn under \$25,000 annually (34%) (Table 8). Among the households in which respondents live, English is not the primary language (Figure 15). Chinese (82%) or some other language (5%) were the two most common languages spoken in these households (Table 9). Fifty-five percent of these households were in a suburban area (Figure 16), and consist of three (30%) or four (25%) family members (Figure 17). Most live seafood purchases are consumed within one hour (33%) or between one to two hours (32%) after being purchased (Table 10). An overwhelming majority (85%) get their information on how to prepare their live seafood from family (Table 11).

Consumers also display some degree of seasonality with their live seafood purchases. Figure 18 shows that 56% of consumers avoid purchasing live seafood during the summer months of June, July, and August. There is a strong preference for purchasing live seafood during the months of November, December, and January. About 45% of consumers prefer to purchase live seafood during these winter months, but we also observed a slight preference (28% of all consumers) for the same summer months many consumers indicated they avoid purchasing live seafood. Certain days of the week are also more popular than others for live seafood purchases (Figure 19). Friday and Saturday, in that order, are the most popular day to purchase live seafood. Saturday and Sunday, in that order, are the second most frequent days of live seafood purchases. Monday through Thursday do not appear to be popular days for buying live fish. Not one of these days was selected by more than 10% of the consumers in our study.

Respondents in our survey had visited 1.7 different live seafood markets in the previous one-month period, and only two different live seafood markets in the previous three-month or previous one-year period (Table 12). Fifty-two percent make their purchase decision while at the store (Figure 20). Quality, in the scope of a fresh product, preferred by 78% of the respondents and quality in the scope of a healthy product was attractive to 23% of the respondents (Table 13). Consistent with the survey of market operators, tilapia and hybrid striped bass were preferred by the consumers (75% and 46%, respectively) (Table 14). Major reasons why consumers prefer each of these varieties include an unspecified reason for liking the particular variety, liking the particular taste of the variety, or some other unspecified reason (Table 15). The most popular variety of the “other” varieties was catfish (52%) (Table 16). When asked what perceptions and preferences were “Very Important”, “Somewhat Important”, and “Not Important”, the responses ranged from 79% believing that physical appearance was the highest “Very Important” attribute to the highest “Not Important” response (94%) being knowing the name of the farm or dock where the fish originate (Table 17). Price ranked third among “Very Important” attributes (38%).

Table 18 demonstrates how consumers choose among a specific attribute, its counter-attribute, or whether they have no preference between the two. Consumers have a slight preference for “Product of the USA” seafood (16%) over imported (6%), but there is overwhelmingly no preference for either (78%). A similar trend exists between method of production. Although slightly more consumers prefer wild-caught seafood (36%) over farm-raised seafood (12%), the majority have no preference (52%). With all other factors being equal, there is little difference between consumer preference for a relatively smaller fish (29%) and a relatively larger fish (25%). Forty-seven percent have no size preference. Scaled fish (53%) are preferred over scaleless fish (13%) and those that have no preference (33%). Most consumers have no preference (48%) for either white-flesh fish or dark-flesh fish, but those that do pay attention to this characteristic prefer white-flesh (41%) over dark-flesh fish (12%). When asked to choose between clean water in the holding tank (22%) or all of the fish live in the tank (21%), most consumers had no preference (57%). Seeing flowing water into the tank (40%) was preferred over bubbles in the tank (18%), but 42% had no preference for either holding system design. One of

the most interesting responses shows that 44% of consumers prefer shellfish submerged in water over shellfish placed on ice (26%). Twenty-nine percent have no preference for either display method of shellfish. Customers also preferred to have their fish gutted or filleted (80%) over leaving the store with an unprocessed fish (12%) and only (8%) had no preference. Although 31% had no preference whether their fish was alive or dead before leaving the store, 60% of consumers preferred that their fish was stunned and nine percent preferred that their fish not be killed or stunned.

Discussion

Market Operator Survey

The market survey displays some interesting trends and characteristics about live seafood supermarket retailers, but since we were only able to collect information on 35 markets, one should exercise caution in interpreting or drawing conclusions from the market survey portion of these study. The market survey performed well within its intended function to help construct the in-store intercept survey of live seafood consumers.

Asians make up the clear majority of those who patronize live seafood markets, but we did observe at least one market that had a high volume of live seafood sales where Asians did not make up the majority of the consumer base. The manager of one market with a high volume of live fish sales, over 1,000 pounds of tilapia alone, reported that African Americans and Hispanics made up the greatest majority of their customer base. This suggests that there may be opportunities to expand sales of live seafood in areas that have a similar demographic. Deliveries of live fish to these stores tend to be frequent shipments of 25 pounds to 125 pounds each, from one to three vendors, most likely coinciding with the days of the week where live seafood purchases are more likely.

Market managers placed more importance on freshness and quality over price. However, we did observe that when we first entered some stores some market managers assumed we were interested in directly selling live fish. This seems natural since many managers said that live fish vendors visited their stores. They immediately began discussing pricing issues until we explained we were only interested in research questions. Future research should include further investigation into willingness to pay, or what level of quality is acceptable at what price.

Seasonality is perhaps the strongest observation to be taken from the market study, mainly because a similar trend was observed in the in-store intercept consumer survey. In those stores that indicated seasonality, November through January are the most popular months, while June through September were the months of weakest seafood sales. It is important to remember that in some stores, live seafood sales seem to be fairly constant. Although the holidays, especially Chinese New Year seem to be a time of the year where there may be more family gatherings or entertaining events, it is difficult to explain why live seafood in some locations is less popular. It may be attributed to the tradition in China to go on a vacation during the Chinese New Year time.

We observed many varieties of freshwater finfish, saltwater finfish, crustaceans, molluscan shellfish, and even frogs and turtles throughout the course of our visits, but tilapia and hybrid striped bass were the most and second most popular varieties in both the market survey and the in-store intercept consumer survey. Both of these varieties are produced in the region, but considerable volumes of these species are shipped in from the southeast. Buffalo (*Ictiobus* sp.), which is traditionally a commercially caught fish from the Midwest, also ranked high among both consumers and market operators.

The majority of markets that sell live seafood view their live seafood section in their store as an important part of their seafood market, and approximately $\frac{1}{4}$ of the stores we interviewed actually plan to expand the number of tanks. Although the live seafood market is typically referred to as saturated, this suggests that there will be some future growth in live seafood sales. Although none that we interviewed planned to reduce the size of their live fish section, some managers view their live fish section as a minor importance to their entire store. It would be interesting to analyze the live fish section as a profit center within the seafood profit center of the store, and its contribution to the overall profitability of the supermarket. This type of profit center analysis (produce, meats, frozen foods, non-perishables) is common among various large, conventional supermarket chains.

Consumer Research

The in-store intercept consumer survey is the more reliable survey upon which to draw conclusions about live seafood markets. The sample size is much larger than in the market survey, consumers may have been less willing to withhold information or give misinformation than market operators.

The mean profile of live seafood consumers presents interesting information on how often family groups purchase live seafood, how much they spend, how far they travel, and the number of people served by that purchase. Summarizing the information in Table 1 yields a total live seafood expenditure of \$301.15 per person per year.

Although the majority of those interviewed were female (57%), we actually expected this percentage to be much higher. The split between either high school or postgraduate education as the most common educational levels could be reflective of the areas where we conducted the interviews, rather than other educational levels being less common among these groups. This seems to be consistent with the reported level of employment status, but conflict with what our respondents reported as income (33% reported earning less than \$25,000 annually). With the nearly complete demographic information on almost all 250 interviewees, we have the ability to do further cross-tabulation analysis between any demographic characteristic and purchase habit.

Consumers also do not visit a large variety of different live seafood markets, which indicates a high degree of consumer loyalty. In two of the areas where we conducted the surveys, there actually seemed to be a large number of other live seafood markets, so lack of market availability does not appear to be driving this low number. Only 1.7 different

markets were visited in the previous month and that number only increases to two markets when considering the previous three month and one year period. Because 52% make their purchase decision while at the store, there may be some opportunities for farmers and fishermen to influence the purchase decision by using point-of-sale marketing. However, recipes may not be an effective point-of-sale tool because 85% of respondents rely on family for information on how to prepare seafood.

We observed seasonality in the consumer survey similar to what we observed in the market survey with about 45% of consumers prefer to purchase live seafood during these winter months. The slight increase in popularity during the summer months; however, was unexpected. The holidays seem to explain the popularity of live seafood during the winter months, but we are unable to explain the slight increase in popularity during the summer. The popularity of live seafood purchases on Friday and Saturday seems to be consistent with our observations during our market visits. As mentioned before, we could barely speak with the market manager when we first tried to do our market visits on Saturday because the market was very busy with all customers, not just purchasers of live seafood. We had more success discussing the project with the market managers during the week because business was much slower. It is possible; however, that because we conducted our interviews during these days that we were only sampling Friday/Saturday shoppers.

Quality/Freshness was preferred by 78% of the respondents and quality as it relates to a healthier product (23%) were the most popular reasons why consumers sought live seafood. We expected tradition to be higher than 12% and may be lower due to a lack of availability of traditional and familiar varieties. Consistent with the market survey, tilapia and hybrid striped bass were preferred by the consumers (75% and 46%, respectively) with crab and lobster (28%) and buffalo (18%) also ranking high among consumers.

As we observed in the market survey, price did not rank as the most important factor with consumers. Physical appearance (79%) and year-round availability (46%) ranked as the highest and second highest “very important” (lowest and third-lowest “not important”) attribute among consumers. Since physical appearance ranks as the most important attribute, efforts by the producer would be best directed toward making sure their product looks as good as possible in the retail store. A product that looks good likely is interpreted by the consumer as a high quality product that relatively fresher and healthier. This includes fish having normal and clear eyes, normal swimming and gilling activity, even coloration, minimal cuts and abrasions on the fins and body, and no missing scales. Some factors that affect the physical appearance of the product are out of the immediate control of the producer and can be greatly affected by post-harvest handling. This is where a good relationship between the producer and the retailer can positively affect sales for both parties. Inasmuch as possible with the particular live product one is producing, consistent availability may develop a loyal and routine customer base.

This further suggests where producers should likely not focus some promotional efforts. Building the name of the farm or dock into promotional efforts does not appear to

resonate well with the consumers (highest “not important” attribute. Since only two percent of respondents felt in-store recipes were “very important” (90% felt recipes were “not important”). This agrees with where consumers get their information on how to prepare their products.

Thirty-eight percent of respondents felt price was the highest “very important” (second lowest “not important”) product attribute. One would assume that price would be the most important attribute to a group of respondents where the majority makes less than \$25,000 annually. Again, future research should include further investigation into willingness to pay, or what level of quality is acceptable at what price.

Asking consumers to choose among a specific attribute, its counter-attribute, or whether they have no preference between the two provided some additional interesting insights into what consumers are looking for with live seafood. It also provides additional insight into aspects of seafood in general, and exposes some consumer preferences which need some educational efforts relating to food safety.

Federally mandated Country-of-Origin-Labeling (COOL) for seafood became effective in 2004 (AMS-USDA 2004). All retailers covered under the Perishable Agricultural Commodities Act (PACA), whose sales exceed \$230,000 fresh or frozen fruits and vegetables, must clearly display for most seafood products they sell, the country from where the product originated and the manner by which the product was produced, either farm-raised or wild-caught. Although there is a small preference for “Product of the USA” (16%) over imported (6%) seafood, and a slightly larger preference for wild-caught seafood (36%) over farm-raised seafood (12%), consumers generally have no preference for the origin of the product (78%) or the method of production (52%).

Consumers are generally split between whether they desire a larger fish (25%) or a smaller fish (29%). Since 47% of respondents have no size preference, aquaculturists who are unsure on what size of fish to deliver to market may want to consider introducing smaller fish. With all other factors equal, smaller fish generally have lower production costs, are easier to transport and handle, and overall represent less risk to the farmer. Commercial fishermen may have less control over the size of the size of fish they can deliver to market due to size, catch, and gear restrictions. Although our methodology could not detect which markets may prefer a smaller or larger fish, size may be important for certain markets who cater to a specific clientele. Size preferences may also be different for certain varieties.

Scaled fish (53%) are preferred over scaleless fish (13%) and those that have no preference (33%). This may be especially true in markets that have customers who are influenced by certain religious customs. Most consumers have no preference (48%) for either white-flesh fish or dark-flesh fish, but those that do pay attention to this characteristic prefer white-flesh (41%) over dark-flesh fish (12%). In an analysis of the top ten consumed species, among fresh and frozen products, consumers prefer for white-fleshed fish (NFI 2007).

Since consumers placed such a high importance on the physical appearance of the fish, we expected this importance to be reflected in the next question. When asked to choose between clean water in the holding tank or all of the fish alive in the tank, both indicators of the quality of the product, we were surprised to learn that 57% of consumers had no preference. It seems that both percentages for clean water in the holding tank (22%) and all of the fish alive in the tank (21%) should have been higher and the no preference percentage should have been lower.

It also seems that consumers would want to see some sort of aeration or filtration system in the fish holding tank rather than stagnant water. Aeration and filtration are of course necessary for keeping the fish in as good condition as possible, but our research did not confirm that consumers wanted to see proof of this prominently displayed, rather than behind the scenes. We are able to show that 42% had no preference for either holding system design. Among those that did have a preference, flowing water into the tank (40%) was preferred over bubbles in the tank (18%). Retailers interested in replacing tanks or expanding their live seafood department should consider using system design that prominently displays flowing water, but the preference is likely not large enough to justify upgrading live seafood holding systems for this reason alone.

Consumers also seem to believe that what is good for fish is also good for molluscan shellfish with respect to holding and displaying product. One of the most interesting responses shows that 44% of consumers prefer shellfish submerged in water over shellfish placed on ice (26%). Twenty-nine percent have no preference for either display method of shellfish. This is significant because immersing shellfish for human consumption in water at the retail level can only be done with an operational variance by the regulatory authority and as specified in a HACCP plan (FDA 2005). Immersion in water is a violation of shellfish sanitation protocol in most states. Direct contact with ice is even prohibited in some states because of the risk that if improperly monitored, the ice will eventually melt and leave the shellfish immersed in water (personal communication, NC shellfish sanitation program). Naturally, a lot of molluscan shellfish kept even under the best conditions will have a small number of dead organisms. If immersed in water, bacteria associated with the putrefaction of these small number of dead animals will be released into the water. In water, the remaining live shellfish will begin filter feeding and take up the bacteria released into the water, contaminating the entire lot and posing a food safety risk. Molluscan shellfish properly kept on ice cannot cross contaminate in this same manner. During our market visits, most retailers properly kept their molluscan shellfish cold and out of water, but a few markets did have molluscan shellfish displayed in water. It is unclear whether this practice is driven by the consumer or the retailer, but nevertheless both retailer and consumer education efforts are desperately needed to be sure that all retailers are aware of proper shellfish storage practices. Consumers also need to have better information on how to properly select quality shellfish and also need to be made aware that shellfish properly kept cold are still live product.

In many markets we visited, consumers can choose to leave the store with a whole fish, a head-on scaled and gutted fish, a headless scaled and gutted fish, or a filleted fish. Once the fish is selected from the holding tank, the fish is weighed, custom-processed, and

packaged while the customer waits. The product form with which the consumer receives the product is very important. Customers preferred to have their fish gutted or filleted (80%) over leaving the store with an unprocessed, in-the-round fish (12%). Only (8%) had no preference. If a market decides to add live fish tanks without having the proper infrastructure to properly process fish, live fish sales will likely not be as robust as those markets that have the proper processing area.

Live fish markets have been identified as a conduit for exotic or non-native species introductions. The reasoning is that a consumer may leave the store with a live product and for some reason later decide to release the fish into a local water body instead of consuming the product, or a market operator may release fish instead of choosing some other means of disposition. Chapman et.al. (2003) demonstrated that bivalves were able to resume feeding after being returned to seawater. Another project was recently completed by Massachusetts Institute of Technology Sea Grant educating consumers at live seafood markets about risks associated with non-native aquatic species introductions. Although this risk exists to some degree, as has been seen in a release of live seafood products by devout Buddhists (Henry 2007) and the recent discovery of snakeheads in certain water bodies in the northeast (Fahrenthold and Partlow 2004), it is most likely that these incidents arise from those not involved in the live seafood retail chain. Snakeheads are most likely associated with aquarium and pet shops than live seafood markets, because we did not observe a single snakehead in any of our visits. We are able to demonstrate that most live seafood consumers do not necessarily prefer that their product be taken from the store alive. Sixty percent of consumers already prefer that their fish was stunned before leaving the store. Thirty-one percent have no preference whether their fish was alive or dead before leaving the store, so a properly directed public information campaign effort could influence those that have no preference. A campaign of this nature would only have to make an effort to change the purchase habits of the nine percent of consumers, who prefer that their fish be “flopping in the bag”.

Future research on live seafood markets in the northeast region should include survey and listings of Canadian markets since this is a viable market for many USA producers and distributors. This project could also be replicated in other regions of the United States, especially the West Coast where live seafood is also popular. There is also a potential for expanding live seafood in outlets that emphasize fresh and local foods, such as independent seafood markets and year-round farmer’s markets.

10. How much live fish product do you sell (lb) per month?
 <100 lb 100-500lb >500lb
11. What are three BEST MONTHS selling live fish products in your store?
 1. _____ 2. _____ 3. _____
12. What are three MONTHS NOT GOOD for selling live fish products in your store?
 1. _____ 2. _____ 3. _____
13. How many kinds of live fish do you sell?
 1-5 5-10 >10
- Please list a few? 1. _____ 2. _____ 3. _____
 4. _____ 5. _____ 6. _____
 7. _____ 8. _____ 9. _____
14. What are your three best selling live seafood products?
 1. _____ 2. _____ 3. _____
15. Rate the importance of live fish section in your store
 Very important Somewhat important Not important
16. Are you planning to _____ live fish sale in your store in the next 2 years?
 Expand Not change Reduce
17. Do you think a directory of live fish market developed by Department of Agriculture will help your business?
 Yes No Maybe

18. If you sell live fish and/or shellfish and would like to be listed in the directory, please provide your contact information below or attach your business card.

Name. _____

Address, City, State, Zip. _____

Phone. _____ Fax. _____

E-mail. _____ Website. _____

Live seafood products you sell and would like to include in the listing.

Thank you for your participation. Please return the survey in the envelope provided.

Appendix 2 – In-store Intercept Research Questionnaire for Consumers of Live Seafood



Ethnic Live Seafood Consumer Survey

1). Why is buying live seafood important to you?

- a) Quality/Freshness b) Tradition c) Use all of the fish, don't waste
 d) Quality/Healthier e) Other _____

2). What species of live seafood do you prefer (check up to three, and explain in 2A)?

- a) Tilapia b) HSB c) Buffalo d) Carp e) Eel
 f) clam/oyster/mussel g) crab/lobster h) Other/Others _____

2A). Why?

1. _____
 2. _____
 3. _____

3). What species of live seafood do you avoid (check up to three, and explain in 3A)?

- a) Tilapia b) HSB c) Buffalo d) Carp e) Eel
 f) clam/oyster/mussel g) crab/lobster h) Other/Others _____

3A). Why?

1. _____
 2. _____
 3. _____

4). Please indicate which of the two terms you prefer, or if you have no preference between the two.

- | 1 | 2 | 3 |
|---|--|--|
| 4a). <input type="checkbox"/> from USA | <input type="checkbox"/> imported | <input type="checkbox"/> no preference |
| 4b). <input type="checkbox"/> wild | <input type="checkbox"/> farmed | <input type="checkbox"/> no preference |
| 4c). <input type="checkbox"/> smaller fish | <input type="checkbox"/> larger fish | <input type="checkbox"/> no preference |
| 4d). <input type="checkbox"/> scaled fish | <input type="checkbox"/> fish with no scales | <input type="checkbox"/> no preference |
| 4e). <input type="checkbox"/> dark flesh | <input type="checkbox"/> white flesh | <input type="checkbox"/> no preference |
| 4f). <input type="checkbox"/> clean water in tank | <input type="checkbox"/> all fish live in tank | <input type="checkbox"/> no preference |
| 4g). <input type="checkbox"/> bubbles in tank | <input type="checkbox"/> flowing water | <input type="checkbox"/> no preference |
| 4h). <input type="checkbox"/> shellfish in water | <input type="checkbox"/> shellfish on ice | <input type="checkbox"/> no preference |

Leaving the store with:

- | | | |
|--|--|--|
| 4i). <input type="checkbox"/> whole fish | <input type="checkbox"/> gutted/filletted fish | <input type="checkbox"/> no preference |
| 4j). <input type="checkbox"/> live fish | <input type="checkbox"/> stunned fish | <input type="checkbox"/> no preference |

- 5). Please indicate if the following term is VERY IMPORTANT, SOMEWHAT IMPORTANT, or NOT IMPORTANT to you.

	VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT
a).Year-round availability	1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>
b).Place of origin	1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>
c).Local product	1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>
d).Knowing name of farm/dock	1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>
e).In-store recipes	1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>
f).Price	1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>
g).Knowing time since harvest	1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>
h).Tradition	1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>
i).Physical appearance	1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>

- 6).Where do you get your information on how to prepare seafood? (Check all that apply)

- a). Newspaper b). Magazine c). TV d). Family
 e). Friends f). Internet g). Cook Book h). Ethnic Newspaper
 i). Ethnic Magazine j). Ethnic TV

- 7).What three months do you most commonly purchase live seafood?

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
 1 2 3 4 5 6 7 8 9 10 11 12

- 8).What three months do you least commonly purchase live seafood?

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
 1 2 3 4 5 6 7 8 9 10 11 12

- 9).How far do you travel to buy your live seafood? _____ miles.

- 10). When do you make your decision about which live seafood products you purchase?

- 1). before arriving to the store 2). while you are at the store

- 11). How much do you typically spend on live seafood per visit? \$ _____

- 12). How many visits do you make to buy live seafood in a month? _____

- 13). How many different live seafood markets have you visited in the last:

- a). 1 month _____ b). 3 months _____ c). 1 year _____?

- 14). What day of the week do you typically purchase live seafood?

- 1). MON 2). TUE 3). WED 4). THU
 5). FRI 6). SAT 7). SUN

- 15). What is the next most frequent day of the week that you also purchase live seafood?

- 1). MON 2). TUE 3). WED 4). THU
 5). FRI 6). SAT 7). SUN

- 16). How much time exists between the time you buy your live fish, to the time you prepare it?
- 1). Less than 1 hour 2). 1-2 hours 3). 2-6 hours
 4). 6-12 hours 5). 12 hours - 1 day 6). 1-2 days
 7). 2-3 days 8). 3-4 days 9). more than 4 days
- 17). INTERVIEWER: RECORD RESPONDENT'S GENDER BY OBSERVATION:
- 1). Female 2). Male
- 18). Do you consider your neighborhood to be Urban, Suburban or Rural?
- 1). Urban 2). Suburban 3). Rural 4). Don't know / Unsure
- 19). Including yourself, how many people live in your household? _____.
- 20). What is your age bracket?
- 1). 20 or less 2). 21 to 35 3). 36 to 50
 4). 51 to 65 5). Over 65
- 21). What is your ethnicity? _____
- 22). Is English the primary language spoken in your household?
- 1). Yes 2). No
- 23). What other language(s) is spoken in your household? (Check all that apply)
- a). None b). Spanish c). French d). Chinese
 e). Japanese f). Korean g). Vietnamese h). Philippine
 i). Indian j). Other (please specify _____)
- 24). What is the highest level of education you have completed?
- 1). Some high school 2). High school 3). Some College
 4). 2 or 4-year college degree 5). Post graduate degree
- 25). Which of the following best describes your current situation?
- 1). Employed full-time 2). Employed part-time 3). Retired
 4). A homemaker 5). Student 6). Unemployed but looking for work
- 26). What is your approximate household income before taxes?
- 1). Under \$25,000 2). \$25,000 up to \$50,000
 3). \$50,000 up to \$75,000 4). \$75,000 up to \$100,000
 5). \$100,000 up to \$150,000 6). \$150,000 up to \$200,000
 7). Greater than \$200,000

Other items to note:

1. How many Family Units visited this store in 1 hour? _____
2. How many Family Units bought live fish in 1 hour? _____

Tables

Table 1 – Chronology of Live Seafood Market Visits, Including Regions and Cities

Date	Region
December 2, 2005	Northeastern PA, outside of Philadelphia; southern upstate NY
February 10, 2006	Pittsburgh
March 11, 2006	Central Northern New Jersey
March 16, 2006	Boston
March 17, 2006	Connecticut
March 23, 2006	southern New Jersey
April 7, 2006	Central Northern New Jersey
April 12, 2006	eastern Northern New Jersey; Long Island, NY
April 13, 2006	South Philadelphia, southern New Jersey
April 19, 2006	Central New Jersey; Brooklyn and Staten Island, NY
May 4, 2006	New York City Chinatown
May 5, 2006	Atlantic City
May 9, 2006	Central New Jersey
May 10, 2006	Central and eastern North New Jersey
May 12, 2006	New York City Chinatown
May 17, 2006	Maryland
May 18, 2006	Washington D.C. and surrounding areas in Virginia and Maryland
July 13, 2006	areas west and north of Philadelphia
July 18, 2006	Philadelphia Chinatown
July 27, 2006	Philadelphia Chinatown
August 4, 2006	Philadelphia Chinatown

Table 2 – Relative Importance of Various Attributes of Live Seafood Reported by Live Seafood Markets

Attribute	Very Important	Somewhat Important	Not Important
Price	79	18	3
Location	24	41	35
Availability	65	21	15
Language	15	47	38
Freshness	97	3	0
Origin	45	30	24
Quality	94	3	3

Table 3 – Mean Profile of Live Seafood Consumers in the Northeastern United States

Parameter	Average
# Visits per Month	6.2 visits
Expenditure per Visit On Live Seafood	\$14.80
Distance Travel to Live Seafood Market	7.8 miles
Household Size	3.7 people

Table 4 – Survey Completion, Store Visit, and Live Seafood Purchase Information

Parameter	Number per Hour
Surveys Completed per Hour	42.1
Family-Unit Store Visits	161.7
Family-Unit Live Seafood Purchases	23.8

Table 5 – Distribution of Respondents by their Ethnicity

Ethnicity	Frequency	Percent
African	14	5.58%
African American	5	1.99%
Asian	12	4.78%
Caucasian	7	2.79%
Chinese	198	78.88%
Haitian	1	0.40%
Hispanic	3	1.20%
Italian	1	0.40%
Russian	2	0.80%
Vietnamese	5	1.99%
none	3	1.20%
Total	251	100.00%

Table 6 – Distribution of Respondents by their Level of Education

Education	Frequency	Percent
Some High School	48	19.12%
High school	69	27.49%
Some College	8	3.19%
2-4 Year College Degree	38	15.14%
Post Graduate Degree	88	35.06%
Total	251	100.00%

Table 7 – Distribution of Respondents by their Employment Status

Employment	Frequency	Percent
Employed Full-Time	165	66.27%
Employed Part-Time	29	11.65%
Retired	6	2.41%
A Homemaker	22	8.84%
Student	24	9.64%
Unemployed but Looking for Work	3	1.20%
Total	249	100.00%

Table 8 – Distribution of Respondents by their Annual Household Income

Income	Frequency	Percent
Under \$25,000	84	33.60%
\$25,000 to \$50,000	56	22.40%
\$50,000 to \$75,000	40	16.00%
\$75,000 to \$100,000	23	9.20%
\$100,000 to \$150,000	26	10.40%
\$150,000 to \$200,000	14	5.60%
Greater Than \$200,000	7	2.80%
Total	250	100%

Table 9 – Respondents those who Speaks other Languages at Home

Language	Frequency	Percent
Chinese	200	81.63%
Other	13	5.31%
Indian	6	2.39%
French	6	2.45%
Vietnamese	6	2.45%
None	5	2.04%
Spanish	4	1.63%
Philippine	3	1.22%
Japanese	1	0.41%
Total	245	100.00%

Table 10 – Period of Time between Live Fish Purchase and the Preparation of the Item for Consumption

Time Period	Frequency	Percentage
Less than 1 hour	84	33.20%
1-2 hours	81	32.02%
2-6 hours	45	17.79%
6-12 hours	10	3.95%
12 hours - 1 day	17	6.72%
1-2 days	10	3.95%
2-3 days	0	0.00%
3-4 days	0	0.00%
more than 4 days	6	2.37%
Total	253	100.00%

Table 11 – Information Sources Used by Consumers as a Guide in Preparing Seafood

Sources Of Information	Frequency	Percent
Newspaper	12	4.78%
Magazine	10	3.98%
TV	26	10.36%
Family	214	85.26%
Friends	52	20.72%
Internet	25	9.96%
Cook Book	36	14.34%
Ethnic Newspaper	1	0.40%
Ethnic Magazine	2	0.80%
Ethnic TV	6	2.40%
Other	3	1.20%

Note: Since consumer selected multiple items, figures do not add up to 100 percentages

Table 12 – Average Number of Different Live Seafood Markets Recently Visited by the Consumer.

Period	Frequency	Average
During Previous 1-Month Period	246	1.74
During Previous 3-Month Period	245	2.00
During Previous 1-Year Period	245	2.01

Table 13 – Various Attributes Sought by Live Seafood Consumers in the Northeastern United States

Important Reasons		Frequency	Percent
Quality/Freshness		195	78%
Tradition		29	12%
Use All of the Fish, No Waste		4	2%
Quality/Healthier		58	23%
Others	Taste	11	4%
	Like	4	2%
	Other	4	2%

Note: Since consumer selected multiple items, figures do not add up to 100 percentages

Table 14 – Popularity of Various Varieties of Live Seafood Sought by Live Seafood Consumers in the Northeastern United States

Types of Live Seafood	Frequency	Percent
tilapia	188	74.60%
hybrid striped bass	116	46.03%
crab/lobster	71	28.17%
buffalo	46	18.25%
carp	29	11.51%
clam/oyster/mussel	25	9.92%
eel	16	6.35%
other	21	8.33%

Note: Since consumer selected multiple items, figures do not add up to 100 percentages

Table 15 – Consumers’ Reasons to buy Species of Live Seafood

Reasons to buy	Variety of Live Seafood						
	tilapia	hybrid striped bass	buffalo	carp	eel	clam/oyster/mussel	crab/lobster
	Frequency (Percent)	Frequency (Percent)	Frequency (Percent)	Frequency (Percent)	Frequency (Percent)	Frequency (Percent)	Frequency (Percent)
Easy to cook	6 (2.90%)	4 (3.31%)	1 (2.13%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Fresh	20 (9.66%)	6 (4.96%)	6 (12.77%)	2 (8.00%)	0 (0.00%)	1 (4.17%)	6 (8.22%)
Good	6 (2.90%)	4 (3.31%)	1 (2.13%)	2 (8.00%)	0 (0.00%)	1 (4.17%)	1 (1.37%)
Healthy	1 (0.48%)	1 (0.83%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Like	71 (34.30%)	35 (28.93%)	17 (36.17%)	10 (40.00%)	6 (60.00%)	10 (41.67%)	36 (49.32%)
Live	2 (0.97%)	3 (2.48%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	1 (1.37%)
Other	32 (15.46%)	24 (19.83%)	5 (10.64%)	4 (16.00%)	1 (10.00%)	5 (20.83%)	13 (17.81%)
Price	14 (6.76%)	2 (1.65%)	3 (6.38%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Taste	46 (22.22%)	39 (32.23%)	11 (23.40%)	5 (20.00%)	2 (20.00%)	4 (16.67%)	12 (16.44%)
Tradition	9 (4.35%)	3 (2.48%)	3 (6.38%)	2 (8.00%)	1 (10.00%)	3 (12.50%)	4 (5.48%)
Total	207 (100 %)	121 (100%)	47 (100%)	25 (100%)	10 (100%)	24 (100%)	73 (100%)

Table 16 – Other Types of Live Seafood Preferred by Consumer

Other Varieties of Live Seafood	Frequency	Percent
catfish	11	52.38%
frog	3	14.29%
stone fish	2	9.52%
catfish, croaker	1	4.76%
cod	1	4.76%
sea bass	1	4.76%
shrimp	1	4.76%
snapper	1	4.76%

Table 17 – Consumer Perceptions and Preferences of Live Seafood and Relative Level of Importance

S.No	Attribute/Preference	Very Important		Somewhat Important		Not Important	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
1	Year-round availability	115	46.18%	38	15.26%	96	38.55%
2	Place of origin	35	14.06%	34	13.65%	180	72.29%
3	Local product	20	8.00%	21	8.40%	209	83.60%
4	Knowing name of farm/dock	7	2.80%	7	2.80%	236	94.40%
5	In-store recipes	5	2.01%	19	7.63%	225	90.36%
6	Price	94	37.60%	74	29.60%	82	32.80%
7	Knowing time since harvest	57	22.80%	41	16.40%	152	60.80%
8	Tradition	21	8.37%	32	12.75%	198	78.88%
9	Physical appearance	197	78.805	23	9.20%	30	12.00%

Table 18 – Consumer Preferences towards Live Seafood Purchase

S.No.	Preferences				No Preference
	Attribute	Frequency (Percent)	Counter-Attribute	Frequency (Percent)	Frequency (Percent)
1	From USA	41 (16.27%)	Imported	15 (5.95%)	196 (77.78%)
2	Wild	91 (36.11%)	Farmed	30 (11.9%)	132 (52.38%)
3	Smaller fish	72 (28.57%)	Larger fish	62 (24.6%)	118 (46.83%)
4	Scaled fish	134 (53.17%)	Fish with no scales	33 (13.1%)	84 (33.33%)
5	Dark flesh	29 (11.51%)	White flesh	102 (40.48%)	121 (48.02%)
6	Clean water in tank	55 (21.91%)	All fish live in tank	53 (21.12%)	144 (57.37%)
7	Bubbles in tank	46 (18.4%)	Flowing water	100 (39.84%)	105 (41.83%)
8	Shellfish in water	111 (44.22%)	Shellfish on ice	66 (26.29%)	74 (29.48%)
9	Whole fish	31 (12.3%)	Gutted/filletted fish	201 (79.76%)	19 (7.54%)
10	Live fish	23 (9.13%)	Stunned fish	150 (59.52%)	77 (30.56%)

Figures

Figure 1 – Locality of Live Seafood Markets

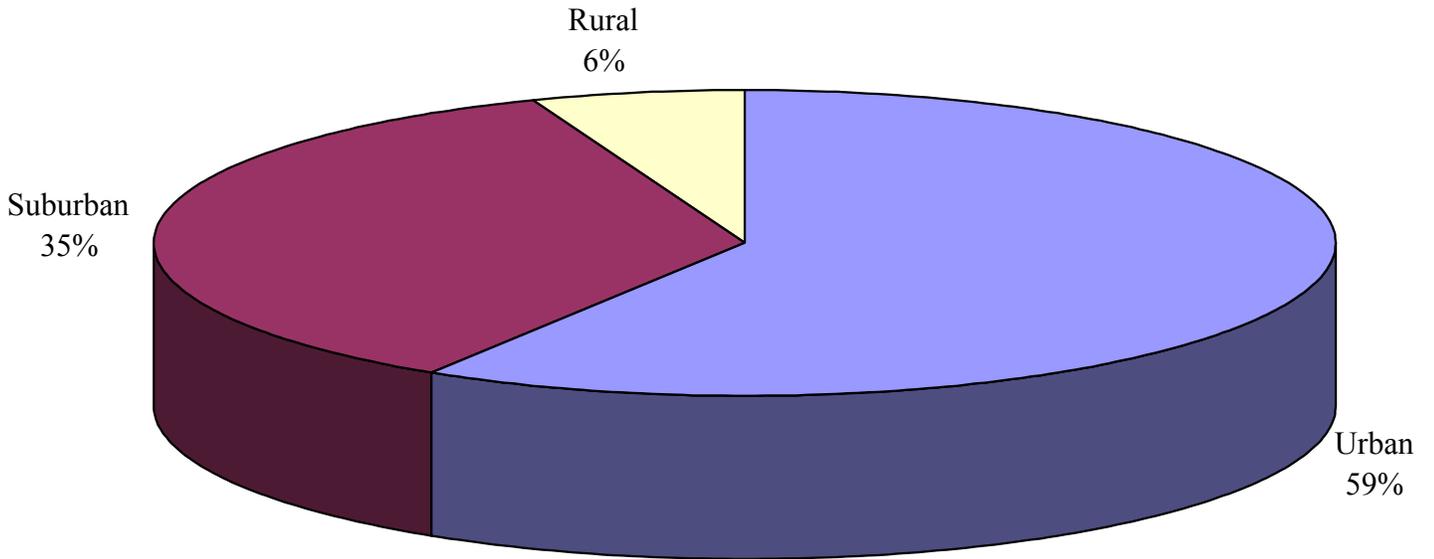


Figure 2 – Ethnic Composition of Consumers that Visit Live Seafood Markets

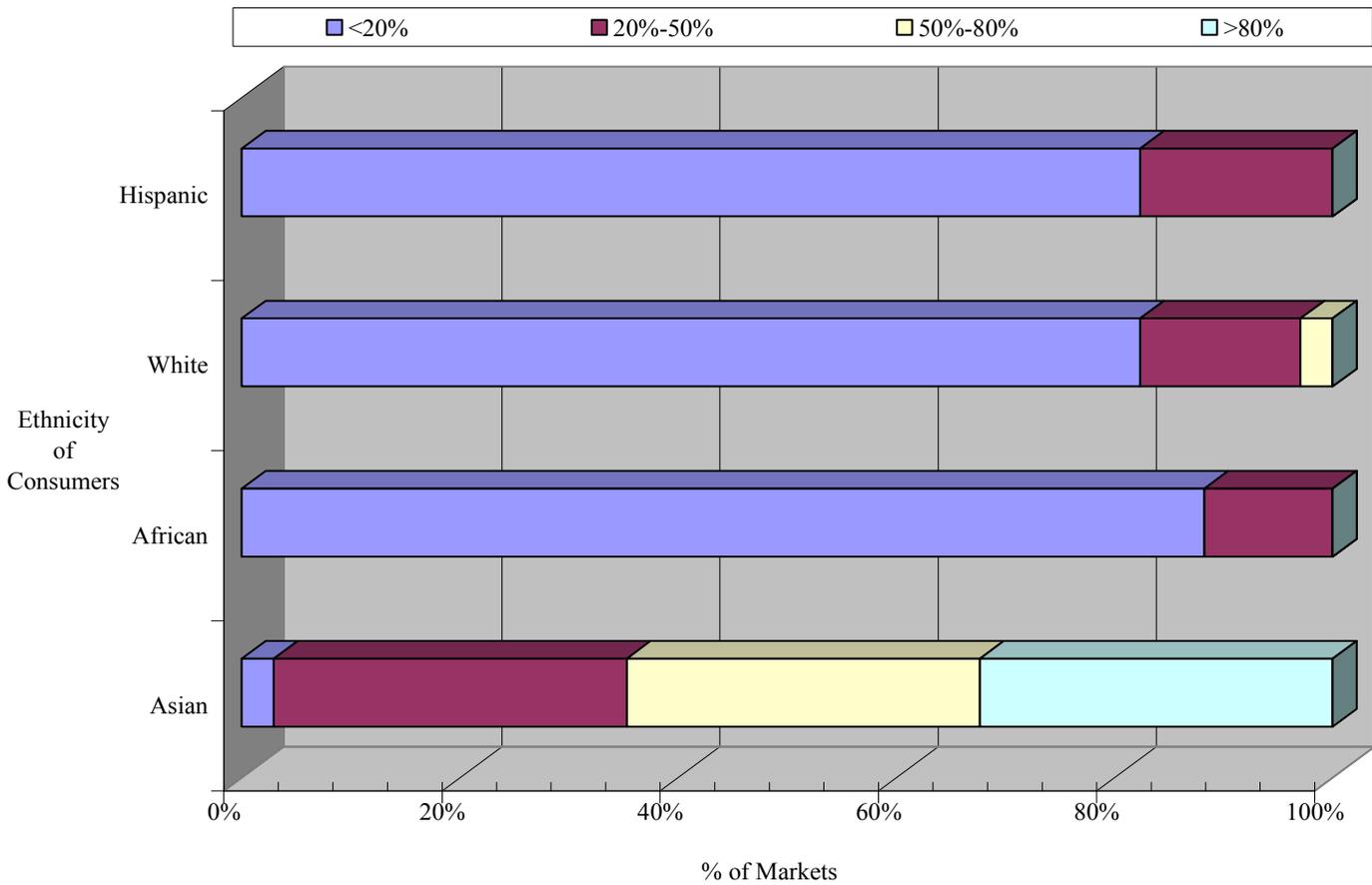


Figure 3 – Number of Live Seafood Vendors Typically used by Live Seafood Markets

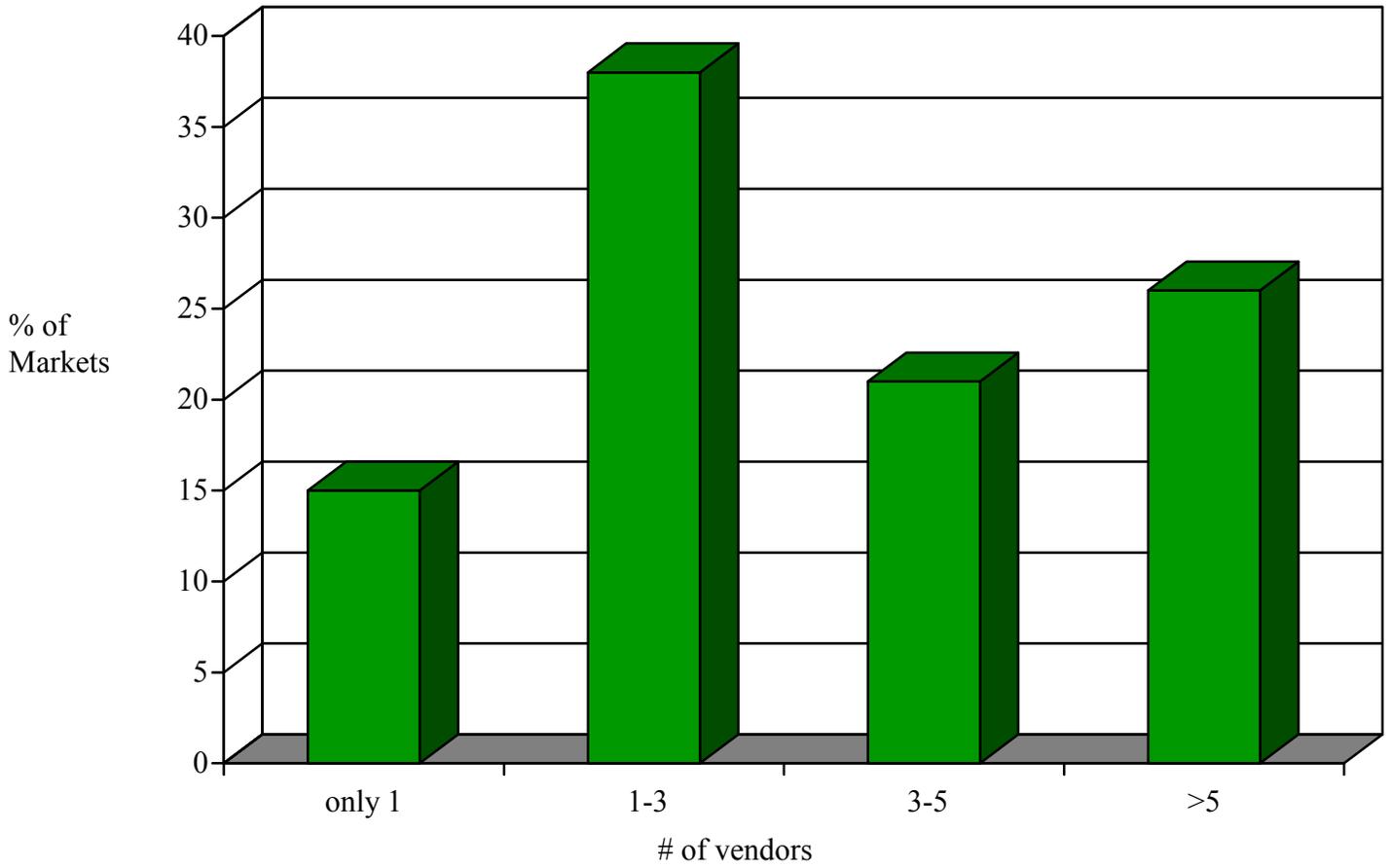


Figure 4 – Locality of Live Seafood Suppliers used by Live Seafood Markets

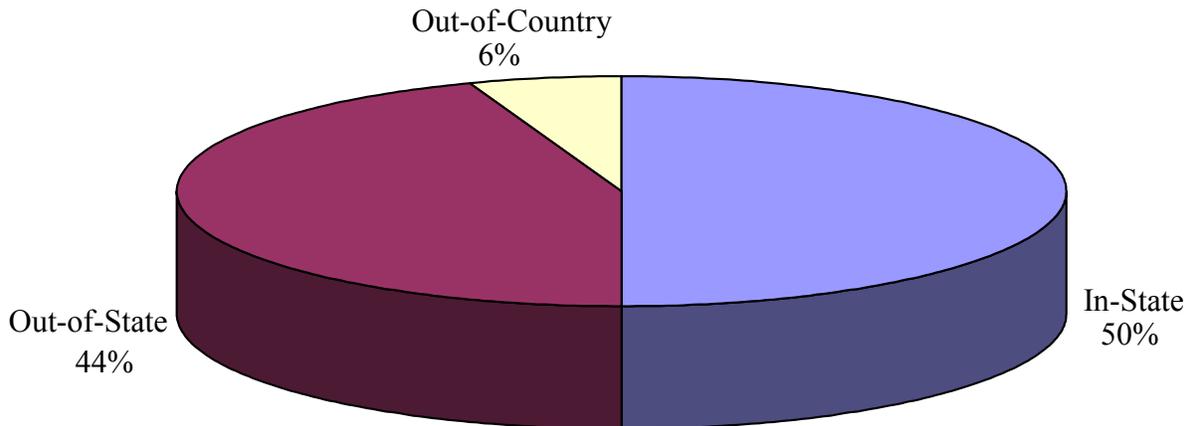
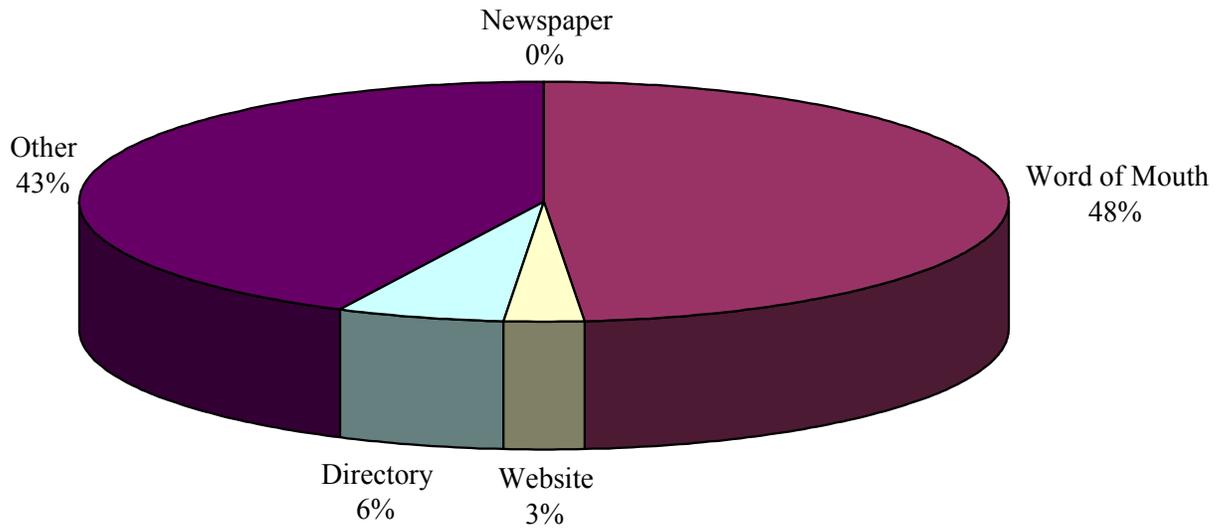


Figure 5 – How Live Seafood Markets Find their Live Seafood Suppliers



Note: Other includes suppliers coming into the store, corporate headquarters, previous ownership, direct sales, other business relationships, business regulation, and a long period in business

Figure 6 – Frequency of Live Seafood Deliveries to Live Seafood Markets

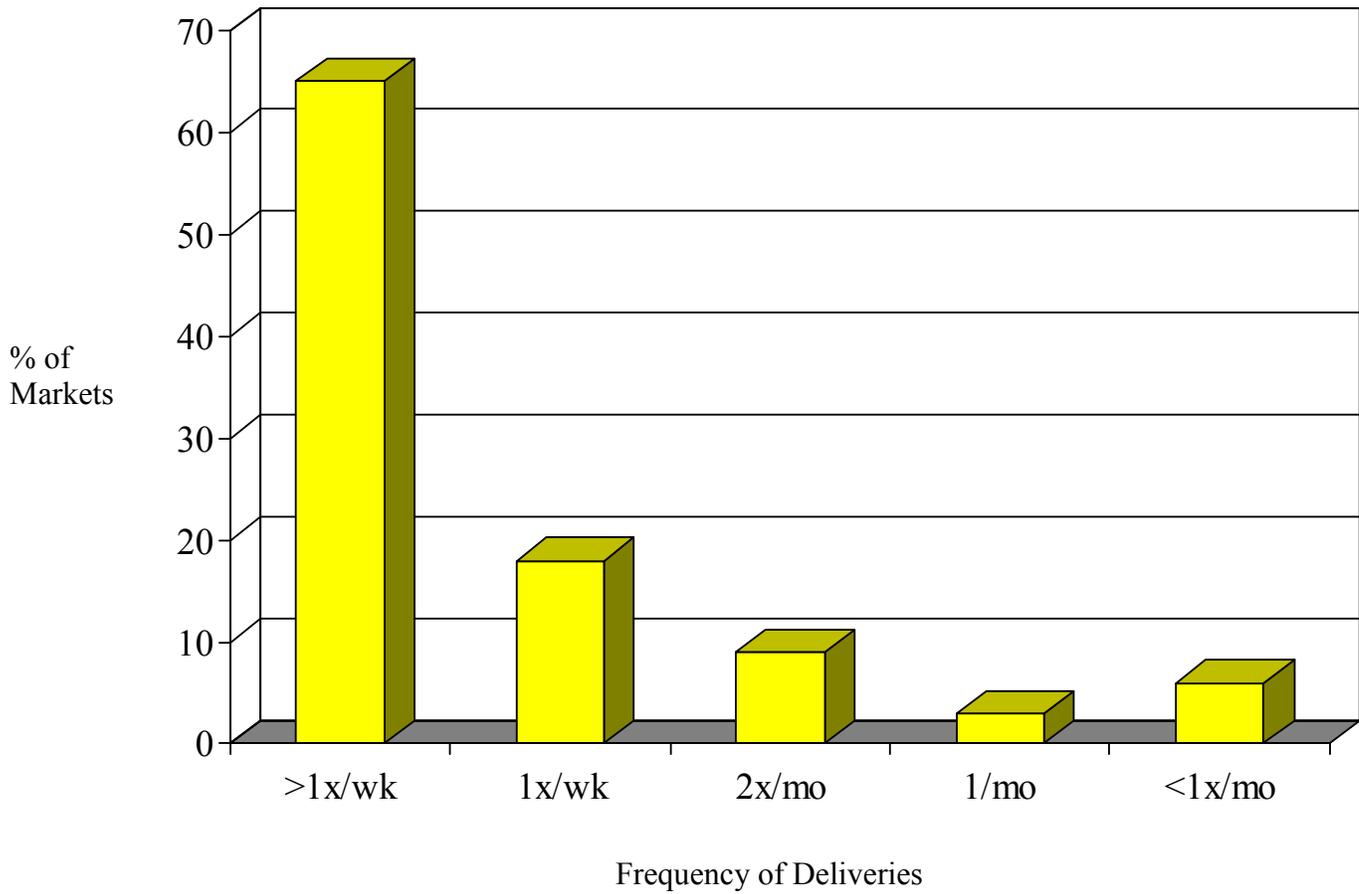


Figure 7 – Quantity (pounds) of Live Fish Sold per Month

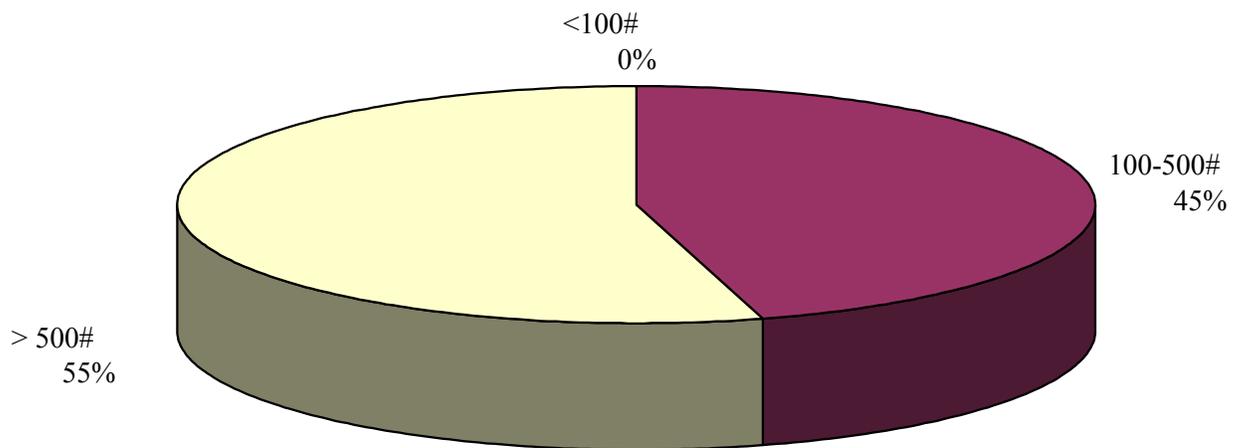


Figure 8 – Months of Strong and Weak Sales of Live Seafood, as Reported by Live Seafood Markets

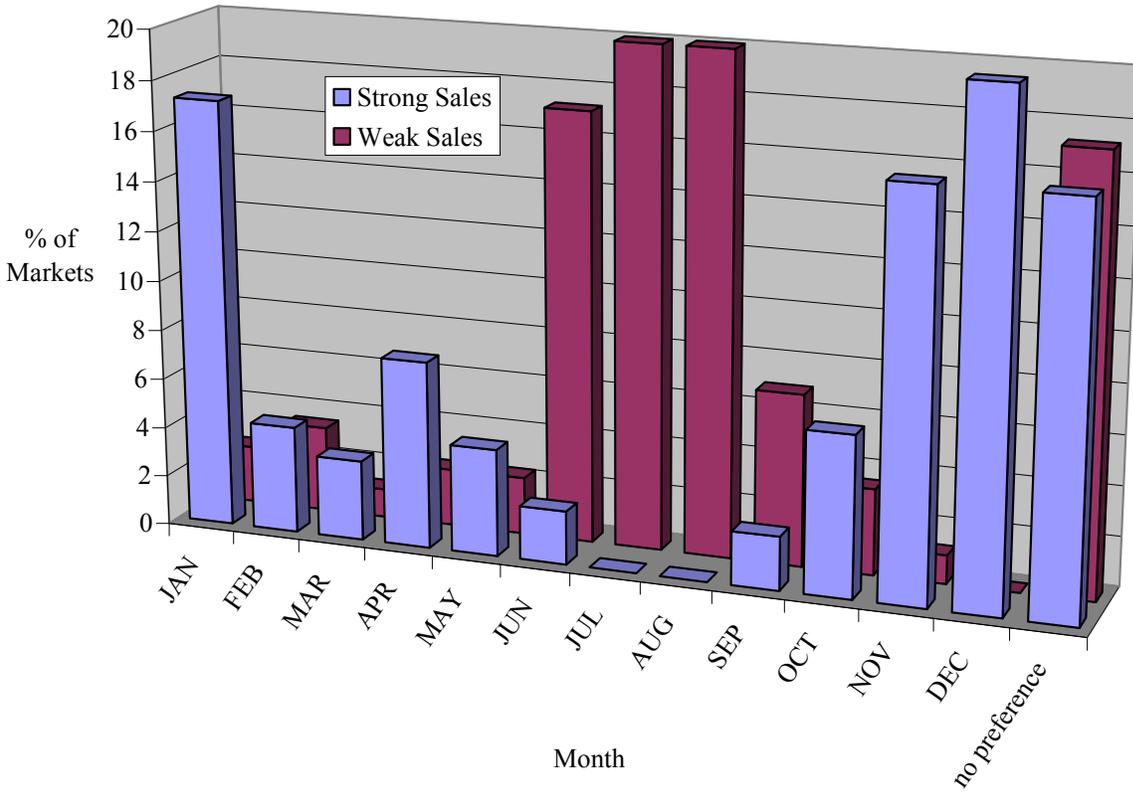


Figure 9 – Number of Varieties of Live Fish Sold

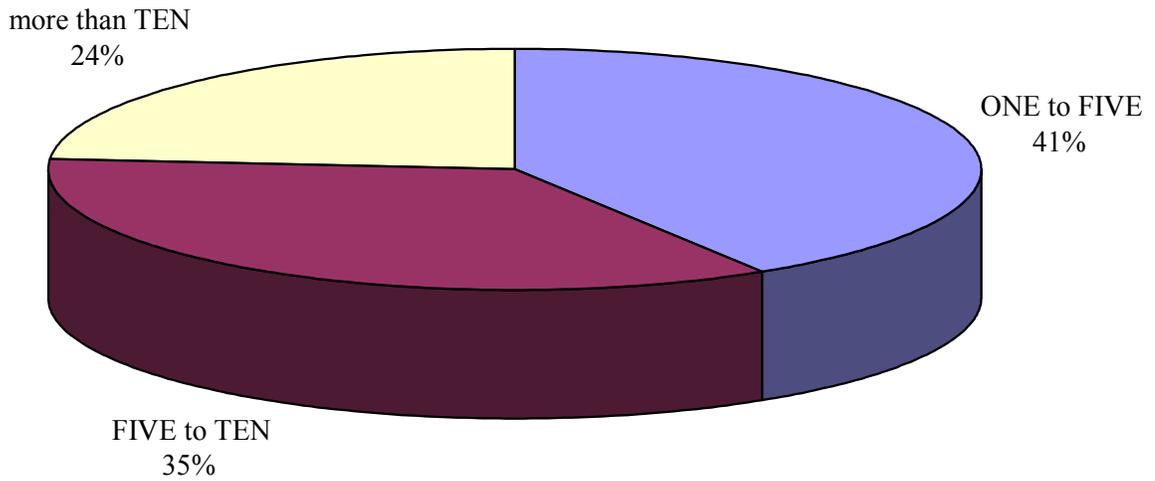


Figure 10 – Popularity of Various Varieties of Live Seafood, as Reported by Live Seafood Markets

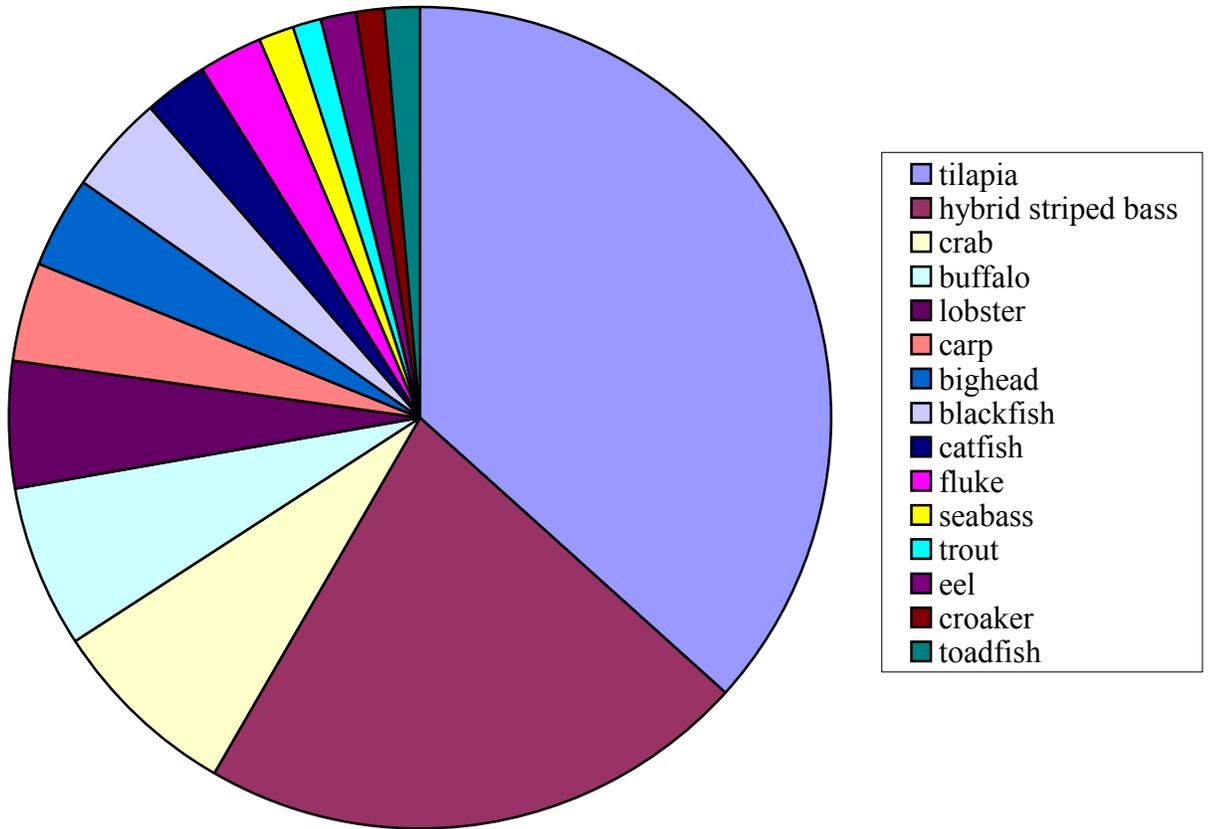


Figure 11 – Importance of the Live Seafood Section to the Overall Store, as Reported by Live Seafood Markets.

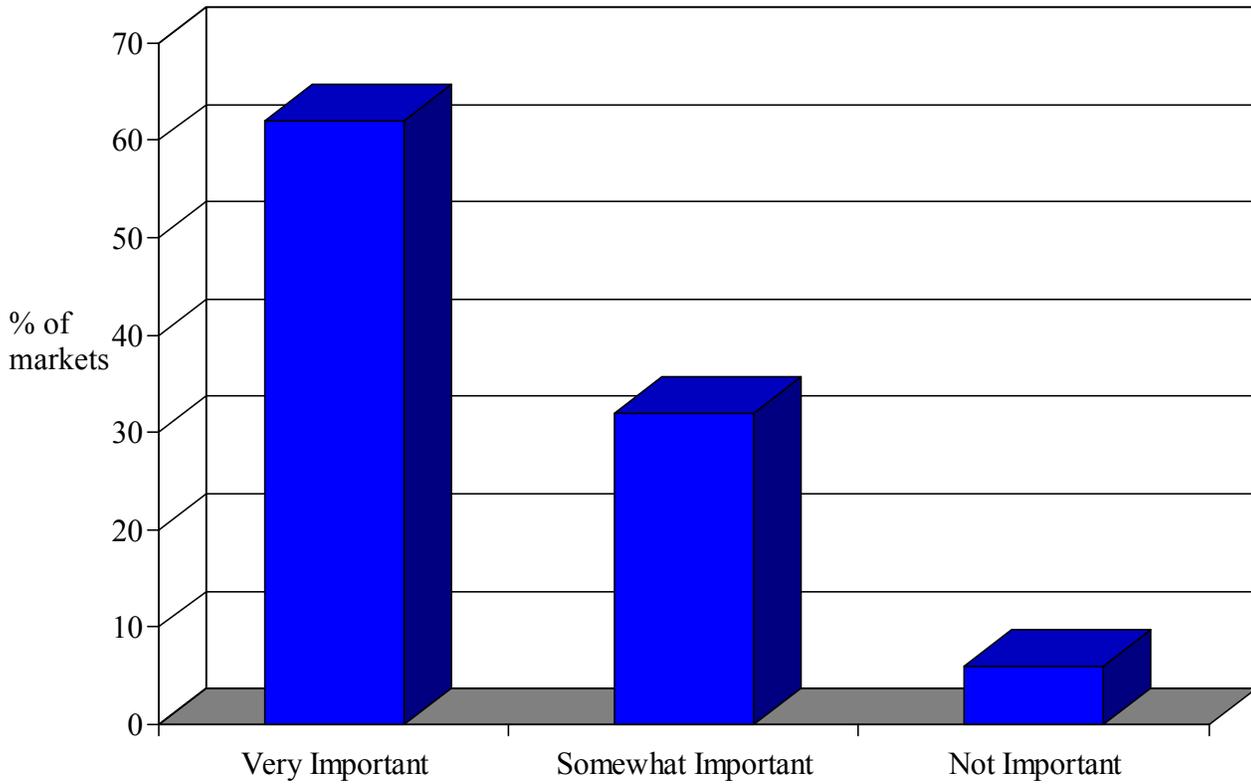


Figure 12 – Plans to Expand, Reduce, or Not Change the Size of the Live Seafood Section in the Store in the Next Two Years.

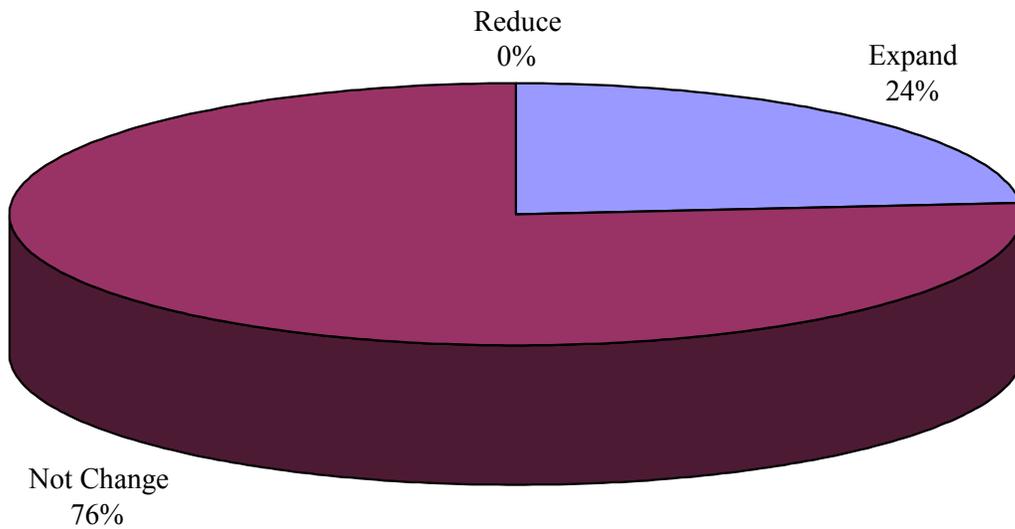


Figure 13 –Live Seafood Consumers by Gender.

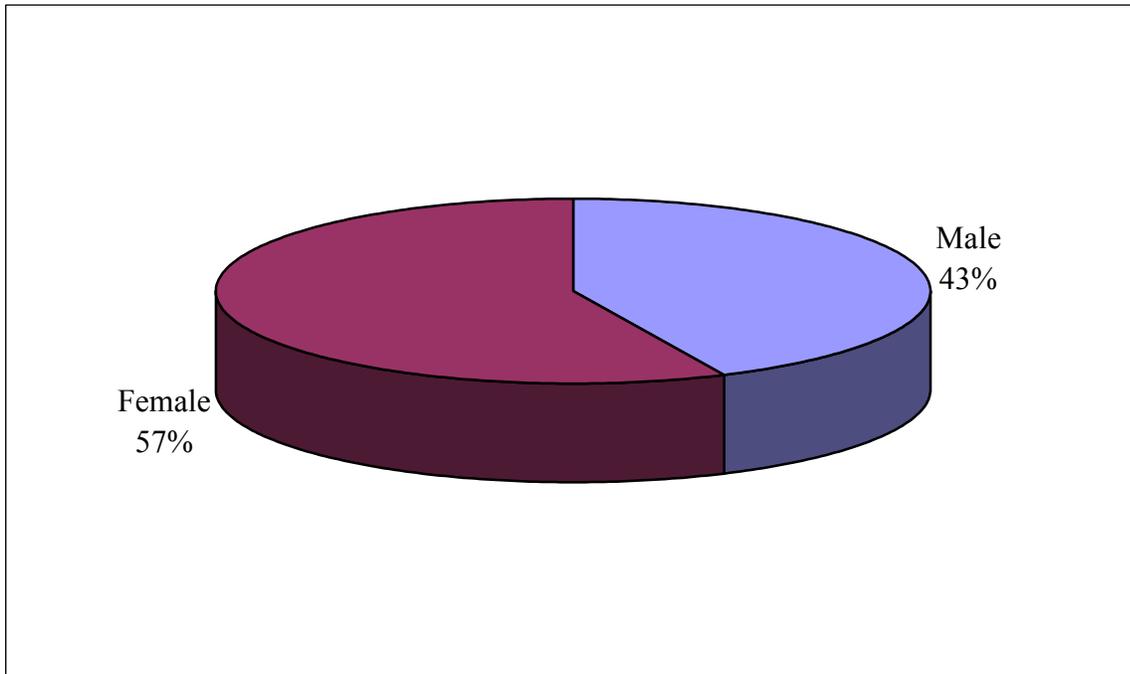


Figure 14 – Age Distribution of Live Seafood Consumers.

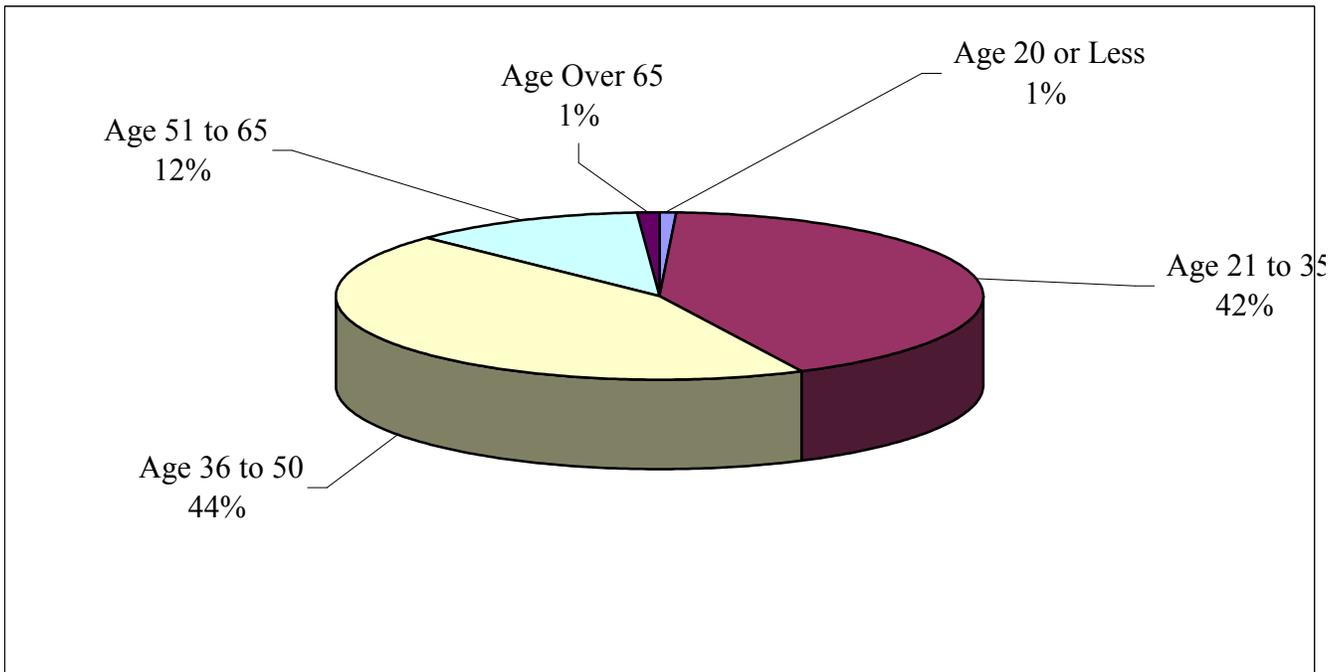


Figure 15 – Is English the Primary Language spoken in your Household?

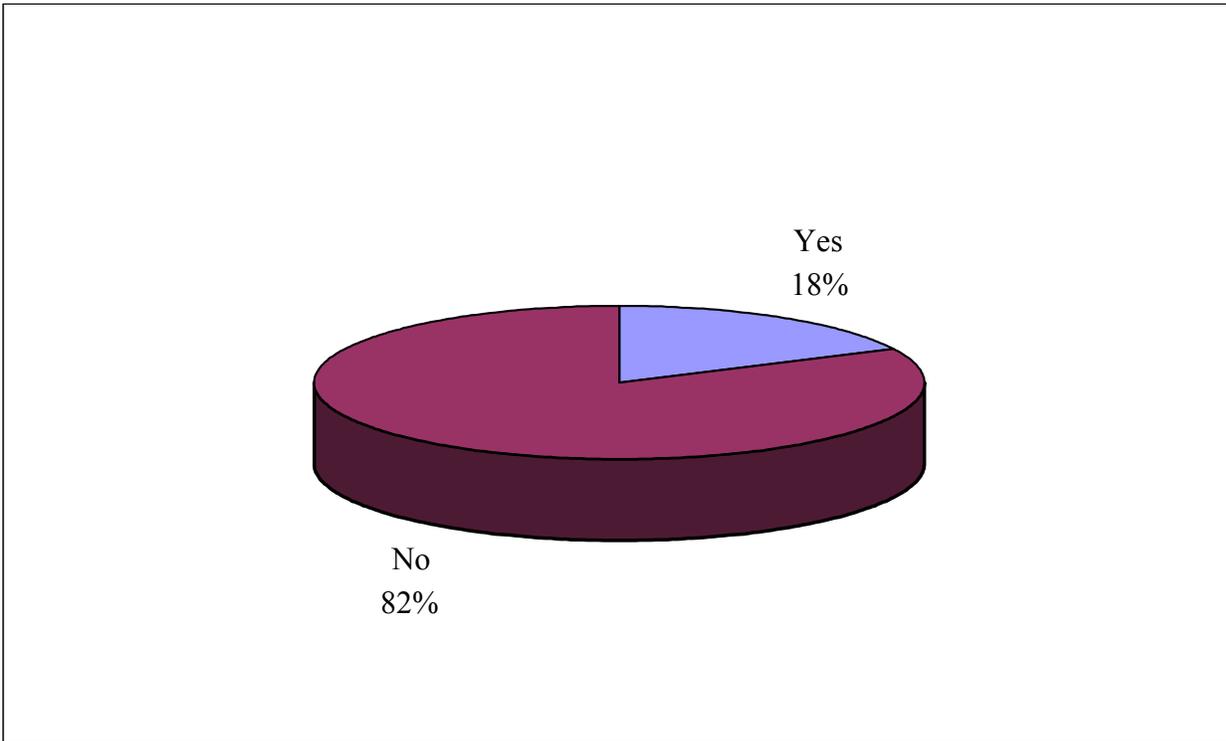
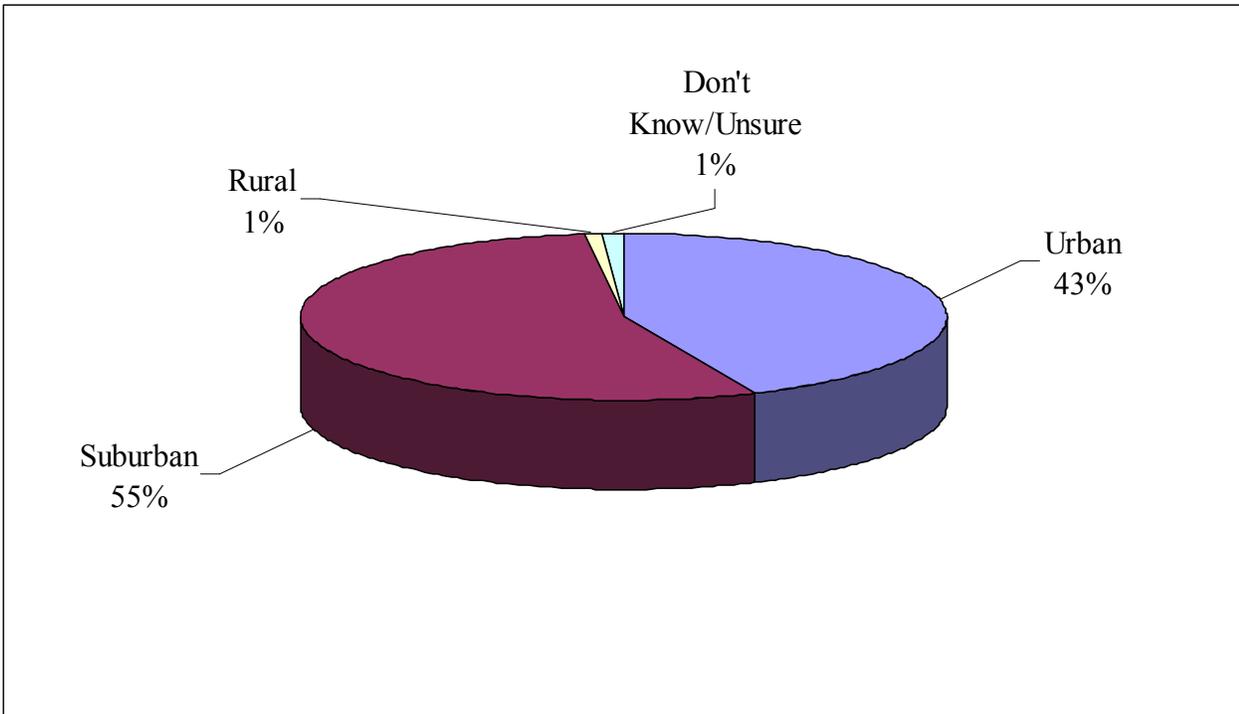


Figure 16 – Live Seafood Consumers Location by Residence



**Note: Surveys where the five markets are located include two urban areas and three suburban areas.*

Figure 17 – Distribution of Respondents by their Family Size

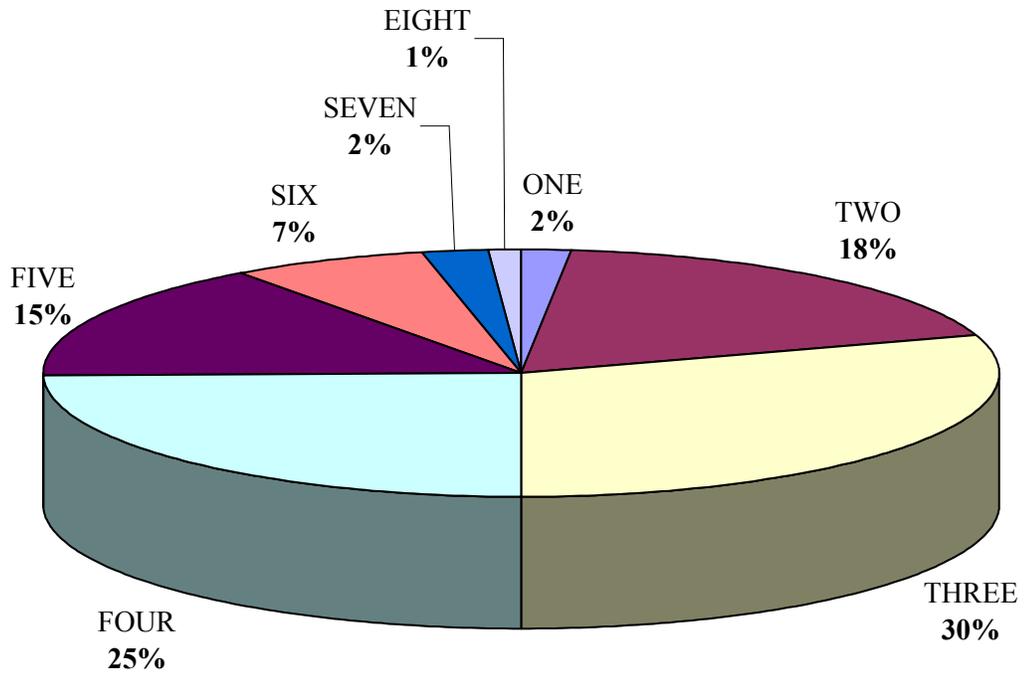


Figure 18 – Months where Live Seafood Consumers are Most and Least Likely to Purchase Live Seafood.

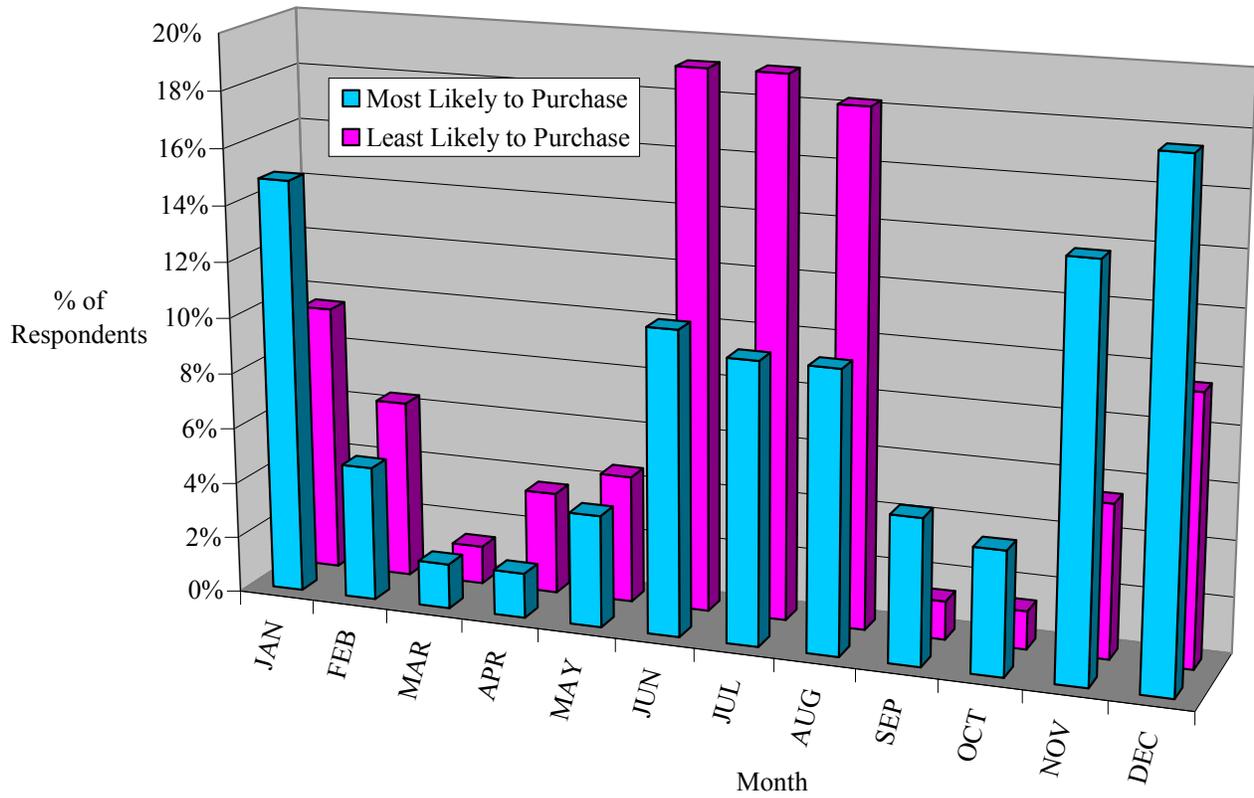


Figure 19 – Days of the Week where Live Seafood Consumers are Most and Least Likely to Purchase Live Seafood.

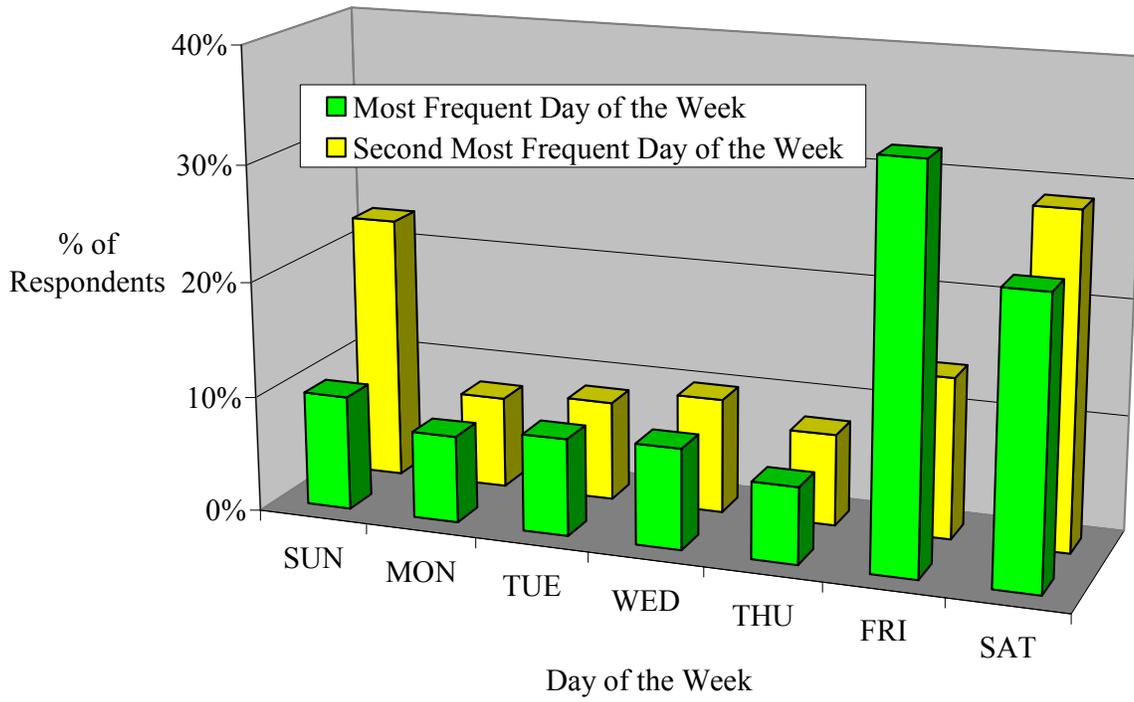
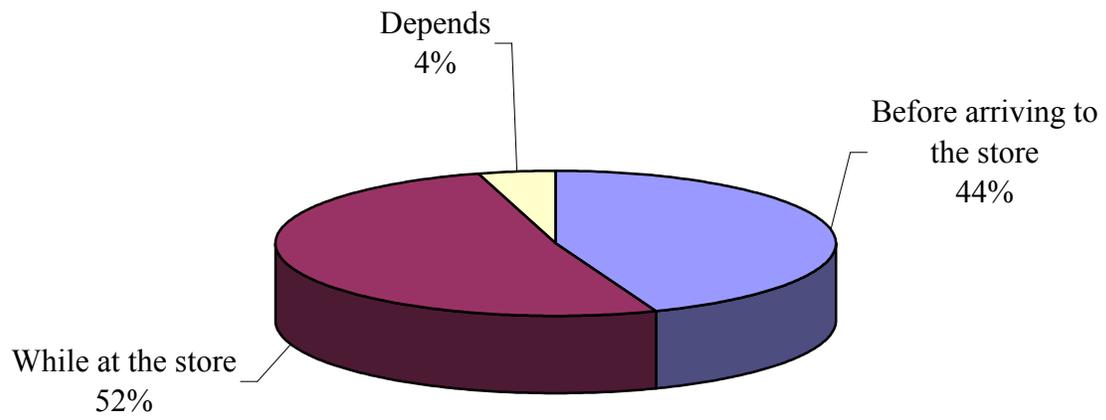


Figure 20 – When Live Seafood Consumers Make their Purchase Decision.



References Cited

- Agricultural Marketing Service -USDA. 2004. AMS News Release. USDA Issues Regulatory Action on Mandatory Country of Origin Labeling for Fish and Shellfish. AMS No. 172-04. published 30 Sep 2004. <http://www.ams.usda.gov/news/172-04.htm> (accessed 6 August 2007).
- Asian American Federation of New York Census Information Center. 2004. Census Profile: New Jersey's Asian American Population. published May 2004. <http://www.aafny.org/cic/briefs/newjersey.pdf> (accessed 9 December 2004).
- Castle, R. 2000. Overview of Leading Finfish Species and Markets. East Coast Live! 2000. Annapolis, Maryland, USA. November 1-4, 2000.
- Chapman, J.W., T.W. Miller, and E.V. Coan. 2003. Live seafood species as recipes for invasion. *Conservation Biology* 17(5):1386-1395.
- Degner, R.L., C.M. Adams, S.D. Moss and S.K. Mack. 1994. Per Capita Fish and Shellfish Consumption in Florida. published 31 August 1994. <http://www.agmarketing.ifas.ufl.edu/downloads/SEAFOOD.pdf> (accessed 9 December 2004).
- Fahrenthold, D.A. and J. Partlow. 2004. Snakeheads May Be Making Home in Potomac. *The Washington Post*. Wednesday, June 30, 2004; p. B01 <http://www.washingtonpost.com/wp-dyn/articles/A16016-2004Jun29.html> (accessed 14 August 2007).
- Food and Drug Administration, Public Health Service, U. S. Department of Health and Human Services. 2005. Equipment, Utensils and Linens, Chapter 4 *in* Food Code. 4-204.110. pp. 111-112. published October 10, 2005. <http://www.cfsan.fda.gov/~dms/fc05-toc.html> (accessed 1 August 2007).
- Henry, S. 2007. Buddhists release creatures into Passaic. *Herald News*. Monday, August 13, 2007. <http://northjersey.com/page.php?qstr=eXJpcnk3ZjczN2Y3dnFIZUVFeXkzNTcmZmdiZWw3Zjd2cWVIRUV5eTcxODE0OTQmeXJpcnk3ZjcxN2Y3dnFIZUVFeXky> (accessed 14 August 2007).
- National Fisheries Institute. 2007. Top 10 U.S. Consumption by Species Chart. http://www.aboutseafood.com/media/top_10.cfm (accessed 6 August 2007).
- National Marine Fisheries Service. 2007. Fisheries of the United States. published July 2007. http://www.st.nmfs.gov/st1/fus/fus06/fus_2006.pdf (accessed 6 August 2007).
- Sechena, R. MD, MPH, C. Nakano, BA, S. Liao, Ph.D., N. Polissar, Ph.D., R. Lorenzana, DVM, Ph.D., S. Truong and R. Fenske, Ph.D., MPH. 1999. Asian and Pacific Islander

Seafood Consumption Study (EPA 910/R-99-003). Published 27 May 1999.
<http://www.epa.gov/r10earth/offices/oea/risk/a&pi.pdf> (accessed 9 December 2004).

U.S. Census Bureau. 2000. "State and County Quick Facts." published 9 July 2004.
<http://quickfacts.census.gov/qfd/> accessed 9 December 2004).

Zimet, D. and P. Zajicek. 2000. The Market Potential for Live Florida Food Fish in the Northeastern United States. East Coast Live! 2000. Annapolis, Maryland, USA. November 1-4, 2000.