Difference In Retail and Foodservice Seafood Buyers Impression of Aquacultural Product

By Hsiang-tai Cheng and Alan S. Kezis

The aquaculture industry in the New England area has been growing steadily over the past two decades with the 1992 farm value reaching an estimated $114 million (New England Agricultural Statistics, 1992). Aquaculture production has continued to increase at a slower pace over the past 5 years but long-term projections indicate sustained growth of the industry overall (Johnson and Dore, 1994). Currently the major shellfish species cultured in the Northeast include oysters, hard-shell clams and mussels. Salmon and trout are the major finfish species produced in New England while states in the southern section of the region have branched out into production of hybrid striped bass and tilapia (New England Agricultural Statistics, 1992).

While production and total sales have generally increased, Northeast producers are encountering increased competition from other domestic and foreign suppliers. The increasing supply of product has not been balanced by increasing demand; per capita consumption climbed dramatically in the mid-1980's to an all-time high of 16 pounds in 1987, but consumption has since stabilized at a lower level of just over 15 pounds (Johnson and Dore, 1994). Along with a stagnant demand, producers in the Northeast have comparatively higher labor costs and shorter growing seasons. As a result, their ability to fend off competitive pressure from foreign suppliers through cost reduction is critically hampered.

For the New England aquaculture industry to develop optimum marketing strategies in this competitive environment a better understanding of retail and food service buyers product perceptions is essential. The objective of this study is to determine differences in buyers impression of aquacultured product by business type, geographic location, and buyers perception of consumer preferences.

Procedures

To meet the objectives, a mail survey was developed to gather data from seafood buyers. Questions in the first portion of the survey asked buyers how they make their purchasing decisions for shellfish and finfish and what factors are most important in selecting a particular supplier. The second question area centered on the present status of their demand for shellfish and finfish products and the possible problems they may have encountered with suppliers and product. The final section was intended to provide information on the attitudes of buyers toward cultured seafood. The survey form underwent several revisions and two pre-tests in preparation for the actual mailout.

The targeted population was seafood buyers in the retail and foodservice sectors. Potential supermarket respondents were selected from The Progressive Grocer's 1993 Listing of Supermarket Distribution Facts Marketing Guidebook. Foodservice Distributors were selected from a 1994 Foodservice Distributor Directory published by CSG information Services. Listings of Chain and Independent Restaurants were also obtained from CSG Information Services which reported addresses and basic sales information for restaurants with sales of $1,000,000 or more.

The buying offices and distribution centers associated with Supermarkets within the New England, Middle Atlantic, Southeast, East Central and Midwest were included in the sample if the buying data indicated that the firm actually purchased seafood. Similarly, foodservice distributors were selected if the firm handled fresh fish. Chain and Independent Restaurants were selected if they (1) specialized in seafood or (2) were classified as white tablecloth restaurants with an average dinner check of over $15.00.

Altogether 1,668 surveys were mailed to the seafood buyers located in the eastern half of the U.S. After two mailouts 208 completed surveys were returned, and 49 surveys were returned as undeliverable. This yielded a response rate of nearly 13%. National mail surveys of business decision makers who have essentially no vested interest in the outcome typically achieve response rates of 3 to 5%. By comparison to this standard, the response rate for this study was reasonably acceptable.

Profile of Respondents

The distribution of respondents based on the type of business they represent and their regional location are presented in Tables 1 and 2.

Table 1. Distribution of Respondents Based on Type of Business.

	N	%
Chain Restaurants	23	11.1
Independent Restaurants	111	53.4
Supermarkets (Buying Office/Distribution Center)	45	21.6
Foodservice Distributors	29	13.9
Total	**208**	**100.0**

Table 2. Regional Distribution of Respondents.

	N	**%**
New England	44	21.2
Mid Atlantic	63	30.3
South East	38	18.3
East Central	29	13.9
Central	34	16.3
Total:	**208**	**100.0**

More than half the respondents are affiliated with independent restaurants. The smallest respondent groups are the chain restaurants accounting for 11% of the returns and foodservice distributors with 14%. The regional distribution shows that half of the respondents are located in New England and the Mid-Atlantic regions. This is primarily due to the higher incidence of restaurants meeting the selection criteria in these two regions. The smallest proportion of respondents is

in the East Central region where there were fewer restaurants, particularly seafood restaurants, that met the criteria for selection. Correspondingly, there were relatively fewer foodservice distributors in this region handling fresh seafood product lines.

Buyer Attitudes Toward Cultured Products

To assess retail buyers attitudes toward cultured products, respondents were asked in the survey how they felt about the cultured shellfish and finfish in comparison to wild harvest. To make these comparisons more precise, respondents were asked to consider only two shellfish species: clams and mussels and two finfish species: salmon and trout. The results are shown in Tables 3 and 4.

The most notable and consistent finding in each table is that very few respondents perceived cultured seafood as inferior. In fact, more than half of the buyers felt it was actually superior to wild harvested product. For the two shellfish species, respondents felt that cultured was superior because the product is cleaner and more evenly sized. Safety was another reason given by many buyers who preferred cultured shellfish and this is consistent with a consumer study in which respondents generally felt more secure about purchasing shellfish that was cultured (Wessels, et. al, 1994). For finfish, price stability and consistent product quality were the major reasons given for the superiority of cultured over wild.

Investigation of the responses from the few buyers who had a poor perception of cultured product revealed two typical concerns. These respondents were worried about feed or "additives", and they indicated that this had an impact on taste as well as the overall "wholesomeness" of the product. In a similar note, several expressed reservations about what aquaculture was doing to the marine environment.

A small but notable percentage of respondents felt that some characteristics of cultured products were better and some were worse. The usual comment among these respondents was that cultured product had more stable pricing but the taste was generally inferior to wild product.

Table 3. Percentage Distribution of Respondents' Perceptions of Quality Differences Between Cultured and Wild Clams and Mussels.

| | -----Restaurants----- | | | | |
	Independent 105 obs.	Chain 23 obs.	Supermarket 42 obs.	Distributor 26 obs.	TOTAL 196 obs.
Cultured Shellfish are superior	63.81	56.52	45.24	53.85	57.65
Cultured Shellfish are inferior	3.81	0.00	2.38	0.00	2.55
No difference between cultured/wild	15.24	4.35	26.19	15.38	16.33
Not sure	11.43	21.74	23.81	30.77	17.86
Some characteristics are better, some are worse	5.71	17.39	2.38	0.00	5.61
Total	100%	100%	100%	100%	100%

Note: Respondents with no experience/familiarity with cultured product are excluded.

Table 4. Percentage Distribution of Respondents' Perceptions of Quality Differences Between Cultured and Wild Salmon and Trout.

| | -----Restaurants----- | | | | |
	Independent 109 obs.	Chain 22 obs.	Supermarket 44 obs.	Distributor 28 obs.	TOTAL 203 obs.
Cultured Finfish are superior	55.05	45.45	52.27	39.29	52.23
Cultured Finfish are inferior	10.09	9.09	4.55	10.71	8.87
No difference between cultured/wild	17.43	18.18	25.00	35.71	21.67
Not sure	11.01	9.09	13.64	10.71	11.33
Some characteristics are better, some are worse	6.42	18.18	4.55	3.57	6.90
Total	100%	100%	100%	1005	100%

Note: Respondents with no experience/familiarity with cultured product are excluded.

The Probit Model and Results

To assess the difference in buyers perceptions of the quality of cultured finfish (salmon and trout) and shellfish (clams and mussels) by types of retail businesses, geographic location, and perceived customers' preference, a probit model was developed.

$$y_i^* = \beta_0 + \beta_1 SPRMKT_i + \beta_2 DSTR_i + \beta_3 MATL_i$$
$$+\beta_4 SE_i + \beta_5 CTRL_i + \beta_6 CSTMR_i + u_i$$

where y^* is an unobservable latent variable, and what we observed is a dummy variable which is defined as

$$y_i = 1 \cdot \text{ if } y_i^* > 0, \quad \text{Cultured finfish}$$
$$\text{(or shellfish) is superior;}$$
$$y_i = 0 \quad \text{if } y_i^* \leq 0, \quad \text{Indifferent or not sure.}$$

u_i are the disturbance term with $IN(0,1)$. Descriptions of the explanatory variables are presented in Table 5.

The estimation technique for the probit model was maximum likelihood (Pindyck and Rubinfeld). The maximum likelihood estimates are consistent and asymptotically normally distributed. Consequently, conventional tests of significance and likelihood ratio tests are applicable. The estimated coefficients and corresponding standard errors of probit models (columns 2 and 3, Table 6) indicate the significance and the direction of impact of selected factors on buyers' perception of the quality of cultured products. Using these estimated coefficients and information from the data, a marginal effect of change in

Table 5. Description of the Explanatory Variables in the Probit Model.

Explanatory Variables	Description
Business Type	
SPRMKT	= 1 if the retailer was a supermarket, = 0 otherwise
DSTR	= 1 if the retailer was a foodservice distributor, = 0 otherwise
Restaurant	The base (omitted) category for business type)
Geographic Location of the Retail Business	
MATL	= 1 if in the Mid-Atlantic, = 0 otherwise.
SE	= 1 if in the Southeast, = 0 otherwise.
CNTRL	= 1 if in the Central region, = 0 otherwise.
New England	The base (omitted) category for geographic region)
Perceived Customer Preference	
CSTMR	= 1 if cultured products are superior, 0 = indifference or not know.

Table 6. The Probit Model Results.

Variable	--------Shellfish--------			--------Finfish--------		
	Coefficient	Standard Error	Marginal Effect	Coefficient	Standard Error	Marginal Effect
Constant	0.772*	0.255		0.326	0.251	
SPRMKT	-0.582*	0.267	-0.217	-0.451	0.291	-0.171
DSTR	-0.620*	0.335	-0.235	-0.917*	0.369	-0.352
MATL	-0.301	0.325	-0.109	0.031	0.328	0.011
SE	-0.354	0.364	-0.131	-0.035	0.368	-0.013
CNTRL	-0.890*	0.324	-0.327	-0.247	0.336	-0.092
CSTMR	1.276*	0.288	0.370	1.817*	0.393	0.462
	Pseudo R^2 = 0.5034			Pseudo R^2 = 0.5223		

* Statistically significant at 10% level.

each factor (dummy variables, from 0 to 1) on the probability of considering cultured product to be superior is calculated[1].

For cultured shellfish products, clams and mussels, buyer perceptions of quality differences between cultured and wild product vary by business type and geographic location. Supermarkets and distributors are estimated to have a 22 and 24 percent lower probability, respectively, of considering cultured products as superior in comparison to restaurants. In other words, restaurants are more likely to prefer cultured clams and mussels than supermarkets and distributors. In terms of geographic differences in preferences for cultured product, there is no significant differences among regions along the east coast. Retailers located in the Central region, however, had about 33 percent lower probability of preferring cultured products than retailers in the New England region. In addition, what buyers perceived their consumer's preference for culture shellfish was also a significant factor. Over 50 percent of the respondent who perceived cultured mussels and clams as superior indicated that consistent in size/quality and cleanness are the top two reasons.

The result on finfish products (salmon and trout) is somewhat different from that on shellfish products (mussels and clams). There is no geographic difference in buyers' perceptions of quality between cultured and wild harvested products. Distributors are estimated to have a 35 percent

[1] From the probit model, the probability that the observed dependent variable equals 1 can be expressed as Prob($CHOICE_i$ = 1) = $\Phi(\beta'x_i)$, where x_i is the set of explanatory variables specified above, β is a vector of coefficients, and $\Phi(.)$ is the cumulative standard normal distribution function. Since the explanatory variables included in the model are dummy variables, the partial effect when an explanatory variable x_k changes from 0 to 1 is calculated by partial effect of $x_k = \Phi(\beta'x| x_k=1) - \Phi(\beta'x| x_k=0)$, and variables other than the kth variable are at the sample means.

lower probability of considering cultured finfish as superior than supermarkets and restaurants. The most significant factor affecting buyers consideration of the quality of cultured products is their customers' preference. The top two reasons given by buyers who perceived cultured salmon and trout as superior are: consistent/better quality and consistent supply.

To illustrate the differences in buyers perception of quality of cultured products by business types and geographic locations, two profiles are constructed using the probit results in which are presented as estimated probabilities of considering cultured products as superior: mussels and clams (Figure 1), salmon and trout (Figure 2).

Figure 1. Estimated Probability that Seafood Buyer Would Consider Cultured Mussels and Clams as Superior than Wild Harvest by Business Type and Region.
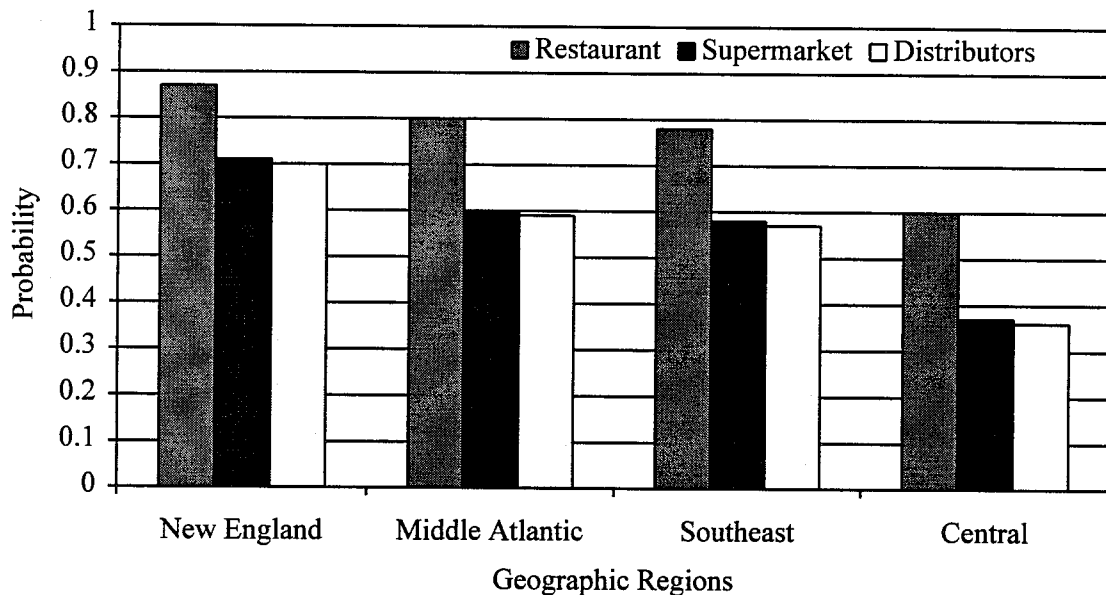
Figure 2. Estimated Probability that Seafood Buyer Would Consider Cultured Salmon and Trout as Superior than Wild Harvest by Business Type and Region.
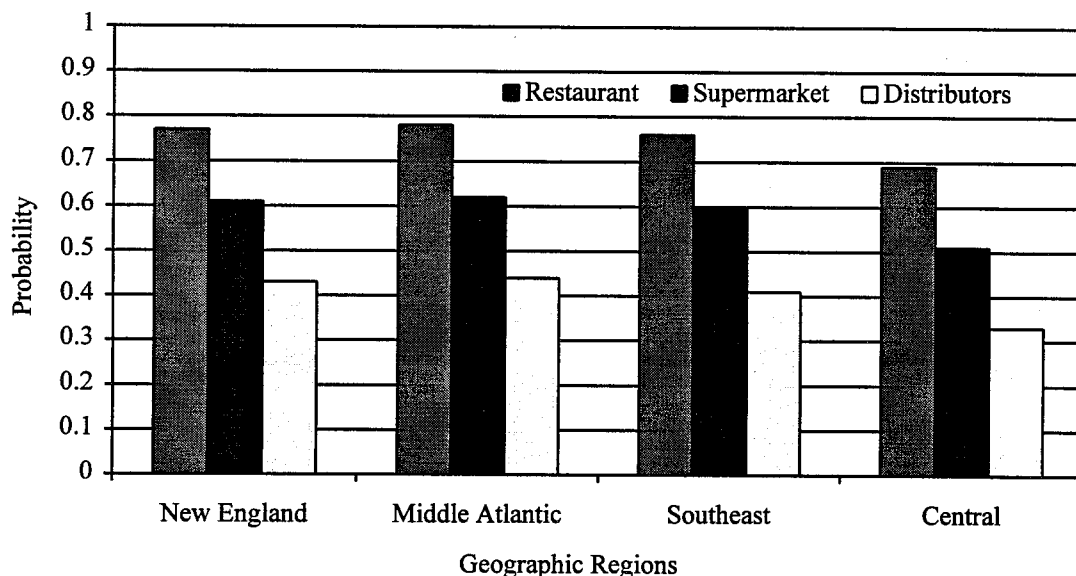
Summary and Conclusions

The objective of this study was to gain a better understanding of differences in retail and foodservice seafood buyers impression of aquacultural products. The findings of this study may help the aquaculture industry in the New England areas in planing marketing strategies toward different market segments. The relative positions of cultured products in the minds of retail buyers in different geographic locations represent market opportunities as well as challenges.

Since the consistency in quality is the primary reason given by respondents for preferring the cultured products, product inspection/certification is likely to be a very effective way for distinguishing cultured products. This, coupled with clear communication that the product is farm-raised can enhance the perceived value of the product and allay the seafood safety concerns that seem to be pervasive among both the seafood buyers and the consumers.

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