IQF Catfish Retail Pack: A Study of Consumers' Willingness to Pay

Kwamena Quagrainie,
University of Arkansas at Pine Bluff

Selected Paper prepared for presentation at the
Southern Agricultural Economics Association Annual Meetings
Little Rock, Arkansas, February 5-9, 2005

University of Arkansas at Pine Bluff, Aquaculture/Fisheries Center
Mail Slot 4912, Pine Bluff, AR 71601
kquagrainie@uaex.edu

The study examined the potential for household-size packs of catfish fillets for grocery sales. Households would purchase 6-fillet packs in various packaging materials except in Styrofoam. The average price households are willing to pay is $4.37/lb. Households that prepare catfish fried have a higher probability of purchasing such retail packs.

Keywords: Catfish, willingness to pay, mixed logit model of ordered data

JEL Classification Q13

Introduction

The foodservice sector including restaurants and fast-food outlets has long been a major market outlet for US farm-raised catfish products. Over 65% of processed catfish products are sold to the food service industry through seafood wholesalers and distributors[1]. The U.S. is a net importer of seafood products and distribution of imported products is by seafood distributors that also handle domestic seafood products. Increased imports of catfish products in the late 1990s and early 2000s caused some decline in catfish price levels (Quagrainie and Engle, 2002; Harvey and Blayney, 2002). There was an increase in the consumption of catfish of about 23% from 1997 to 2000 and yet domestic prices did not change during that period (National Marine Fisheries Service, 2002). In terms of revenue however, both domestic traders and importers of catfish benefited from the increased consumption and the major beneficiary in the catfish market appeared to be the importer (Quagrainie, 2002).

The apparent economic downturn in the U.S. that began during the last half of 2000, the effects of the 9/11 attacks in 2001, and the resulting unstable economy may have exacerbated the declining trends in catfish sales as restaurant sales generally declined late 2001 and in 2002. Consumer spending in restaurants in 2002 increased by 2% over spending in 2001 (NPD, 2003). There were less visits from consumers aged 25-49 years in 2001 and 2002, a drop not experienced by the industry since 1982 (NPD, 2003).

Though long-term trends in household consumption expenditure indicate increasing food expenditure towards prepared foods and meals consumed away from home, food prepared at home accounts for more than half (52%) of household consumption expenditure (USDA/ERS, 2004). The catfish industry is interested in expanding sales of catfish through the grocery market

channel because of the competitive nature that imported fish fillets pose at the foodservice sector market. It is envisaged that the marketing strategy of country-of-origin labeling (COOL), emphasizing "US farm-raised catfish" can be better pursued at the grocery retail market level than at the foodservice sector level. Currently, COOL is voluntary for retail seafood products, which includes catfish. Proper household-size retail packages for catfish could be used to provide labeling information on origin, price, quality, nutrition, product safety and other relevant product information to consumers. That way, a positive relationship could be developed between consumers and US catfish to establish a US farm-raised brand equity and loyalty, and probably a guarantee of quality and safety. Umberger et al. (2003) reported a difference of up to $1.03/lb in auction bids (willingness to pay) between non-labeled steak and steak labeled "US Guaranteed."

The grocery retail channel represents a potential for increased sale for catfish products but it has not been fully explored. Recently, America's Catch, a catfish processing company announced a marketing arrangement with Wal-Mart, for Wal-Mart to sell the former's retail packs of Arkansas-raised catfish products. The arrangement applies to Wal-Mart stores in Arkansas. The product line involved in the marketing arrangement includes a 2lb-bag and a 4lb-bag catfish fillets, as well as a 2½lb-bag catfish nuggets (The Catfish Journal, 2004).

The objectives of this study were to determine consumers willingness to purchase a household-size pack of individual-quick-frozen (IQF) 6-fillets of catfish, and determine how much ($/lb) households will be willing to pay (WTP) for such a retail pack. A 6-fillet pack of catfish would weigh about 2lb, net.

Studies on Willingness-to-Pay

The study of willingness to pay has taken on a variety of forms in the applied economics literature. The traditional approach has been the use of contingent valuation, which is a questioning technique that asks individuals what they would be willing to pay, contingent on market availability of the product or service (see for example Buzby, Ready and Skees, 1995; Gil, Gracia and Sanchez, 2000; Boccaletti and Nardella, 2000; Cranfield and Magnusson, 2003). Through the use of discrete choice techniques, stated choice experiments, and experimental auction methods, analysts have also derived estimates of money an individual is willing to pay to obtain a product (see for example Hoffman et al., 1993; Lusk et al., 2001; Loureiro and Umberger 2003; Lusk, 2003; Umberger et al., 2002 and 2003)

Though WTP techniques have been applied to examine different issues, it has not been applied to potential market opportunities for grocery retail catfish products. The catfish industry is struggling to stay competitive therefore studies of this nature will help the industry to explore the potential for expanding the market beyond the foodservice sector. In addition, this study contributes to the literature on willingness to pay by performing a mixed logit analysis of ordered data, which is a departure from the ordered probit model commonly used for ordered data analysis. The results from this study will provide important information for the catfish industry that can help them develop products to be sold through the grocery market channel to a target clientele. Catfish sales and even farmer profitability could be increased if consumers are willing to pay for such household-size grocery products.

Theoretical Framework and Empirical Model

Analyses of survey rankings and ratings data in empirical work commonly utilize ordered probit or logit models (Greene, 2000) that account for the ordinal ranking or rating of the

dependent variable. Random utility modeling technique is the behavioral assumption of these models. With the ordered probit or logit model, the utility of each factor is assumed to fall within a specific utility interval, and the estimation procedure assumes that all respondents perceive approximately the same utility differences between the alternative ratings (Calfee, Winston and Stempski, 2001). This assumption imposes a restriction on the ratings because the implicit assumption of the random terms is that they are independent and identically distributed (iid). A potential problem also arises when data are aggregated, especially when the dependent variable is pooled into categorical levels. Aggregation results in uneven utility spacing, and the behavioral assumptions underlying the discrete choice modeling may be inconsistent with the nature of the ratings or rankings (Calfee, Winston and Stempski, 2001).

In applied analysis, dependent variable data are commonly pooled into discrete groups for the purpose of using discrete choice procedures to analyze the data (see for example, Huang and Fu, 1995; Dasgupta, Foltz, and Jacobsen, 2000; Klapper and Herwartz, 2000). In this study, willingness-to-pay data were pooled into categorical levels therefore the dependent variable data may be "unbalanced." This is because the pooling resulted in a multi-level data structure with different levels of variability and utility spacing. Consequently, a model of a general covariance structure that assumes uncorrelated errors and even utility spacing is not appropriate. Models that allow random effects, such as the mixed logit model of Revelt and Train (1998) are more applicable to model such pooled data. The mixed logit model is applied in this study because it allows the parameters to randomly vary across the WTP categorical levels to capture the potential heterogeneity in attitudes of respondents. The mixed logit model estimates adjusted parameter means and standard errors that accounts for the cluster effect.

The mixed logit is a generalization of the multinomial logit in which the utility from alternative *j* is denoted as

$$U_j = \beta' \mathbf{x}_j + [\eta_j + \varepsilon_j] \quad (1)$$

where $\mathbf{x}_j$ is a vector of explanatory variables, β is a vector of coefficients to be estimated, η_j is a random term with a zero mean with a distribution over individuals and WTP categories that depends on the underlying coefficients and observed data relating to category *j*, and ε_j is the random term distributed iid extreme value but does not depend on underlying parameters or data. Denoting the density function of η_j as $f(\eta_j|\theta)$, where θ is a vector of the fixed parameters of the distribution, the unconditional choice probability requires integrating over all possible values of η, weighted by the density of η, i.e.,

$$\pi_i = \int \frac{\exp[\beta' \mathbf{x}_i + \eta_i]}{\sum_j \exp[\beta' \mathbf{x}_j + \eta_j]} f(\eta_i \mid \theta) d\eta \quad (2)$$

where π_i is the choice probability of the mixed logit. The integral has no closed-form solution so the integral is approximated through simulations and estimating the simulated log-likelihood function (see Revelt and Train, 1998; Brownstone and Train, 1999).

Data and Methods

In order to examine consumers' willingness to pay for a household-size pack of IQF 6-fillet catfish, data from a telephone survey conducted in February 2004 were used. The survey questionnaire was designed and administered by Advantage Communications Inc. (ACI), a market research firm in Little Rock, Arkansas. The final questionnaire used in the survey was based on the findings from preliminary focus groups conducted by ACI. The survey area covered Little Rock, Tulsa, Oklahoma city, Dallas, San Antonio, Houston, Baton Rouge, New Orleans,

Birmingham, Montgomery, Jackson, Mississippi, and Nashville, all cities in the southern U.S. The interviews were conducted with the primary grocery shopper in the household. The main purpose of the survey was to collect data on household fish purchasing habits. Questions asked related to frequency of fish purchase, place of purchase, type of fish purchased, importance of selected factors on purchase decisions, willingness to pay for selected fish products, and other demographic factors. A total of 1,194 responses were generated from the ACI survey but for this study, only 270 were found to be useful.

The variables selected for this study included: willingness to pay for an IQF 6-fillet household-size pack of catfish; frequency of fish purchase (attitudinal variables); importance of product origin and packaging in fish purchasing decisions (informational variables); and demographic factors. Summary statistics of the variables are provided in Table 1. The WTP data were pooled into four groups. Respondents unwilling to pay a price constituted the 'none' category and assigned 0; willingness to pay $1-$2.99 was assigned 1; willingness to pay $3-$5.99 was assigned 2; and willingness to pay $6 and over was assigned 3. The explanatory variables were incorporated as follows: Dummies were assigned each to "a respondent who buys fish more than once a week;" "a respondent who buys fish once a week;" "a respondent who buys fish twice a month;" "a respondent who buys fish once a month;" "a respondent whose race is white;" "a respondent whose race is black;" "a respondent whose race is Hispanic;" and "a respondent whose gender is female." Omitted variables are indicated in Table 1. "Age" and "household size" are continuous variables and were incorporated in the model as such. "Importance of product origin" and "Importance of packaging" are rankings on a Likert scale of 1-5, where 1=not important at all, and 5=very important. Income was not included in the model because of insufficient data points.

Results/Discussion

In Table 1, the distribution of the sample suggests that about 56% of respondents have positive WTP values for a household-size 6-fillet pack of catfish. The average price households were willing to pay is $4.37/lb. Forty four percent were unwilling to pay any price. This group of respondents probably does not perceive any positive utility to be obtained from the product. The average age of respondent was 44 years, and the average household size was 3. Regarding racial distribution of the sample, 58% were white, 31% were black, 3% were Hispanic, and 8% were of other race. Females constituted 61% of the sample (Table 1).

The mixed logit model of ordered data was estimated with the LIMDEP econometric software. The attitudinal variables and the constant were incorporated to have random parameters. Table 2 presents the estimation results. For the random parameters, all the estimates of standard deviations of the estimated mean coefficients were statistically significant except the variable representing twice a month purchase of fish. The statistical significance of the estimated standard deviations indicates there is heterogeneity among respondents. In particular, there is heterogeneity in respondents' fish buying attitudes of more than once a week, once a week, and once a month. However, only the estimated mean coefficient associated with respondents who buy fish more than once a week is statistically significant.

The sign and magnitude of parameter estimates from the ordered choice model are not appropriate indications of the direction and effects of the explanatory variables on the categorical levels of willingness-to-pay. A more meaningful measure of the effect of an explanatory variable is the marginal effect, i.e., the effect of a change in an explanatory variable on the predicted WTP level or class. For the continuous variables, the marginal effect represents the change in

the predicted probability of willingness to pay levels as a result of a unit change in the explanatory variable, all other factors held constant. For the dummy variables, the marginal effects are the differences of the two predicted probabilities, with and without the variable (Greene, 2000). Estimates of marginal effects are presented in Table 3. The estimated marginal effects sum to zero across the four WTP classes for each explanatory variable, therefore a higher probability associated with a WTP class implies a lower probability for another.

In Table 3, buying fish more than once a week, once a week, and twice a month had a negative propensity to pay a price for a 6-fillet catfish pack, i.e., the probability of being in the class of WTP-None decreased by -0.178, -0.067, and –0.103 respectively. If willingness to pay represents marginal utility of consumption, the results suggest that respondents who did not express any positive willingness to pay probably did not see any utility obtainable from the product. However, for classes involving willingness to pay at least $3.00/lb, the probability increased by at least 0.026 (Table 3). All estimates of marginal effects for those categories are statistically significant. Buying fish more than once a week had a relatively stronger effect than the other fish buying patterns. These results may be expected because frequent fish purchase is an indication of fish preference, and such shoppers will be expected to pay more for fish products. Cranfield and Magnusson (2003) also reported a positive marginal effect of frequency of shopping at health food store on willingness to pay a premium for PFP™. On the contrary, Umberger et al. (2002) and Umberger et al. (2003) reported that those who ate beef frequently had no significant marginal effect on willingness to pay for steak. For the catfish industry, the results from this study suggest that continued availability of the product will be a principal factor to the market success of the product, since frequent fish buyers are willing to pay more for the

product. Targeting this group of shoppers will be an effective marketing strategy based on attitudinal segmentation (Cranfield and Magnusson, 2003).

Regarding labeling on product origin, the results indicate this factor positively affected the probability of unwillingness to pay (WTP-none) by 0.03 but negatively affected the probability of the other WTP classes. The negative effects are not as strong as the positive effect on the probability of the WTP- none class. As the scale of importance decreased, the probability of unwillingness to pay a price increased. Nevertheless, shoppers who were willing to pay a price did not appear to find product origin to be important. The increasing importance of product origin to those unwilling to pay and decreasing importance to those willing to pay at least $3.00/lb could be that the question did not provide specific details about the product origin. The origin variable is an informational variable and the results obtained could suggest that respondents unwilling to pay a price required specific information on source or origin and would probably pay a price for a catfish pack from a specific source. Alternatively, respondents in classes WTP: $3-$5.99 and WTP: $6 and over would probably avoid paying higher prices for catfish products from certain sources. Umberger et al. (2002) reported a significant positive effect of beef knowledge on willingness to pay for corn-fed steak, a U.S. product. Similarly, Umberger et al. (2003) reported a significant positive effect of COOL on the willingness to pay for steak labeled "US Guaranteed." An IQF 6-fillet pack of catfish labeled "US farm-raised catfish" could be an effective grocery product to use to expand sales.

The importance of packaging is similar to that of product origin. The average rating on a Likert scale for packaging is 2.43 compared to 2.54 for product origin (Table 1). The marginal effect is positive and relatively stronger on the probability of the WTP-none class but negative on the probability of WTP: $6 and over class. This finding reinforces the importance of specific

information on consumer purchase decisions. For example, using experimental auctions to assess willingness to pay for various packages of beef, Hoffman et al. (1993) did not find any difference between bids for vacuum-skin and over-wrapped Styrofoam tray packages when subjects had no information about the packages. However, with specific information about the packages, bids significantly increased.

The marginal effects of the demographic variables were mixed. Household size and the presence of children in the family have been reported to affect willingness to pay in the WTP literature. Household size was incorporated as a continuous variable and was expected to negatively affect willingness to pay. The variable had a relatively stronger negative impact on the WTP-none class (-0.172) than the impact on WTP: $3-$5.99 and WTP: $6 and over classes. The relative change in sign of marginal effect on WTP-none to positive on higher WTP classes is similar to the findings of Boccaletti and Nardella (2000), who suggest that this positive effect on willingness to pay may be consistent with psychological studies. In Table 3, all WTP classes with positive values indicate positive marginal effects. A possible explanation for the positive relationship between household size and willingness to pay could be that, larger households probably have more home-prepared meals, therefore the primary shopper will likely be willing to pay more for such a household-size catfish pack.

Regarding race, marginal effects varied with the race of respondents (Table 3). Being a Hispanic increased the probability of being in the class of respondents willing to pay at least $3/lb (WTP: $3-$5.99 and WTP: $6 and over) for the 6-fillet pack, and decreased the probability of having a zero willingness to pay (WTP-none). This ethnic group showed the strongest effect on all the four WTP categories compared to the other explanatory variables. Being white increased the probability of the WTP-none category but decreased the probability of the WTP:

$3-$5.99 category. This is in contrast with Umberger et al. (2002) who reported a positive effect of being white/Caucasian on willingness to pay. Assuming that whites eat out more, compared to Hispanics and other races, the opposing marginal effects of the race variables on willingness to pay for a grocery pack would be expected.

The marginal effects of age and being female indicated a lower likelihood of paying a price, but a higher likelihood of paying a price for the catfish pack. The age variable is continuous suggesting that older respondents were willing to pay a price for an IQF 6-fillet pack of catfish. The significant effect of being a female on willingness to pay at least $3.00/lb is probably an indication of the role of females in the household's grocery shopping decisions.

From these results, it appears that an IQF 6-fillet pack of catfish will sell. The target clientele should be primary household shoppers willing to pay at least $3.00/lb. This clientele would include shoppers who buy fish at least twice a month, shoppers with large households, Hispanics, older shoppers, and females. The total marginal effect of these two classes (WTP: $3-$5.99 and WTP: $6 and over) for the suggested audience are presented in Table 4.

Summary and Conclusions

The purpose of this study was to assess the effects of attitudinal, informational and demographic factors on classes of willingness to pay for a household-size IQF 6-fillet pack of catfish. The catfish industry is interested in expanding grocery channel sales because of increased competition with imported fish products at foodservice market channels. The results of the study suggested that consumers in the southern US were generally split about their willingness to pay for such a household-size catfish pack, with 56% of respondents willing to pay a price for the product. The average price indicated was $4.37/lb. The willingness-to-pay

data were pooled into categorical levels and a mixed logit model used to estimate the ordered data. The model is different from those used in previous studies for ordered data, which assumed homogeneity in attitudes of respondents. In this study,, the attitudinal variables were specified to have random parameters. The results suggest that there is heterogeneity among respondents regarding frequency of fish purchase. The overall results suggest that the clientele that will be willing to pay at least $3.00/lb for the product include shoppers who buy fish at least twice a month, shoppers with large households, Hispanics, older shoppers and females. Promotion of a household-size 6-fillet pack of catfish should target consumers who fit these descriptions. Any information to be associated with the product should be specific on product origin, and a US product could attract premiums.

Notes

[1] The proportion represents the minimum fillet percentage of all catfish sales. There is no data on the percentage of total catfish sold to the food service sector so fillet percentage is used because the food sector purchases mainly catfish fillets.

Table 1. Summary statistics of variables

	Mean	Std Deviation	Minimum	Maximum
WTP-None	0.441	0.497	0	1
WTP $1-$2.99	0.144	0.352	0	1
WTP $3-$5.99	0.263	0.441	0	1
WTP $6 and over	0.148	0.356	0	1
Buys fish more than once a week	0.148	0.356	0	1
Buys fish once a week	0.274	0.447	0	1
Buys fish twice a month	0.174	0.380	0	1
Buys fish once a month	0.300	0.459	0	1
Buys fish less than once a month[a]	0.104	0.305	0	1
Importance of product source	2.537	1.387	1	5
Importance of packaging	2.430	1.273	1	5
Household size	2.926	1.364	1	10
Race-white	0.581	0.494	0	1
Race-black	0.311	0.464	0	1
Race-Hispanic	0.033	0.180	0	1
Race-other[a]	0.075	0.236	0	1
Age	44.189	12.274	24	78
Gender-female	0.607	0.489	0	1
Gender-male[a]	0.393	0.489	0	1

[a] denotes omitted from the estimation procedure.

Table 2. Estimates of mixed logit analysis of ordered willingness-to-pay data

	Mean coefficients		St. dev of mean coefficient	
	Estimate	t-ratio	Estimate	t-ratio
Constant	-0.973*	-1.747	0.707**	8.192
Buys fish more than once a week	0.781**	2.434	0.757**	3.333
Buys fish once a week	0.297	0.894	1.449**	7.700
Buys fish twice a month	0.434	1.353	0.048	0.245
Buys fish once a month	-0.142	-0.469	0.457**	2.825
	Fixed coefficients			
Importance of product source	-0.121**	-2.031		
Importance of packaging	-0.103*	-1.686		
Household size	0.706**	4.284		
Race-white	-0.200	-0.658		
Race-black	-0.083	-0.265		
Race-Hispanic	1.483**	3.211		
Age	0.718**	2.396		
Gender-female	0.358**	2.257		
Threshold parameters for probabilities				
$\mu 1$	0.773**	12.399		
$\mu 2$	2.524**	22.201		
Log likelihood function	-325.65			
Number of observations	270			

"**" and "*" denote statistical significance at the 5% and 10% level respectively.

Table 3. Marginal effects for explanatory variables

	Willingness to pay (WTP)			
	None	$1 - $2.99	$3 - $5.99	$6 and over
Buys fish more than once a week	-0.178**	-0.013**	0.105**	0.086**
	(-7.200)	(-4.461)	(2.622)	(6.188)
Buys fish more once a week	-0.067**	0.000	0.041*	0.026*
	(-3.117)	(0.191)	(1.352)	(1.667)
Buys fish twice a month	-0.103**	0.002	0.062*	0.043**
	(-4.585)	(0.930)	(1.878)	(2.829)
Buys fish once a month	0.035*	-0.001**	-0.021	-0.012
	(1.761)	(-3.637)	(-0.916)	(-0.675)
Importance of product source	0.030**	-0.001	-0.018**	-0.011**
	(2.030)	(-0.867)	(-21.414)	(-5.306)
Importance of packaging	0.025*	-0.001	-0.015	-0.009**
	(1.684)	(-0.822)	(-1.646)	(-5.306)
Household size	-0.172**	0.005	0.105**	0.063**
	(-4.286)	(0.949)	(4.165)	(3.303)
Race-white	0.049**	-0.001	-0.029**	-0.018
	(2.521)	(-1.017)	(-1.357)	(-0.921)
Race-black	0.020	-0.001**	-0.012	-0.007
	(1.008)	(-21.334)	(-0.509)	(-0.404)
Race-Hispanic	-0.287**	-0.064**	0.131**	0.220**
	(-9.424)	(-33.951)	(2.390)	(15.896)
Age	-0.175**	0.005	0.106**	0.064**
	(-2.395)	(0.896)	(2.373)	(2.140)
Gender-female	-0.088**	0.004	0.053*	0.031**
	(-4.026)	(0.978)	(1.702)	(2.250)

"**" and "*" denote statistical significance at the 5% and 10% level respectively.

Table 4. Total Marginal effects for WTP: $3-$5.99 and WTP: $6 and over.

Variable	Total Effects
Buys fish more than once a week	0.191
Buys fish once a week	0.068
Buys fish twice a month	0.105
Household size	0.168
Race-Hispanic	0.351
Age	0.170
Gender-female	0.840

References

Boccaletti, S. & Nardella, M. (2000). "Consumer willingness to pay for pesticide-free fresh fruit and vegetables in Italy" International Food and Agribusiness Management Review 3, 297–310

Brownstone, D. & Train, K. (1999). "Forecasting New Product Penetration with Flexible Substitution Patterns." Journal of Econometrics, 89, 109-129.

Buzby, J.C., Ready, R.C. & Skees, J.R. (1995). Contingent Valuation in the Food Policy Analysis: A Case Study of a Pesticide-Residue Risk Reduction. Journal of Agricultural and Applied Economics, 27 (2), 613-625.

Calfee, J., Winston C. & Stempski T. (2001) "Econometric Issues in Estimating Consumer Preferences from Stated Preference Data: A Case Study of the Value of Automobile Travel Time." The Review of Economics and Statistics. 83, 699-707.

Cranfield, J.A.L. & Magnusson, E. (2003). Canadian Consumer's Willingness-To-Pay For Pesticide Free Food Products: An Ordered Probit Analysis. International Food and Agribusiness Management Review, 6(4), 13-30.

Dasgupta, S., Foltz, J. & Jacobsen, B. (2000) Trout Steaks: Consumer Perceptions of a New Food Item, Journal of Food Distribution Research, (November): 37-47.

Gil, J.M., Gracia, A. & Sanchez, M. (2000). "Market Segmentation and Willingness to pay for Organic Products in Spain." International Food and Agribusiness Management Review 3, 207–226

Greene, W.H. (2000). Econometric analysis, 4th ed. Englewood Cliffs, NJ: Prentice Hall.

Harvey, D. & Blayney, D. (2002). Imports and Lackluster Demand Pressure Catfish Prices. Agricultural Outlook. No. 290. April. USDA, Economic Research Service.

Hoffman, E., Menkhaus, D.J., Chakravarti, D., Field, R.A. & Whipple, G.D. (1993). Using laboratory experiment auctions in marketing research: A case study of new packaging for fresh beef. Marketing Science, 12 (3), 318-338.

Huang, C. L. & Fu, J. (1995). Conjoint Analysis of Consumer Preferences and Evaluations of a Processed Meat. Journal of International Food & Agribusiness Marketing, 7(1), 35-53.

Klapper, D. & Herwartz, H. (2000). Forecasting market share using predicted values of competitive behavior: further empirical results. International Journal of Forecasting, 16, 399-421.

Loureiro, M.L. & Umberger, W.J. (2003). Estimating Consumer Willingness-to-Pay for Country-of-Origin Labeling. Journal of Agricultural and Resource Economics. 28, 287-301.

Lusk, J.L. (2003). Effects of cheap talk on consumer willingness-to-pay for golden rice. American Journal of Agricultural Economics. 85(4), 840-856.

Lusk, J.L., Fox, J.A., Schroeder, T.C., Mintert, J., & Koohmaraie, M. (2001). In-store valuation of steak tenderness. American Journal of Agricultural Economics. 83(3), 537-550.

National Marine Fisheries Service, NOAA (2002). Fisheries of the United States - 2002. Fisheries Statistics and Economics Division Report, (F/ST1), Silver Spring, MD.

NPD. (2003). The NPD Group reports slight increase in consumer restaurant spending. Press release: March 10, 2003. NPD Group, Port Washington, N.Y. www.npdfoodworld.com

The Catfish Journal. (2004). Wal-Mart's Arkansas Stores will Promote State's Catfish - America's Catch Participating." *The Catfish Journal*, Vol. 19, No. 1, September 2004.

Quagrainie, K. K. (2002). “How Can the Catfish Industry Compete?” Aquaculture Magazine, 28(4), 11-14.

Quagrainie, K. K. & Engle, C.R. (2002). "Analysis of Catfish Pricing and Market Dynamics: The Role of Imported Catfish" Journal of the World Aquaculture Society, 33(4), 389-397.

Revelt, D. & Train, K. (1998). Mixed logit with repeated choices: households' choices of appliance efficiency level. Review of Economics and Statistics, LXXX, 647-657.

Umberger, W.J., Feuz, D.M., Calkins, C.R. & Killinger, K. (2002). U.S. Consumer Preference and Willingness-to-Pay for Domestic Corn-fed Beef versus International Grass-fed Beef Measured through an Experimental Auction. Agribusiness: An International Journal. 18, 491-504.

Umberger, W.J., Feuz, D.M., Calkins, C.R. & Sitz, B.M. (2003). Country-of-Origin Labeling of Beef Products: U.S. Consumers Perceptions. Journal of Food Distribution Research. 34, 103-116.

USDA, Economic Research Service (ERS) (2004). Food CPI, Prices, and Expenditures: Expenditure Tables. ERS/USDA Briefing Room. www.ers.usda.gov/briefing/CPIFood Accessed 11/10/04.