DEVELOPMENT OF CENTRAL AMERICAN MARKETS FOR TILAPIA PRODUCED IN THE REGION: POTENTIAL MARKETS FOR FARM-RAISED TILAPIA IN HONDURAS

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ABSTRACT

Three surveys were conducted in Honduras from September through December 1999. A random sample of restaurants and a census of supermarkets and fish markets were conducted in the major urban areas and in selected small rural towns. Descriptive analyses of the restaurant and supermarket surveys are attached; the descriptive analysis of the fish market vendor survey is nearly complete. Quantitative analyses of the survey data have been initiated. Similar surveys are scheduled to be conducted in Nicaragua from August through October 2000. Descriptive and quantitative analyses will also be conducted with the Nicaraguan survey data.

INTRODUCTION

Tilapia culture was initiated in Honduras in the late 1970s (Teichert-Coddington and Green, 1997). In the early years, tilapia production was primarily a small-scale, family operation that was managed either extensively or semi-intensively as a supplemental agricultural activity. Sarmiento and Lanza Nuñez (1995) found a total of 113.6 ha of small-scale, family-level fish ponds (2,738 ponds) in every department (province) of Honduras.

Export oriented production of tilapia began in 1990 and has grown rapidly since 1991 and 1992 (Teichert-Coddington and Green, 1997). In 1997, there were 15 tilapia farms with a total water surface of 185.3 ha that produced for export and domestic markets. These farms produce tilapia exclusively and are owned by individuals, local investors, and international investors (Green and Engle, in press). Exports of tilapia to the US from Honduras have grown consistently since 1992.

The rapid growth in tilapia production is expected to generate a supply that could be available domestically in Honduras. The development of a strong domestic market for tilapia in Honduras could diversify market opportunities for tilapia growers and serve to stabilize this young aquaculture industry from the external shocks common in export-oriented markets. Furthermore, the development of a domestic market could enhance the income generating potential of small-scale tilapia production.

A limited amount of work has been done on markets for finfish in Central America. The few studies that have been carried out focused on the catch from commercial fisheries in Panama (Matton, 1981) and Costa Rica (Scheid and Sutinen, 1979). Head et al. (1994) developed market guidelines for saltwater-cultured Florida red tilapia in Puerto Rico. Several studies conducted in the US have examined the potential to develop markets for tilapia (Crawford et al., 1978; Nelson et al., 1983; Galbreath and Barnes, 1981). More recently, Swanson (1995) described US market requirements for tilapia. Engle (1997) interviewed intermediate seafood buyers in the US to determine the potential to increase sales of fresh and frozen tilapia fillets in the US. However, virtually no work has been done on the potential to develop domestic markets in Central America for tilapia. Engle (1997) describes the domestic markets that have emerged in Colombia for Colombian and Ecuadorian produced tilapia.

METHODS

Direct personal interviews were conducted in Honduras in 1999 based on a census of supermarkets and fish market vendors and a random sample of restaurants in Tegucigalpa and San Pedro Sula (the two main urban population centers in Honduras) and in selected small rural towns. Small rural towns were selected along the primary route from north to south through the country to collect data along a possible gradient of preferences between the Pacific and Atlantic coasts. Honduras is the only Central American country with good access between the two coasts where this might be possible. Additional towns that were large enough to be included on maps and located to the east and west of the Tegucigalpa-San Pedro Sula highway were included. In all, the following small rural towns were included in the survey: Catascamas, Siguatepeque, Santa Barbara, Comaguela, Lago de Yojoa, Choluteca, Puerto Cortes, Juticalpa, Comayagua, La Paz, Santa Maria del Real, and Campamento La Lima.

Fast-food eating establishments, bars, cafes, and Chinese restaurants were excluded from the restaurant survey; only full-service restaurants were represented. Supermarkets represented in the survey excluded convenience stores. In the fish markets, only those vendors with a market stand within the market were interviewed. If there were itinerant vendors selling fish outside the market area they were excluded from the survey.

The survey instruments were designed to obtain descriptive information about the restaurants, supermarkets, and fish market vendors. This information included the other types of fish and seafood sold, prices, most frequently sold fish products, and supplier information. Awareness and availability of tilapia were addressed through questions related to the managers' familiarity with tilapia as well as questions related to the supply of tilapia. Information on restaurant and supermarket manager and fish market vendor attitudes towards attributes such as flavor, odor, supply, quality, ease of preparation, size, and price was elicited by asking respondents to assign a value from 1 to 10 in response to statements concerning each attribute. A score of 1 represented complete disagreement with the sentence, and a score of 10 represented complete agreement.

Characteristics related to the clientele and to the restaurant, supermarket, and fish markets interviewed were necessary to interpret responses to the survey. Questions were asked about the size of the stores and restaurants, the type of ownership, location, years in business, and the type of food sold or served.

The response rate was very high. This is likely due to the novelty of marketing surveys in Honduras. People were surprised to be asked to participate but were extremely cooperative. The response rate was 99% for the restaurant survey, 100% for the supermarket survey, and 100% for the fish market survey. In all, 73 restaurant, 54 supermarket, and 66 fish market questionnaires were completed.

Restaurant and supermarket managers and fish market vendors participated in the study. There were 86 potential questions on the restaurant questionnaire, 56 potential questions on the supermarket questionnaire, and 40 potential questions on the fish market vendor questionnaire. The restaurant interviews lasted the longest. Frequently, the managers provided samples of various fish and seafood preparations and wanted to discuss a variety of issues in addition to the survey. These interviews often lasted from 15 minutes up to one hour. The supermarket interviews lasted approximately 12 minutes while the fish market vendor interviews were the shortest at approximately 7 minutes.

RESULTS

Restaurant Survey

Of the 73 completed questionnaires, 64% of the respondents were located in the Pacific coast, or central-south, region of Honduras while 36% were located in the north, reflecting the

Table 1. Number and percentage of restaurants that sell and do not sell fish and tilapia by region, restaurant survey, Honduras, 1999.

Category	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Do Not Sell Fish	1	2	1	4	2	3
Sell Fish, But Not Tilapia	35	74	18	69	53	73
Sell Tilapia	11	23	7	27	18	25
Total	47	64	26	36	73	101

Table 2. Number and percentage of restaurants surveyed by percentage of total sales from fish and seafood, restaurant survey, Honduras, 1999.

Region	Seafood Sales						
	> 40%		*20–40%*		*0–19%*		*Total*
	No.	%	No.	%	No.	%	No.
CENTRAL-SOUTH							
Sell Tilapia	5	45	3	27	3	27	11
Don't Sell Tilapia	15	44	13	38	6	18	34
Total	20	44	16	36	9	20	45
NORTH							
Sell Tilapia	4	57	2	29	1	14	7
Don't Sell Tilapia	9	50	8	44	1	6	18
Total	13	52	10	40	2	8	25
TOTAL	33	47	27	39	13	19	70

Table 3. Most popular species of fish and seafood on menu by region, restaurant survey, Honduras, 1999.

Species	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Shrimp	37	28	20	27	57	27
Conch	17	13	10	13	27	13
Other Fish	11	8	15	20	26	12
Corvina	23	17	2	3	25	12
Other Shellfish	8	6	6	8	14	7
Robalo	7	5	6	8	13	6
Lobster	7	5	3	4	10	5
Red Tilapia	5	4	5	7	10	5
Crab	9	7	1	1	10	5
Red Pargo	6	4	3	4	9	4
Black Tilapia	4	3	4	5	8	4
Total	134	100	75	100	209	100

Table 4. Peak demand season for fish and seafood by region, restaurant survey, Honduras, 1999.

Season	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Mar.–Apr. (Easter)	23	44	10	40	33	43
None	19	37	8	32	27	35
Sept.–Dec. (Christmas)	8	15	7	28	15	19
Jan.–Feb.	1	2	0	0	1	1
May–Aug.	0	0	0	0	0	0
Don't Know	1	2	0	0	1	1
Total	52	100	25	100	77	100

Table 5. Current sales volumes of fish and seafood compared to 1998 and to 1997 by region, restaurant survey, Honduras, 1999.

Change in Sales	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
ONE YEAR AGO						
Same	21	46	5	20	26	37
More	14	30	5	20	19	27
Less	7	15	11	44	18	25
New Restaurant	3	6	3	12	6	8
Don't Know/ No Answer	1	2	1	4	2	3
Total	45	100	25	100	71	100
TWO YEARS AGO						
Same	17	37	4	16	21	30
More	9	20	12	48	21	30
Less	15	33	4	16	19	27
New Restaurant	3	6	3	12	6	8
Don't Know/ No Answer	2	4	2	8	4	5
Total	46	100	25	100	71	100

greater population density in the central-south part of the country (Table 1). Only 3% of the restaurants that responded to the survey did not sell fish at all. Seventy-three percent sold fish but not tilapia, and 25% of the restaurants sold tilapia. There was little difference in the percentages of those selling different types of fish from those selling tilapia between the two regions in the country.

Forty-seven percent of the restaurants surveyed had fish and seafood sales that composed greater than 40% of their total sales; 39% of the restaurants had fish and seafood sales that composed 20–40% of their total sales; and 19% had fish and seafood sales that composed 0–19% of their total sales (Table 2). The north region had a higher percentage (52%) of restaurants that had greater than 40% of their total sales from fish and seafood compared to the central-south (40%). The central-south region also had a higher percentage (20%) of restaurants that had only 0–19% of their total sales from fish and seafood compared to the north region (8%). There was only one restaurant in each region that did not include some type of fish or seafood on the menu. While nearly all restaurants surveyed included some type of fish and seafood, restaurants in the north relied more heavily on fish and seafood sales than did restaurants in the central-south part of the country. This corresponds with various observations made during the survey that people in the north consume fish and seafood more frequently than do people in the central-south region of Honduras.

Shrimp was indicated most often as one of the most popular types of fish or seafood on restaurant menus (Table 3). Shrimp was followed in descending order by conch, "other fish," corvina, "other shellfish," robalo, lobster, red tilapia, crab, red pargo, and black tilapia. "Other fish" refers to a frequent menu item that can be any of a number of different species of finfish depending on the daily catch and what the suppliers have

Table 6. Top fish and seafood dishes and appetizers in terms of sales, restaurant survey, Honduras, 1999.

Dish	Preferred Dish	
	No.	*%*
Breaded Shrimp	33	47
Fried Fish	30	43
Garlic Shrimp	24	34
Shrimp Cocktail	15	21
Soup	29	41
Breaded Fish	13	19
Fish *Ceviche*	11	16
Grilled Fish	8	11
Garlic Fish	8	11

available fresh that day. "Other fish" often is corvina, robalo, pargo, or other marine species. Regionally, corvina was identified as the second most popular type of fish and seafood after shrimp in the central-south region, while "other fish" was the second most popular item mentioned in the north region. Crab was identified as the fifth most popular in the central-south region but the least mentioned in the north region.

The peak demand period was indicated to be the Easter season during March and April by 43% of the respondents (Table 4). Interestingly, another 35% responded that there was no one peak demand period, and 19% said that the period from September through December, or around Christmas, was the peak demand period. Similar percentages of respondents in the central-south and north regions agreed that March through April was the peak demand period, but more respondents in the north (28%) indicated that September through December was the peak demand period than did respondents in the central-south region (15%).

Thirty-seven percent of respondents said that they were selling the same amount of fish in 1999 and 1998 (Table 5). Twenty-seven percent said they were selling more, and 25% said they were selling less in 1999 compared to 1998. There were apparent regional differences in the response to this question. In the north, 44% of respondents said that they were selling less compared to only 15% who said they were selling less in the central-south region. Thirty percent of respondents in the central-south region said that they were selling more compared to only 20% in the north. In the central-south region, 46% said they were selling the same amount as one year ago, but only 20% of respondents in the north made the same assessment.

There were fewer restaurants with similar sales in 1999 and 1997 (Table 5). Higher percentages of respondents were recorded for both the categories of selling more and for selling less in 1999. Fewer respondents in both regions indicated that their sales were the same in 1999 and 1997 than the percentages indicating similar sales in 1999 and 1998. Higher percentages of central-south respondents were recorded for both categories of selling more and selling less in 1999 as compared to 1997. However, there were more respondents in the north indicating lower sales in 1999 as compared to 1997 than did when comparing 1999 to 1998 sales. Fewer respondents in the north said they were selling more in 1999 compared to 1997 than did when comparing 1999 to 1998 sales. These results seem to indicate a good deal of fluctuation in fish and seafood sales between 1997 and 1999. Some of the fluctuation may be due to the effects of hurricane Mitch on both the capture fisheries and the Honduran economy.

Breaded shrimp was mentioned most often as the top fish and seafood dish or appetizer in terms of sales (Table 6). It was followed in descending order of importance by fried fish, garlic shrimp, shrimp cocktail, soup (mariner's and conch), breaded fish, fish *ceviche*, grilled fish, and garlic fish.

Fried fish was the dish mentioned most often as having the fastest sales growth in the last year (Table 7). It was followed by breaded shrimp, conch soup, garlic shrimp, shrimp cocktail, breaded fish, fish *ceviche*, mariner's soup, and grilled shrimp.

Table 7. Fish and seafood dishes with fastest sales growth in last year, restaurant survey, Honduras, 1999.

Dish	Sales Growth	
	No.	*%*
Fried Fish	22	34
Breaded Shrimp	21	33
Soup	19	30
Garlic Shrimp	13	21
Shrimp Cocktail	10	16
Breaded Fish	9	14
Fish *Ceviche*	8	13
Grilled Shrimp	5	9
Shellfish *Ceviche*	4	6
Grilled Fish	4	6

Table 8. Type of fish and seafood suppliers by region, restaurant survey, Honduras, 1999.

Type of Supplier	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Wholesalers	35	73	19	76	54	74
Fishermen	4	8	3	12	7	10
Fish Farmers	7	15	0	0	7	10
Processor/Producers	0	0	1	4	1	1
Importers	0	0	1	4	1	1
Other	2	4	1	4	3	4
Total	48	100	25	100	73	100

Table 9. Likelihood of restaurants beginning to sell tilapia by region, restaurant survey, Honduras, 1999.

Likelihood of Selling Tilapia	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Likely	18	53	6	33	24	46
Unlikely	9	26	11	61	20	38
No Answer	7	21	1	6	8	15
Total	34	100	18	100	52	100

Wholesalers were mentioned as the major suppliers of fish and seafood by the highest percentage (74%) of respondents in both the central-south and north regions (Table 8). Some restaurants (20%) also purchased fish and seafood directly from fishermen or fish farmers. One notable regional difference was that only restaurants in the central-south region indicated that they purchased from fish farmers.

Fifty-nine percent of respondents indicated that their wholesalers were from the central-south region while another 28% reported that their wholesalers were from the north.

Over half (59%) of the respondents had two or fewer different suppliers. An additional 27% had from three to five different suppliers, and only 13% had more than seven different suppliers.

Eighty percent of respondents did not transport their own fish. Twenty percent did haul their own fish. A few restaurants (8.5%) delivered fish to other restaurants.

Overall, 46% of respondents indicated that they were likely to begin adding tilapia to their menu in the next year (Table 9). Thirty-eight percent said that they would be unlikely to add tilapia to their menu in the next year, and 15% did not know. There was a marked regional difference in response to this question. Over half of the respondents in the central-south region expressed the likelihood of adding tilapia and only 26% were unlikely to add tilapia. However, in the north, only one-third (33%) were likely to add tilapia, but 61% were unlikely to do so.

Sixty-seven percent of respondents indicated that they could get tilapia supplied on a consistent basis (Table 10). However, respondents in the central-south region were more likely (72%) to indicate that tilapia supplies were consistent than respondents in the north (57%).

Across all respondents, the most often cited tilapia supply problem was seasonality of supply or unavailability at certain times of the year (Table 11). Insufficient quantities of tilapia, lack of availability of preferred sizes, and other, unspecified, problems of supply were mentioned. However, only respondents in the north mentioned problems of insufficient quantity.

Half (50%) of the respondents had been selling tilapia for more than five years, 22% for more than two but less than five years.

Table 10. Availability of consistent supply of tilapia by region, restaurant survey, Honduras, 1999.

Consistent Supply of Tilapia	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Yes	8	72	4	57	12	67
No	3	28	3	43	6	33
Total	11	100	7	100	18	100

Table 11. Problems indicated with the supply of tilapia by region, restaurant survey, Honduras, 1999.

Supply Problems	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Unavailable at Certain Time of Year	3	60	2	29	5	42
Insufficient Quantity	0	0	3	43	3	25
Availability of Preferred Sizes	1	20	1	14	2	17
Other	1	20	1	14	2	17
Total	5	100	7	100	12	100

Table 12. Years restaurant has been selling tilapia, restaurant survey, Honduras, 1999.

Years Selling Tilapia	Restaurant	
	No.	%
> 5 years	9	50
2–5 years	4	22
1–2 years	2	11
0.5–1 year	1	6
< 0.5 year	2	11

Table 13. Current sales volume of tilapia compared to 1998 and to 1997 by region, restaurant survey, Honduras, 1999.

Change in 1999 Sales	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
1998						
More Tilapia	6	54	5	71	11	61
Less Tilapia	2	18	2	29	4	22
Same	2	18	0	0	2	11
No Answer	1	9	0	0	1	6
Total	11	100	7	100	18	100
1997						
More Tilapia	5	46	2	29	7	39
Less Tilapia	2	18	3	43	5	28
Same	2	18	1	14	3	17
No Answer	2	18	1	14	3	17
Total	11	100	7	100	18	100

Another 28% had been selling for less than two years (Table 12).

Sixty-one percent of respondents indicated that they sold more tilapia in 1999 compared to 1998 (Table 13). However, only 39% said that they sold more in 1999 than in 1997. In the north region, 71% said they sold more in 1999 than in 1998, but only 29% said that 1999 sales were higher than 1997 sales. In the central-south region, 54% said that they sold more in 1999 than 1998, and 46% said that they sold more in 1999 than 1997. These results indicate that 1998 sales were lower than normal, but sales in 1999 had recovered and tended to be somewhat higher than in 1997.

Table 14. Product forms purchased of tilapia, restaurant survey, Honduras, 1999.

Product Forms	Restaurant	
	No.	%
Fresh Whole-dressed	14	78
Fresh Fillets	6	33
Live	2	11
Frozen Whole-dressed	1	6
Total	23	100

Table 15. Forms of preparation of tilapia by region, restaurant survey, Honduras, 1999.

Form of Preparation	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Fried	11	41	7	100	18	100
Breaded	5	19	1	14	6	33
Boneless	1	4	3	43	4	22
Garlic	2	7	2	29	4	22
Grilled	1	4	2	29	3	17
Onion	3	11	0	0	3	17
Other	4	15	3	43	7	39

Seventy-eight percent of respondents said that they sold fresh whole-dressed tilapia (Table 14). An additional 33% sold fresh fillets; 11% sold tilapia live; and 6% sold frozen whole-dressed tilapia. The majority (57%) of those selling tilapia sold less than 50 lb wk^{-1}. Sixty-seven percent of respondents sold 1-lb fresh whole-dressed tilapia, while 33% sold 2-lb fresh whole-dressed tilapia. All respondents who sold fillets indicated that they sold 1-lb fillets.

Only 22% of respondents transported their own tilapia. Seventy-eight percent had the tilapia delivered to their restaurant.

All respondents fried tilapia to serve in their restaurants (Table 15). In addition, 33% breaded tilapia. This was a more common form of preparation in the central-south region (19%) than in the north (14%). However, 43% of respondents in the north also served tilapia as a boneless product compared to only 4% in the central-south region. An additional 17 to 22% of respondents served tilapia grilled or in a garlic sauce. Respondents in the central-south region also used an onion sauce to prepare tilapia.

All respondents served tilapia as a main dish. An additional 11% also served it as an appetizer.

Table 16. Quality problems of tilapia products by region, restaurant survey, Honduras, 1999.

Quality Problems	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Yes	9	82	7	100	16	89
No	2	18	0	0	2	11
Total	11	100	7	100	18	100

Table 17. Use of promotion for tilapia by region, restaurant survey, Honduras, 1999.

Use of Promotion	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Yes	3	27	4	57	7	39
No	8	73	3	43	11	61
Total	11	100	7	100	18	100

Table 18. Mean ratings of various attributes of tilapia by region, restaurant survey, Honduras, 1999.

Attribute	Sold Tilapia			Did Not Sell Tilapia		
	Central-South	*North*	*Total*	*Central-South*	*North*	*Total*
Reliable Quality	8.18	8.71	8.39	2.71	3.56	3.00
Available	8.00	9.29	8.50	3.06	4.44	3.53
Consumers Like to Eat	7.45	8.14	7.72	4.14	3.17	3.81
High Quality Fish	9.64	9.29	9.50	5.03	3.83	4.62
Little Fishy Odor	7.09	8.14	7.50	4.26	3.94	4.15
Taste Like Earth	3.36	3.14	3.28	3.37	4.11	3.62
Nice Fresh Flavor	9.45	9.29	9.39	5.09	4.06	4.74
Easy to Prepare	9.55	9.29	9.44	7.46	5.67	6.85
Price is Too High	4.45	3.57	4.11	2.89	1.11	2.28
Patrons Like Variety	7.18	8.57	7.72	5.00	5.11	5.04
Size Too Small	5.09	5.43	5.22	4.54	4.56	4.55

Table 19. Most important services of restaurants, restaurant survey, Honduras, 1999.

Degree of Importance	Meal Service									
	Breakfast		*Lunch*		*Dinner*		*Carry-out*		*Banquet*	
	No.	%	No.	%	No.	%	No.	%	No.	%
Very Important	9	12	60	82	58	80	54	74	63	86
Somewhat Important	3	4	11	15	11	15	12	16	5	7
Less Important	5	7	1	1	4	6	4	6	3	4
Service Not Available	56	77	1	1	0	0	3	4	2	3
Total	73	100	73	100	73	100	73	100	73	100

Table 20. Number and percentage of supermarkets that sell and don't sell fish and tilapia by region, supermarket survey, Honduras, 1999.

Category	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Do Not Sell Tilapia	15	40	4	25	19	35
Sell Tilapia	12	32	10	62	22	41
Used to Sell Tilapia	11	29	2	12	13	24
Total	38	100	16	100	54	100

Eighty-nine percent of respondents indicated that they did not have any problems with the quality of tilapia products (Table 16). None of the respondents in the north indicated any quality problems while 18% of respondents in the central-south region indicated problems with the quality of tilapia products. Problems mentioned, while few, included off-flavor, freshness concerns, and fish being too small.

Only 39% of respondents reported using some form of promotion of tilapia products (Table 17). Promotion of tilapia products was more common in the north than in the central-south region. Types of promotion used included in-store signs, radio, discounted specials, news circular, TV, newspaper, and in-store samples. In-store signs and radio announcements were the most common.

Table 21. Number and percentage of stores with reasons for why supermarkets either do not sell or stopped selling tilapia by region, supermarket survey, 1999.

Reasons For Not Selling Tilapia	Region of Country								Total	
	Central-South				*North*					
	Did Not Sell		Used To Sell		Did Not Sell		Used To Sell			
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
There Is No Demand	4	27	3	27	2	50	2	100	11	34
Storage Problems	7	47	0	0	0	0	1	50	8	25
Unavailable at Certain Times of Year	2	13	2	18	0	0	1	50	5	16
Not Fresh	0	0	3	27	0	0	0	0	3	9
Don't Know/No Answer	1	7	1	9	1	25	0	0	3	9
Other	5	33	3	27	3	75	1	50	12	38

Table 22. Likelihood of supermarkets beginning to sell tilapia in the next year by region, supermarket survey, Honduras, 1999.

Likelihood of Selling Tilapia	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Very Likely	6	23	4	67	10	31
Somewhat Likely	4	15	2	33	6	19
Somewhat Unlikely	0	0	0	0	0	0
Very Unlikely	8	31	0	0	8	25
No Answer	8	31	0	0	8	25
Total	26	100	6	100	32	100

Respondents were asked to rank tilapia on a series of attributes on a scale of 1 to 10, in which 1 meant strong disagreement and 10 indicated complete agreement (Table 18). Restaurants that sold tilapia rated it highly on all attributes, except they disagreed that the price of tilapia was too high. Respondents of restaurants that had tilapia on the menu were neutral about the size of the fish supplied.

Restaurants that did not include tilapia on the menu rated tilapia low on reliable quality, availability, and preferences of consumers. Ratings on flavor, odor, and quality attributes were more neutral. Price was not considered to be too high, and tilapia was rated highly on ease of preparation. Responses to the size statement were neutral. Responses to the statement that patrons would like the additional variety that tilapia would add were nearly neutral (5.04 mean rating).

These results indicate clear differences in attitudes towards tilapia. Restaurants that serve tilapia rate it highly on all attributes; restaurants that do not have tilapia on the menu rate it much lower. The lowest ratings by restaurants that did not offer tilapia were for reliability of quality and availability. Still, ratings on the reliability of tilapia quality were neutral, particularly in the central-south region. Flavor and odor rankings were also nearly neutral. These results suggest that if tilapia farmers can guarantee supplies and availability of high-quality tilapia and combine this with samples and recipes, they could take advantage of the importance of variety to consumers by suggesting tilapia dishes as daily specials. This may be the best means of introducing tilapia to both restaurant mangers and their clientele as long as supplies can be guaranteed and reliable.

The most important services of the restaurant respondents were banquets (86%), lunch (82%), dinner (80%), and carry-out (74%) (Table 19).

Supermarket Survey

Of the 54 completed supermarket questionnaires, 70% were from the central-south region and 30% from the north (Table 20). This reflects the greater population levels in the central-south part of the country. All of the supermarkets sold some type of fish product. Overall, 41% sold tilapia, 24% used to sell tilapia but did not currently sell tilapia, and 35% had never sold tilapia. A much higher percentage of respondents in the north region were selling tilapia as compared to only 32% of the respondents in the central-south region. The central-south region had a higher percentage of stores (29%) that used to sell tilapia as compared to only 12% in the north.

In the north, the lack of demand was mentioned as a reason for either not selling or ceasing to sell tilapia (Table 21). However, in the central-south region, storage problems were cited most frequently as the reason for not having ever sold tilapia. This was followed by the citing of a lack of availability during certain times of the year. Supermarkets in the central-south region that used to sell tilapia indicated that it was not fresh and that it was not available at certain times of the year. None of the stores indicated that they had not heard of tilapia, that the wholesale price was too high, that fish were too small, that consumers had negative attitudes towards tilapia, or that tilapia tasted like earth.

Overall, 50% of supermarket managers responded that they were either somewhat or very likely to begin to sell tilapia in the next year (Table 22). There were an additional 25% who did not know if they might and 25% who were very unlikely to begin to sell tilapia. There was a marked regional difference in response to this question. All of the respondents in the north region said that they were likely to sell tilapia in the next year, but only 38% of central-south respondents indicated that they were likely to do so. Thirty-one percent said that they were very unlikely to do so.

The majority (60%) of the supermarket respondents began to sell tilapia in the last three years (1997–1999) (Table 23). Another 23% of supermarket managers responded that they began to sell tilapia in the last 6 years (1993–1996) while only 17% began selling tilapia prior to 1992. There was little difference between responses from the central-south and north region.

Twenty-six percent of respondents indicated that they sold more tilapia in 1999 compared to each of 1998 and 1997 (Table 24). Only 17% said they were selling less tilapia in 1999 as compared to each of 1998 and 1997.

Table 23. Years supermarket has been selling tilapia, supermarket survey, Honduras, 1999.

Category	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Do Not Sell Fish	1	2	1	4	2	3
Sell Fish, But Not Tilapia	35	74	18	69	53	73
Sell Tilapia	11	23	7	27	18	25
Total	47	64	26	36	73	101

Table 24. Current sales volumes of tilapia compared to 1998 and to 1997 by region, supermarket survey, Honduras, 1999.

Change in 1999 Sales Volume	1998		1997	
	No.	*%*	*No.*	*%*
More Tilapia	9	26	9	26
Less Tilapia	6	17	6	17
Same	9	26	4	11
No Answer	11	31	16	46
Total	35	100	35	100

Over half (54%) of respondents purchased tilapia from wholesalers (Table 25). Another 17% purchased tilapia from fish farms. There were no regional differences in type of suppliers of tilapia. The majority (57%) of the supermarkets that sold tilapia purchased from only one to two different suppliers. None had more than four suppliers.

Table 26 lists preference ratings for supermarkets that purchased tilapia for a variety of attributes. On a scale of 1–10, a score less than 5 indicates disagreement; 5 is a neutral score, and a score above 5 indicates agreement with the statement. Respondents rated tilapia favorably on supply, availability, patrons' preferences, odor, flavor, ease of preparation, price, variety, and size. Of these, quality received the highest ratings along with ease of preparation. In general, responses of those who purchased tilapia from the central-south were lower, although still positive, than responses from supermarkets with suppliers from the north.

The majority (71%) of respondents did not transport their own tilapia. The remaining 29% did not answer this question.

Less than half (49%) indicated that their supply of tilapia had been consistent (Table 27). Another 23% indicated it had not been, and 28% did not answer. Responses were similar for supermarkets with suppliers in the north and central-south regions. However, 75% of the respondents who obtained fish from Nicaragua said that their supply was consistent.

Table 25. Type of tilapia suppliers by region, supermarket survey, Honduras, 1999.

Type of Supplier	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Wholesalers	12	52	7	58	19	54
Fishermen	0	0	1	8	1	3
Fish Farmers	4	17	2	17	6	17
Processor/Producers	1	4	1	8	2	6
No Answer	8	35	2	17	10	29
Total	25	100	13	100	38	100

Table 26. Mean ratings of various attributes of tilapia by region, supermarket survey, Honduras, 1999.

Attribute	Sold Tilapia			Did Not Sell Tilapia			Used to Sell Tilapia			Total
	Central-South	*North*	*Total*	*Central-South*	*North*	*Total*	*Central-South*	*North*	*Total*	
Reliable Quality	6.83	7.70	7.23	4.93	4.50	5.96	5.18	7.00	5.46	5.96
Available	7.67	8.80	8.18	4.20	2.00	5.69	3.73	7.50	4.31	5.69
Consumers Like to Eat	6.67	9.00	7.73	5.47	7.75	5.95	7.09	5.50	6.85	6.89
High Quality Fish	8.33	9.00	8.64	7.87	4.75	7.21	8.00	7.50	7.92	7.96
Little Fishy Odor	7.50	9.10	8.23	4.60	1.75	4.00	5.91	5.50	5.85	6.17
Taste Like Earth	4.33	3.00	3.73	4.00	4.50	4.11	4.45	9.00	5.15	4.20
Nice Fresh Flavor	7.42	9.20	8.23	6.07	4.75	5.79	6.91	7.50	7.00	7.07
Easy to Prepare	7.75	8.60	8.14	8.27	2.25	7.00	8.45	7.50	8.31	7.78
Price is Too High	3.83	4.90	4.32	2.53	1.50	2.32	2.82	3.50	2.92	3.28
Patrons Like Variety	3.75	8.30	5.82	4.40	6.25	4.79	7.18	7.00	7.15	5.78
Size Too Small	4.75	3.30	4.09	2.67	n.a.	2.11	3.18	10.00	4.23	3.43

Table 27. Availability of consistent supply of tilapia by region, supermarket survey, Honduras, 1999.

Consistent Supply of Tilapia	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Yes	8	35	9	75	17	49
No	7	30	1	8	8	23
No Answer	8	35	2	17	10	28
Total	23	100	12	100	35	100

Table 28. Problems indicated with the supply of tilapia by region, supermarket survey, Honduras, 1999.

Supply Problems	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Unavailable at Certain Times of the Year	6	26	1	8	7	20
Insufficient Quantity	3	13	0	0	3	9
Availability of Preferred Product Forms	1	4	0	0	1	3
Unreliable Quality	1	4	0	0	1	3
Fish Tastes Like Earth	1	4	0	0	1	3
Other	2	9	0	0	2	6
No Answer	17	74	11	92	28	80

Table 29. Product forms purchased of tilapia, supermarket survey, Honduras, 1999.

Product Forms	Central-South		North		Total	
	No.	*%*	*No.*	*%*	*No.*	*%*
Fresh Whole-dressed	13	56	7	58	20	57
Fresh Fillets	2	9	5	42	7	20
Frozen Whole-dressed	3	13	0	0	3	9
No Answer	8	35	2	17	10	29
Total	26	100	14	100	40	100

The most commonly cited supply problem was that tilapia was unavailable at certain times of the year (Table 28). This was followed by insufficient quantity and a few responses related to unavailability of certain product forms, unreliable quantity, and off-flavor fish. There were more respondents with suppliers from the north who indicated insufficient quantity as the major supply problem.

The top selling tilapia product was fresh whole-dressed fish (57%) followed by fresh fillets (20%) (Table 29). There was little difference between respondents in the north and central-south regions on fresh whole-dressed fish; however, 13% of supermarkets in the central-south region that sold tilapia sold them as frozen whole-dressed products and even fewer (9%) sold fresh fillets. By comparison, 42% of the supermarkets in the north that sold tilapia handled fresh fillets, and none sold frozen whole-dressed fish.

Tilapia volumes sold daily were low (Table 30). Most of the supermarket respondents indicated that they sold from 0 to 10 lb d^{-1} of fresh whole-dressed tilapia. An additional 30% sold from 20 to 30 lb d^{-1}. Sales of fresh fillets were of similar magnitude.

Table 30. Pounds per day sold by product form, supermarket survey, Honduras, 1999.

Product Form	Amount Sold (lb d^{-1})							
	0–10		*20–30*		*40–50*		*> 70*	
	No.	%	No.	%	No.	%	No.	%
Fresh Whole Dressed	9	45	6	30	2	10	3	15
Fresh Fillets	3	43	2	29	1	14	1	14
Frozen Whole Dressed	1	33	0	0	1	33	1	33

Table 31. Retail price of tilapia by product form, supermarket survey, Honduras, 1999.

Product Form	Retail Price (Lempiras lb^{-1})							
	10–15		*16–20*		*21–25*		*30–40*	
	No.	%	No.	%	No.	%	No.	%
Fresh Whole Dressed	13	65	4	25	2	10	1	5
Fresh Fillets	1	14	1	14	1	17	4	57
Frozen Whole Dressed	2	67	1	33	0	0	0	0

The most frequent prices for fresh whole-dressed tilapia were in the range of 10 to 15 Lempiras lb^{-1} (Table 31). Fewer respondents sold fresh whole-dressed tilapia at higher prices. Fresh fillet prices were mostly in the range of 30 to 40 Lempiras lb^{-1}.

Wholesale prices of fresh whole-dressed tilapia were in the range of 5 to 10 Lempiras for 68% of the supermarket respondents (Table 32). Thirty-two percent of supermarkets purchased fresh whole-dressed tilapia at higher prices.

Only 11% of respondents indicated that they experienced problems with the quality of tilapia that they purchased (Table 33). Sixty percent said that they did not have problems with the quality of the tilapia. Of those that mentioned quality problems, off-flavor and freshness were the problems most frequently cited (Table 34).

Only 34% of the supermarket respondents used any form of promotion (Table 35). However, 42% of the respondents in the north did promote tilapia as compared to only 30% in the central-south region. In-store signs, discounted specials, and newspaper advertisements were the most common forms of promotion (Table 36). Some supermarkets also used radio advertising to promote tilapia sales.

Most supermarkets (54%) reported that suppliers of fish and seafood were wholesalers (Table 37). A few respondents purchased directly from fishermen or from a processor.

Half of the supermarket respondents had been in business less than 5 years (Table 38). An additional 12% had been in business for more than 20 years. The recent economic expansion in Honduras may have resulted in this evident growth in the supermarket sector.

Half of the supermarkets responding to the survey had weekly sales volumes of less than 540,000 Lempiras (Table 39). An

Table 32. Wholesale price of tilapia by product form, supermarket survey, Honduras, 1999.

Product Form	Wholesale Price (Lempiras lb^{-1})					
	5–10		*11–15*		*> 20*	
	No.	%	No.	%	No.	%
Fresh Whole Dressed	13	68	4	21	2	11
Fresh Fillets	1	33	1	33	1	33
Frozen Whole Dressed	2	67	1	33	0	0

Table 33. Quality of tilapia products by region, supermarket survey, Honduras, 1999.

Quality Problems	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Yes	3	13	1	8	4	11
No	12	52	9	75	21	60
No Answer	8	35	2	17	10	29
Total	23	100	12	100	35	100

Table 34. Quality problems of tilapia products by region, supermarket survey, Honduras, 1999.

Quality Problems	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Off-flavor	0	0	3	75	3	75
Freshness	1	100	3	75	3	75
Don't Know/No Answer	0	0	1	25	1	25
Other	0	0	1	25	1	25

Table 35. Use of promotion for tilapia by region, supermarket survey, Honduras, 1999.

Use of Promotion	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Yes	7	30	5	42	12	34
No	8	35	4	33	12	34
No Answer	8	35	3	25	11	31
Total	23	100	12	100	35	100

Table 36. Means of promotion used, supermarket survey, Honduras, 1999.

Use of Promotion	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
In-store Signs	5	71	5	100	10	83
Discounted Specials	6	86	4	80	10	83
Newspaper	4	57	3	60	7	58
Radio	2	29	1	20	3	25
Other	2	29	0	0	2	17
Total	19		13		32	

Table 37. Type of fish and seafood suppliers by region, supermarket survey, Honduras, 1999.

Type of Supplier	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Wholesalers	20	53	9	56	29	54
Fishermen	1	3	6	38	7	13
Processor/Producers	1	3	0	0	1	2
No Answer	17	45	1	6	18	33
Total	39		16		54	

additional 32% of respondents had weekly sales from 540,000 to 1,012,500 Lempiras, and the remaining 17% had weekly sales greater than 1,012,500 Lempiras.

Middle-income mestizos were the clientele group mentioned most frequently (82% of the time) as patrons of the responding supermarket managers (Table 40). Equal proportions by both high- and low-income mestizo groups were next most frequently mentioned. Twenty-four percent of the clientele was characterized as international.

The top fish and seafood product in terms of sales in the supermarkets was shrimp, mentioned by 52% of respondents (Table 41). This was followed by conch (35%), jaiba (33%), robalo (26%), "red" fish (22%), "other fish" (20%), corvina (18%), "fish fillets" (17%), red tilapia (17%), red pargo (17%), "other shellfish" (15%), crab (9%), and tilapia fillets (13%). There were some regional differences in the listing. More respondents in the north rated conch, "red" fish, red tilapia, crab, and tilapia fillets as top products than in the central-south region. However, in the central-south region, corvina and red pargo were more

Table 38. Years in business, supermarket survey, Honduras, 1999.

Years in Business	**Central-South**						**North**						**Total**	
	Sold Tilapia		*Did Not Sell Tilapia*		*Used to Sell Tilapia*		*Sold Tilapia*		*Did Not Sell Tilapia*		*Used to Sell Tilapia*			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0–5	7	58	8	53	6	54	6	60	0	0	0	0	27	50
6–10	2	17	2	13	2	18	1	10	2	50	0	0	9	17
11–15	2	17	1	7	1	9	1	10	2	50	0	0	7	13
16–20	0	0	0	0	1	9	2	20	0	0	1	50	4	7
20–25	1	8	1	7	0	0	0	0	0	0	1	50	3	6
30–40	0	0	2	13	1	9	0	0	0	0	0	0	3	6
No Answer	0	0	1	7	0	0	0	0	0	0	0	0	1	2
Total	12	100	15	100	11	100	10	100	4	100	2	100	54	100

Table 39. Weekly sales volume, supermarket survey, Honduras, 1999.

Sales Volume	**Region**												**Total**	
	Central-South						*North*							
	Sold Tilapia		Did Not Sell Tilapia		Used to Sell Tilapia		Sold Tilapia		Did Not Sell Tilapia		Used to Sell Tilapia			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
< Lps 540,000	5	42	11	73	3	27	3	30	3	75	2	100	27	50
Lps 540,000–1,012,500	4	33	2	13	4	36	6	60	1	25	0	0	17	32
Lps 1,012,501–1,336,500	2	17	0	0	1	9	0	0	0	0	0	0	3	6
Lps 1,336,501–2,011,500	1	8	0	0	0	0	0	0	0	0	0	0	1	2
Lps 2,011,501–2,700,000	0	0	1	7	0	0	0	0	0	0	0	0	1	2
> Lps 2,700,000	0	0	1	7	3	27	0	0	0	0	0	0	4	7

Table 40. Clientele groups of supermarkets that did and did not sell tilapia by region, supermarket survey, Honduras, 1999.

Clientele Group	**Region**								**Total**	
	Central-South				*North*					
	Sold Tilapia		Sold Fish, Not Tilapia		Sold Tilapia		Sold Fish, Not Tilapia			
	No.	%	No.	%	No.	%	No.	%	No.	%
High-Income Mestizo	6	50	3	20	8	80	2	50	24	44
International	7	58	0	0	2	20	0	0	13	24
Middle-Income Mestizo	9	75	13	87	8	80	3	75	44	82
Low-Income Mestizo	4	33	11	73	1	10	2	50	22	41
Middle-Income Black	0	0	1	7	1	10	0	0	4	7
Low-Income Black	4	33	11	73	1	10	2	50	3	6

Table 41. Top fish and seafood products in terms of sales by region, supermarket survey, Honduras, 1999.

Species	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Shrimp	15	40	13	81	28	52
Conch	8	21	11	69	19	35
Jaiba	12	32	6	38	18	33
Red Fish	5	13	7	44	12	22
Other Fish	6	16	5	31	11	20
Corvina	9	24	1	6	10	18
Fish Fillets	6	16	3	19	9	17
Other Shellfish	5	13	3	19	8	15
Robalo	9	24	5	31	14	26
Red Tilapia	5	13	4	25	9	17
Crab	0	0	5	31	5	9
Red Pargo	8	21	1	6	9	17
Tilapia Fillets	3	8	4	25	7	13
No Answer	17	45	1	6	18	33

Table 42. Seafood items with the fastest sales growth by region, supermarket survey, Honduras, 1999.

Species	Region of Country				Total	
	Central-South		*North*			
	No.	%	No.	%	No.	%
Shrimp	11	29	10	62	21	39
Conch	6	16	9	56	15	28
Red Fish	4	10	4	25	8	15
Jaiba	3	8	1	6	4	7
Other Fish	3	8	4	25	7	13
Corvina	4	10	1	6	5	9
Fish Fillets	4	10	2	12	6	11
Other Shellfish	1	3	2	12	3	6
Robalo	6	16	2	12	8	15
Red Tilapia	2	5	2	12	4	7
Crab						
Red Pargo	8	21	1	6	9	17
Tilapia Fillets	4	10	4	25	8	15
No Answer	17	45	2	12	19	35

frequently mentioned as top products. The seafood items reported to have the fastest sales growth were often identified as those with the highest sales volumes (Table 42).

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