DEVELOPMENT OF CENTRAL AMERICAN MARKETS FOR TILAPIA PRODUCED IN THE REGION

Ninth Work Plan, Marketing and Economic Analysis Research 3 (9MEAR3)
Final Report

Carole R. Engle, Ivano Neira, Nelson Omar Fúnez, and Diony Monestime
Department of Aquaculture and Fisheries
University of Arkansas at Pine Bluff
Pine Bluff, Arkansas, USA

ABSTRACT

Domestic markets for farm-raised tilapia could reduce market risk by providing alternative market outlets. Surveys of restaurants, supermarkets, and fish markets were conducted in Honduras and in Nicaragua between 1999 and 2000. Tilapia was well known in both countries. Wild-caught tilapia was sold by a majority of fish market vendors in both countries. Market penetration of tilapia products was greater in Honduras than in Nicaragua. In Honduras 40% of supermarkets and 30% of restaurants sold tilapia compared to 21% of restaurants and 26% of supermarkets that sold tilapia in Nicaragua. Both restaurants and supermarkets in both countries indicated that tilapia sales had increased over the previous year. Half of respondents who were not selling tilapia indicated that they were likely to begin selling tilapia the next year. In Honduras the primary reasons for not selling tilapia were availability problems, lack of demand, and freshness. In Nicaragua, however, the fear on the part of consumers that freshwater fish may be from Lake Managua and may be contaminated was a major constraint to tilapia sales. Marketing strategies in Honduras could focus on sales of whole-dressed tilapia to larger chain supermarkets with specialized fish sections and to international and middle-high income clients. In-store demonstrations, samples, and point-of-purchase information should be used to increase demand. Restaurant sales in both countries could likely be enhanced through catch-of-the-day promotions in upscale restaurants that feature product information supplied by tilapia growers. Fish markets in both countries and supermarkets in Nicaragua do not appear to be viable market outlets because wholesale tilapia prices appear to be too low for farm-raised products.

INTRODUCTION

The tilapia industry has grown rapidly in recent years in Central America. The United States is the primary export market for Central American tilapia, yet tilapia production companies have had to develop their own marketing companies in the US or work through a very limited number of brokers who are willing to make the effort required to develop markets for a new species like tilapia. The low number of brokers who are willing to handle tilapia increases the market risk involved in tilapia businesses. The development of domestic markets for tilapia would provide stability to Central American tilapia markets. Domestic markets could provide an outlet for smaller tilapia, enhance profits, and reduce risks.

METHODS AND MATERIALS

Six surveys were conducted between 1999 and 2000 in Honduras and Nicaragua, three in each country. Supermarkets, fish markets, and restaurants were surveyed in both countries. Data were collected to characterize each market outlet in terms of the type of business, types of clientele, and types of fish and seafood sold. Questions specific to tilapia sales included volumes, prices, suppliers, product forms, supply problems, and market channels used. Preferences for tilapia were measured with response scales and compared with responses for other types of fish and seafood.

Honduras

The three surveys were conducted in the two main urban population centers in Honduras (Tegucigalpa and San Pedro Sula) and in selected small rural towns. The following small rural towns were included in the survey: Catacamas, Siguatepeque, Santa Barbara, Comayaguela, Lago de Yojoa, Choluteca, Puerto Cortes, Juticalpa, Comayagua, La Paz, Santa Maria de Real, and Campamento La Lima. Response rates were very high (95 to 100%). This was likely due to the novelty of market surveys in Honduras.

<u>Restaurant Survey</u>
Fast-food establishments, bars, cafes, and Chinese restaurants were excluded from the restaurant survey; only full-service restaurants were represented. The direct personal interviews of randomly selected restaurants resulted in 72 completed questionnaires.

<u>Supermarket Survey</u>
Direct personal interviews were based on a census of the supermarkets published in telephone listings and resulted in 54 completed questionnaires. Supermarkets represented in the survey excluded convenience (Start Mart) stores.

<u>Fish Market Survey</u>
Vendors with a stand in the market were interviewed. Itinerant vendors selling fish outside the market area were excluded from the survey.

Nicaragua

Interviews for all three surveys were conducted throughout the populated region of Nicaragua in August and September 2000. The Atlantic Coast was not considered due to its low population density and a dense rain forest with difficult access.

Interviews were conducted in Managua, Los Pueblos, Masaya, Granada, Boaco, Jinotega, Matagalpa, Estelí, Chinandega, León, and Rivas. Response rates were very high (95 to 100%). This was likely due to the novelty of market surveys in Nicaragua.

Restaurant Survey
The sampling universe consisted of full-service restaurants registered with the Nicaraguan Institute of Tourism and those listed in the telephone directory. Fast-food eating establishments, roast-chicken specialty stores, catering shops, and pizza stores were excluded from the sampling universe for the survey. In all, 118 restaurant owners were interviewed in Nicaragua.

Supermarket Survey
A complete census of supermarkets was conducted in the major urban and rural population centers. Managers of all the supermarkets published in the telephone listings were interviewed, resulting in 35 completed questionnaires. Supermarkets represented in the survey excluded convenience (Start Mart) stores.

Fish Market Survey
A complete census of open-air markets was conducted in the major urban and rural population centers. Only fish market vendors with a stand in the open-air market areas were interviewed. Overall, 108 fish vendors were interviewed in Nicaragua.

RESULTS

Honduras

Restaurant Survey
Complete summaries of the Honduran restaurant survey data are available in Monestime et al. (2001). Approximately 90% of all the respondents surveyed in Honduras reported being familiar with tilapia. However, only 28% of restaurants also reported selling tilapia. Sixty-seven percent of the respondents in the north reported having sold more tilapia over the past year. More than half (54%) of the respondents who were not selling tilapia were willing to try it within the next year.

The most commonly purchased forms of tilapia throughout the country were fresh whole-dressed tilapia (60%), followed by fresh fillets (26%), live (9%), and frozen whole-dressed tilapia (5%). Restaurants reported off-flavor problems. Half also reported problems with freshness, and the other half reported problems with the size of the fish.

Respondents reported problems with insufficient quantity (100%), lack of availability of tilapia at certain times of the year (50%), availability of preferred sizes (50%), and unreliable quality of tilapia products (50%).

The highest rating overall from respondents who sold tilapia was for "tilapia is a high quality fish" (9.50). This rating was followed in decreasing order of agreement by "tilapia is easy to prepare" (9.44), "tilapia has a nice fresh flavor" (9.39), "tilapia is always readily available" (8.50), "tilapia supply is of reliable quality" (8.39), and "the patrons of my restaurant would like the variety that adding tilapia would provide" (7.78). The attribute that received the lowest rating was the "price of tilapia is too high relative to my patrons' desire to buy it" (4.11). A similar series of statements was presented to managers of restaurants who reported not selling fish or seafood. The highest rating was for the statement "the patrons of my restaurant would like the variety that adding fish or seafood to the menu would provide" (7.50).

Supermarket Survey
Complete summaries of the Honduran supermarket survey data can be found in Fúnez et al. (2001b). Overall, 41% of the supermarkets sold tilapia, 24% used to sell tilapia, and 35% had never sold tilapia. Larger stores, especially those with specialized seafood sections, tended to be those that sold tilapia. Forty-four percent of supermarkets that sold tilapia and reported a specialized fish section had a weekly sales volume from US$36,000 to US$67,500. Among the stores that sold tilapia, the most frequently mentioned type of clientele was international. This was followed by high-income mestizos, then middle-income mestizos. Of the stores that never sold tilapia, the most frequently mentioned clientele were low-income mestizo and black clients.

More of the supermarkets (34%) that had either stopped selling or had never sold tilapia mentioned lack of demand as the principal reason. This was followed by storage problems (22%), seasonal availability problems (16%), freshness, lack of space, and had not heard of it (9%) as reasons for not selling tilapia. Ninety-five percent of the respondents indicated that they did not have problems with the quality of tilapia. Only 5% said that they experienced problems with the quality of tilapia that they purchased. Of those that mentioned quality problems, freshness and off-flavor were the problems most frequently cited. Forty-one percent of the respondents indicated that they were selling more tilapia in the current year compared to one and two years ago. Overall, only 18% indicated that they were selling less tilapia compared to two years ago.

The top-selling tilapia product form was fresh whole-dressed tilapia (68%), followed by fresh tilapia fillets (24%) and frozen whole-dressed fish (8%). However, tilapia volumes sold daily were low. Thirty-six percent of the supermarket respondents indicated that they sold from 0 to 10 lb d^{-1}, and another 32% said that they sold from 20 to 30 lb d^{-1}.

The most frequently mentioned price (47% of responses) for fresh whole-dressed tilapia was \$0.83 lb^{-1}, but prices as high as \$2.35 lb^{-1} were reported. Fresh fillet prices were mostly in the range of \$1.06 to \$2.70 lb^{-1}. Prices of frozen whole-dressed tilapia averaged \$1.50 lb^{-1}. Wholesale prices of fresh whole-dressed tilapia products averaged \$0.83 lb^{-1} and ranged from \$0.33 to more than \$1.33 lb^{-1}. Fresh tilapia fillet wholesale prices averaged \$1.20 lb^{-1} and ranged from \$0.73 to \$2.13 lb^{-1}, but the majority of respondents (80%) reported prices higher than \$1.33 lb^{-1}. Wholesale prices of frozen whole-dressed tilapia products averaged \$0.87 lb^{-1} and ranged from \$0.73 to \$1.00 lb^{-1}.

More than three-quarters (77%) of respondents indicated that their supply of tilapia had been consistent. Another 23% indicated that it had not been. The majority of the supermarkets that purchased from fish farmers indicated that their tilapia supplies were consistent. The most commonly cited supply problem was that tilapia was unavailable at certain times of the year. This response was followed by high price.

Quality received the highest rating along with ease of preparation. The only three statements with which respondents disagreed were "tastes like earth," "price is too high," and "size too small." In other words, respondents indicated that off-flavor was not a problem and that tilapia price and sizes were acceptable.

Supermarkets that reported a specialized fish section or that were likely to add such a section rated tilapia higher on all attributes compared to other supermarkets. The only supermarkets that responded that tilapia tasted like earth were those that used to sell tilapia and were unlikely to add a specialized fish section. Half of the supermarket managers responded that they were likely to begin to sell tilapia the next year. Most supermarkets (80%) that were very likely to begin to sell tilapia the next year indicated that they were very likely to add a specialized seafood section. Moreover, all supermarkets that responded that they were very unlikely to begin to sell tilapia the next year said that they were very unlikely to add a specialized fish section.

Fish Market Survey

Complete results of the Honduran fish market survey can be found in Fúnez et al. (2001a). Overall, 70% of the respondents sold tilapia, 17% used to sell it, and 14% never sold tilapia. Equal percentages of respondents indicated that they were selling more and less tilapia compared to two years ago, but more respondents indicated that sales had remained constant from 1999 to 2000. Over half of the respondents (65%) indicated that they were very or somewhat likely to begin to sell tilapia the next year.

The top-selling tilapia form was fresh whole-dressed (74%) followed by frozen whole-dressed tilapia and fish fillets (4%). The most frequently mentioned price (93% of respondents) for fresh whole-dressed tilapia was \$0.68 lb^{-1}, but prices as high as \$0.87 lb^{-1} were reported. Wholesale prices of fresh whole-dressed tilapia averaged \$0.51 lb^{-1} and ranged from \$0.20 to more than \$0.60 lb^{-1}. Fresh tilapia fillets and frozen whole-dressed tilapia wholesale prices averaged \$0.58 lb^{-1} and ranged from \$0.20 lb^{-1} to \$0.80 lb^{-1}.

More than half (56%) of respondents indicated problems with tilapia supply. Approximately 24% of tilapia supplies were purchased from Nicaragua. The most frequently mentioned problem (69%) was seasonal availability. Half of the vendors mentioned insufficient quantity. A smaller number mentioned unreliable quality, availability of product form, and earthy flavor.

Nicaragua

Restaurant Survey

Complete results of the Nicaraguan restaurant survey can be found in Neira and Engle (2001). Only 21% of the restaurants sold tilapia. Sixteen percent used to sell tilapia, and 8% did not sell fish or seafood of any kind. Overall, 64% of the respondents were very likely and 21% were somewhat likely to begin to sell tilapia the next year if they had a consistent tilapia supply and could get a farm-raised tilapia product.

Restaurants that sold tilapia tended to be local restaurants selling primarily Nicaraguan food, steaks, Chinese food, seafood, and a variety of cuisine. Restaurants that sold tilapia tended to have more seating capacity than restaurants that used to sell or never sold tilapia. Tilapia sales were most often indicated to have remained stable. Forty percent of the respondents indicated that they were selling more tilapia compared to one year ago, but only 4% said they were selling less.

The most popular tilapia product form reported by the respondents was fresh tilapia fillets (53%), followed by fresh whole-dressed tilapia (27%) and frozen tilapia fillets (20%). Volumes of tilapia sold were generally low. The most frequently mentioned size of fresh tilapia fillets (75%) was between 0.21 and 0.60 lb per fillet. More than half of the respondents (56%) prepared breaded tilapia to serve in the restaurants. This was followed by grilled (48%), ceviche (32%), fried (28%), garlic (24%), boiled (20%), and soup (16%).

The most frequently mentioned reason for either not selling or having stopped selling tilapia (31% of respondents) was off-flavor (tastes like earth). Off-flavor was followed in importance by lack of awareness. Twenty-one percent of respondents overall had not heard of tilapia. This reason was followed by mention of the contamination of Lake Managua and lack of supply. Other reasons mentioned included lack of demand, selling only marine fish, negative consumer attitudes, poor consistency after frying, bony, patrons do not like to eat tilapia, size, gas flavor, price too high, and selling only fillets.

More than two-thirds of the respondents (68%) indicated that their supply of tilapia has been consistent. The most commonly mentioned problems with the supply of tilapia were the availability of preferred sizes (62%) and insufficient quantity (38%).

The highest rating overall was for ease of preparation. This was followed in descending order by positive ratings on the following attributes: adding variety to the menu, high-quality fish, nice fresh flavor, little fishy odor, reliable supply, availability, consumers like to eat, and tilapia is similar to guapote. Low ratings for price being too high and the size being too small indicated that respondents viewed both the size and the price of tilapia as appropriate. Respondents, however, also agreed that marine fish is better than tilapia. Some respondents indicated that tilapia tasted like earth or had an off-flavor.

The most important fish attribute mentioned by restaurant managers was quality. Supply and size were mentioned as the second and third most important characteristics that influenced restaurants that sold or used to sell tilapia. For restaurants that never sold tilapia, price was the second most important characteristic, while size was second most important for restaurants that did not sell fish. Of those restaurants that never sold tilapia and never sold fish, availability was the third most important characteristic.

Supermarket Survey

Complete results of the Nicaraguan supermarket survey can be found in Engle and Neira (2001b). Overall, 26% of the supermarkets sold tilapia. Another 29% sold fish but never sold tilapia. Supermarket respondents indicated that sales of tilapia in 2000 were higher than those in the previous year.

In the south-central region, the larger stores (401 to 2,000 m^2) were those that tended to sell tilapia. This was not the case in the Northwest region. Those that sold tilapia in the Northwest region tended to be the smaller supermarkets.

The primary reasons given for not selling tilapia were that it tasted like earth and that there was no supply. Other reasons given included contamination of Lake Managua, hadn't heard of it, negative consumer attitudes, and storage problems.

Fresh fillets were indicated to be the preferred tilapia product form by 60% of the respondents. This was followed by frozen fillets. Supermarkets sold more fresh fillets than any other product form. On a weekly basis, supermarkets sold an average of 396 lb wk^{-1}. This quantity was followed by frozen fillets with an average weekly sales volume of 134 lb wk^{-1}. The weekly volume sold of fresh whole-dressed fish averaged 30 lb wk^{-1}.

The average size of fresh fillets sold was 0.60 lb. The average size of frozen fillets was 0.37 lb, and the average size of fresh whole-dressed fish was 2.5 lb. There was only one respondent that sold fresh whole-dressed tilapia. Wholesale prices of fresh tilapia fillets averaged \$1.34 lb^{-1}. Wholesale prices of frozen fillets averaged \$1.43 lb^{-1}, while wholesale prices of fresh whole-dressed tilapia averaged \$0.64 lb^{-1}. Retail prices of fresh fillets averaged \$1.97 lb^{-1}, and retail prices of frozen fillets averaged \$1.94 lb^{-1}.

Overall, the majority of respondents indicated that their supply of tilapia was not consistent. The most frequently mentioned supply problem was an insufficient quantity of tilapia. This was followed by the lack of availability of tilapia at certain times of the year and by competition with Honduran exporters.

Quality was the most important characteristic that influenced the choice of fish products for supermarkets that sold tilapia, used to sell tilapia, never sold tilapia, or did not sell fish of any kind. Those who used to sell tilapia rated quality much higher than the other supermarkets. The second most important characteristic was price for all categories of sales with the exception of those that never sold tilapia. For this group of supermarkets, availability was the second most important characteristic. Availability was the third most important characteristic for most of the categories of supermarkets. For supermarkets that used to sell tilapia and that sold tilapia, the third most important characteristic was consumer preferences.

Overall, supermarkets rated tilapia highest on ease of preparation, nice fresh flavor, patrons like variety, high quality fish, and little fishy odor. However, respondents gave a high rating to the statement that "marine fish is better." Low ratings on the statements that "price was too high" and the "fish were too small" indicated that respondents found the prices and sizes of fish acceptable. Supermarkets that never sold tilapia rated it lower on reliable supply and on the attribute "consumers like to eat." Those who did not sell fish also rated tilapia low on reliable supply.

A very high percentage of respondents indicated that they were very likely to begin to sell tilapia the next year. This was true both for supermarkets that used to sell tilapia and those that never sold tilapia.

Fish Market Survey

Complete results of the Nicaraguan fish market survey can be found in Engle and Neira (2001a). Overall, 65% of the fish market vendors sold tilapia. Another 22% sold fish and seafood but never sold tilapia, while another 13% used to sell tilapia and stopped doing so. The majority of fish market vendors indicated that they were selling less tilapia than they sold in the previous year.

Tilapia has been sold by fish market vendors for 10 years on average. One respondent indicated that tilapia had been sold for 42 years in Nicaragua. Tilapia appeared to be sold equally frequently by vendors who had been in business a long time and by those who had been in business only a few years.

Vendors with larger stand areas tended to be those who sold tilapia, particularly in the south-central region. The vast majority of the clientele groups of fish market vendors were low-income clients. There appeared to be a slightly higher percentage of low-income clients of vendors who sold tilapia. More of those who never sold tilapia indicated that they had middle-income clients.

Fish market vendors sold an average of 57 lb of fish and seafood per day. Vendors who sold tilapia tended to have lower daily sales volumes of fish and seafood. Respondents indicated that the most preferred product form of tilapia was a fresh fillet. Vendors who sold tilapia sold 184 lb wk^{-1} of fresh whole-dressed tilapia and 90 lb wk^{-1} of fresh fillets. The average size of tilapia sold was 1 lb for fresh whole-dressed tilapia and 0.32 lb for fresh fillets. However, the majority of respondents indicated that they sold fresh whole-dressed tilapia in the range of 0.61 to 1.00 lb. For fresh fillets the most common size was 0.10 to 0.20 lb.

Wholesale prices averaged \$0.41 lb^{-1} for fresh whole-dressed tilapia. These prices ranged from \$0.15 lb^{-1} to \$1.30 lb^{-1}. Fresh fillet wholesale prices averaged \$0.91 lb^{-1} and ranged from \$0.46 lb^{-1} to \$1.30 lb^{-1}. Retail prices averaged \$0.56 lb^{-1} for fresh whole-dressed tilapia. Retail prices ranged from \$0.15 to \$1.30 lb^{-1}. Fresh fillet retail prices averaged \$1.20 lb^{-1} and ranged from \$0.71 to \$1.70 lb^{-1}.

A majority of respondents indicated that their supply of tilapia was not consistent. The most frequently mentioned problem with tilapia was an insufficient quantity. An additional 20% of responses indicated that lack of availability at certain times of the year was a problem. Other problems mentioned included off-flavor, too expensive, lack of availability of certain product forms, unreliable quality of the product, inconveniently sized purchase lots, and fish being too small.

All vendors, with the exception of those who never sold tilapia, indicated that quality was the most important characteristic that influenced the choice of fish products. Size of fish and price were the next two most important characteristics across all types of vendors. For those vendors who never sold tilapia, supply and odor were the most important characteristics. Price was the second most important characteristic (after quality) for those vendors who used to sell tilapia.

Respondents rated tilapia highest on attributes such as can prepare many dishes with tilapia, easy to prepare, nice fresh flavor, tilapia is a good fish, consumers like to eat tilapia, and supply is reliable. However, respondents thought that marine fish tasted better. Those who never sold tilapia rated it much lower on reliable supply, consumers like to eat, price, size, flavor, and odor.

The primary reason open-air fish market vendors stopped selling or never sold tilapia was the contamination of Lake Managua. This was followed by lack of supply, price being too high, negative consumer attitudes, and lack of demand. Among those who never sold tilapia, contamination of the lake and price being too high were the most frequently mentioned reasons.

In spite of the frequent comments about supply problems, over half (53%) of the respondents said that they were very likely to begin selling tilapia the next year. Higher percentages of those who used to sell tilapia were very likely to begin selling the next year.

DISCUSSION

During the course of the survey, it was observed that restaurants that used to sell or never sold tilapia were hesitant to admit that they were aware of tilapia. This was due to concerns that they would be accused of selling contaminated fish from Lake Managua. Some of these respondents indicated a lack of awareness of tilapia. This was particularly true of some restaurants that indicated that they did not sell tilapia. There were cases in which the managers denied selling tilapia, but the chef admitted that they cooked tilapia and showed the product to the interviewers. In addition some suppliers showed names of restaurants that had denied selling tilapia on their buyers' list.

CONCLUSIONS

Tilapia was a well-known product in Honduras in restaurants, supermarkets, and fish markets. More than 40% of surveyed supermarkets, 30% of restaurants, and 70% of open-air markets reported selling tilapia. Moreover, tilapia sales were reported to have increased in restaurants, supermarkets, and open-air fish markets in recent years. Of those that were not selling tilapia, half of the restaurants, supermarkets, and fish market vendors indicated that they were likely to begin selling tilapia in the coming year.

Availability problems (including lack of availability, seasonal availability, and inconsistency of supply) were mentioned as the primary reasons for not selling tilapia by all market segments. Restaurants, supermarkets, and fish market vendors all mentioned the lack of demand and freshness as problems. Restaurants had additional problems related to off-flavor and small fish, whereas fish market vendors complained of high wholesale prices. Preference ratings were high on most attributes of tilapia, but tilapia was rated unfavorably on reliable quality and ready availability by restaurants.

San Pedro Sula had higher percentages of market outlets interested in tilapia, but Tegucigalpa represents the largest market in Honduras. Attitudes towards tilapia were also favorable in Tegucigalpa, and long-term marketing efforts will need to be focused on this larger market. Small, rural towns not only had lower populations, but there was less interest in and lower perceptions of tilapia in all market segments in the small towns.

Maintaining a reliable supply and high quality of tilapia products will be essential factors in the development of domestic markets for tilapia in Honduras. Farmers will need to work with prospective clients to provide samples, recipes, and background information on farm-raised tilapia. Marketing strategies for farm-raised tilapia could focus on offering catch-of-the-day promotions in restaurants to generate increased demand. Effective forms of preparation such as grilled tilapia and garlic tilapia may be attractive to international and high-income clientele groups.

Larger, chain supermarkets with specialized fish sections and middle-high income mestizo and international clients appeared to have the greatest potential to increase tilapia sales in Honduras, particularly in the short term. Longer-term strategies should focus on supermarkets that cater to middle-income clientele groups. Lack of demand could be addressed in supermarkets through in-store demonstrations, samples, and point-of-purchase consumer information. Freshness should be emphasized. Given the low daily volumes of tilapia purchased, these same in-store promotions should be developed to increase sales for stores that currently sell tilapia.

The negative ratings of tilapia by some respondents may be related to the poor quality of the wild-caught product also circulating on the market. It will be important for tilapia growers to differentiate their product from wild-caught tilapia and to promote quality-control programs on tilapia farms and in processing plants. The results of the surveys suggest that if tilapia farmers can combine adequate marketing strategies with availability of high-quality tilapia, it may be possible to further develop the domestic market for tilapia in Honduras.

It is unlikely that farm-raised tilapia can be sold profitably to open-air fish markets. Production costs that have been estimated for tilapia in Honduras appeared to be greater than current wholesale prices paid by fish market vendors for tilapia.

Tilapia were also well known in Nicaragua. Tilapia have been sold for more than 10 years in the open-air markets and were sold by 65% of the fish market vendors. However, open-air fish market vendors indicated that they were selling less tilapia than before. Tilapia was considered as the fourth most important finfish species sold in restaurants. Only 26% of the supermarkets sold tilapia in Nicaragua, but those that sold it indicated that their sales in 2000 were higher than they had been in 1999. The vendors who did not sell tilapia indicated that the consistency and quantity of supply and odor problems were the most important reasons they did not sell tilapia.

Underlying all other reasons for not selling tilapia in Nicaragua was the fear of selling contaminated fish from Lake Managua. Restaurants were reluctant to admit selling tilapia due to off-flavor and fear of confusion with wild-caught tilapia viewed as contaminated. Consumers perceived tilapia as a freshwater fish caught in a polluted lake and were unaware of the advantages of a high-quality farm-raised fish. These fears extended to other preferred freshwater fish like guapote.

Nevertheless, half of restaurant, supermarket, and open-air fish market vendors indicated that they were very likely to begin to sell tilapia the next year if they had a consistent supply and if they could get a farm-raised tilapia product differentiated from wild-caught tilapia.

The reluctance to admit selling freshwater fish led to an emphasis on selling fillets instead of whole-dressed products in supermarkets and even in fish markets. This is in direct contrast to sales in Honduran supermarkets and fish markets. Given overall cost structures in Nicaragua, the preference for fillets in supermarkets and fish markets may prevent tilapia farmers from using these outlets as profitable market outlets. A few tilapia farms could potentially target a few upscale supermarkets. Moreover, fish and seafood overall comprised a low percentage of total supermarket sales (0.5 to 5%) in Nicaragua. In contrast to those in Honduras, few of the stores had specialized seafood counters. The combination of low fish sales and the emphasis on fillet products for freshwater fish result in low potential to develop supermarket sales for tilapia. Retail supermarket prices for fillets are not likely to be sufficiently high to cover the production costs of tilapia fillets. Similarly, for open-air fish markets the wholesale prices of wild-caught tilapia appeared to be too low to constitute an economically viable market outlet for farm-raised tilapia.

It may be possible to develop markets for tilapia in upscale Nicaraguan restaurants. Tilapia marketing strategies might be developed to compete with whole-dressed guapote and red snapper and with drum and red snapper fillets.

However, for a farm-raised tilapia industry to develop a domestic market for tilapia in Nicaragua, the issue of consumer fears of contamination must be addressed. Broad-based consumer education, third-party certification, and labeling programs may be needed to assist consumers to differentiate between farm-raised and wild-caught tilapia. Tilapia farms and processors in Nicaragua will need to guarantee and ensure the flavor, quality, and safety of their product and promote these attributes. A consistent supply of high-quality tilapia positioned as an upscale, export-quality product will be essential.

ANTICIPATED BENEFITS

Results of these surveys will be of value to tilapia growers as they seek alternative market outlets for their products.

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Cite as: [Author(s), 2002. Title.] In: K. McElwee, K. Lewis, M. Nidiffer, and P. Buitrago (Editors), Nineteenth Annual Technical Report. Pond Dynamics/Aquaculture CRSP, Oregon State University, Corvallis, Oregon, [pp. ___.]