

IMPLICATIONS OF EXPORT MARKET OPPORTUNITIES FOR TILAPIA FARMING PRACTICES IN THE PHILIPPINES MARKETING

Economic Risk Assessment & Trade/Study/07MER04NC

Wilfred E. Jamandre and Remedios B. Bolivar
Department of Agricultural Management
College of Agriculture
Central Luzon State University
Science City of Munoz, Nueva Ecija, Philippines

Upton Hatch
Department of Agricultural and Resource Economics
North Carolina State University
Raleigh, NC USA,

Russell J. Borski
Department of Biology
North Carolina State University
Raleigh, NC, USA

ABSTRACT

Market driven production research can reap substantial benefits, once a period of production research has established and producers have adopted viable production practices. That is, production research needs to establish baseline farming practices systems that farmers are willing to adopt before fine tuning for specific market opportunities is likely to bear fruit. Philippine tilapia production would appear to be ready for such a market driven strategy. Production research continues, but with an added dimension of targeting adjustments in recommended production practices that might assist farmers in reaping the benefits of new market opportunities.

Local markets for tilapia are well established; the challenge now is to spread that success to larger national and international markets. These new markets will have different requirements, e.g., species, volumes, product forms, with the potential to have important implication for selecting the appropriate farming systems. Philippine tilapia researchers need to expand their research portfolio to include the analysis, development and associated recommendations for farming systems that target these market opportunities. For example, if these new markets are associated with larger product size or changes in dates of stocking and harvesting, how would recommendations to farmers change?

Structured interviews with market participants including brokers, processors, experts from both the private sector and government were used to determine product specifications for export and other market niches, especially for Korea, Japan and the U.S. Established research results were

used to provide a first approximation for tailoring production systems to individual market opportunities.

Tilapia export markets require large whole fish size, minimum volumes and ability to provide these volumes throughout the year. Market windows, often within very tight time frames, increase risk by adding the possibility that windows close before market sizes have been reached and product has been delivered to market. Alternative product forms - frozen, fillet, live, smoked or processed - imply differences in harvested size and quality (typically based on time from pond to consumer). The location of processing is an important constraint; in many cases, the distance from the pond to the processing facility cannot be substantial and specialized vehicles are needed. Currently, Philippine farm size is insufficient to supply the consistent volumes and quality for export markets. Sufficient hectare in proximity to processing and hatchery operations will be necessary.

To combat the tendency of market forces leading to production concentration in large economic entities to the exclusion of small producers, it is recommended that the government of the Philippines (GOP) invest in facilitation of the formation of producer/marketing associations; provide low interest loans for a defined period to assist in expanding small farmers participation; and develop storage, processing and refrigeration infrastructure to facilitate maintenance of quality from pond to final consumer.

INTRODUCTION

Market driven production strategies have proven to be valuable to aquaculture and agriculture producers worldwide, especially once a production system has reached some level of maturity and sophistication. That is, after a period of some years of technology generation and dissemination, there exists a time when more emphasis on marketing will reap high rewards. Basic production research will continue as before, but a new element will be added to its portfolio – market-driven production research.

Tilapia has established local markets in the Philippines. The challenge is to expand Philippines farmed fish market opportunities, both international and domestic (particularly the trend toward very large urban supermarkets). These new markets should provide an excellent new opportunity for tilapia producers while maintaining their traditional production systems for local consumption. Clearly, export and supermarkets will have different requirements in the form of species, volumes, product form and other constraints that have the potential to have important implication for selecting the appropriate farming systems.

Export market and supermarket requirements can be quite imposing, particularly when a new market niche is being targeted (Olowolayemo et al., 1992; Engle, Hatch and Swinton, 1988). Generally, these markets will involve a diverse array of constraints on the appropriate production systems that will tend to make these new systems much more intensive (Nerrie, B., et al., 1990). That is, the volumes, timing and quality requirements will imply a vastly more controlled growing environment. Stocking densities, feeding, water quality and targeted final size and form - virtually all management decisions - will require greater sophistication and financial resources. The latter typically will favor larger, better financed operations.

The ability of small farmers to take advantage of this opportunity is a challenge that the government of the Philippines (GOP) must decide whether it is willing to invest the necessary public funds or grant special concessions to foster their participation. Unfettered market forces tend to lead to production concentration in large economic entities that exclude small producers.

The overall goal of this investigation is to add a market-driven approach to aquaculture research and outreach programs in the Philippines. Anticipated benefits include increased export volumes and value of farmed tilapia; increased tilapia farm income; and increased participation of small farmers. Clearly, production research is fundamental to improved conditions in the Philippine tilapia industry, but it must also be asserted that more consideration of market constraints will greatly assist research and outreach programs in addressing the needs of fish farmers. Production research that is designed to target specific market possibilities will greatly expand the opportunities available to fish farmers.

OBJECTIVES

9. To determine requirements for export and other market opportunities for tilapia in the Philippines.

10. To assess implications of these market opportunities on production systems.

METHODS

Existing and potential tilapia production areas in Central and Southern Luzon of the Philippine and existing processing were the study areas. In addition areas with farm ponds, processing and marketing outlets for fish and seafood were targeted, both those currently handling tilapia and those that were deemed to have that potential.

Interviews with export brokers, traders, processors, trade experts, relevant government agencies and farmers were done to determine the exact specifications of the export and other market niches (Hatch and Kinnucan 1993). Several destinations were targeted, including Korea, Japan and the U.S.

Literature reviews were undertaken on both Philippine production and strategies used by nascent tilapia industries in other countries attempting to expand into similar markets. Existing research results were used to tailor production systems to individual export and other markets (Zidack and Hatch 1991). Of particular relevance was the experience in Jamaica (Hatch and Hanson 1991) and other countries (Medley et. al. 1994) that have recently been successful.

RESULTS AND DISCUSSION

Requirements of tilapia export and other market niches

Three growing markets of tilapia in the Philippines were identified and their specific requirements are shown in Table 1.

Product size and volume

Export markets for tilapia require larger whole fish size (about 1 kg each) than domestic markets in order to obtain a size fillet of approximately 600 – 800 grams. Monthly volume requirement

of one exporter in Pampanga were 60 tons/month of whole (chilled) tilapia with an average size of 800-1000 g. Export was not sustained because of contract breach by growers, who normally sell their fishes (200-250 grams per fish) in traditional markets at competitive price levels. Consistency and/or uniformity of size and economies of scale were the constraints faced by farmers, thus resulting in the contract termination.

The minimum volumes required to meet needs of international markets generally far exceed that of local markets. Not only are volumes higher, but high volume levels are often needed throughout the year. Obvious implications are scale issues (see below) and need to stagger harvests. Scale issues will imply that the volumes of product will most likely require a considerable hectareage and the ability to provide a consistent volume every month. These large volumes will require either large producers or well-coordinated small and medium sized producers. Since it is a policy of the GOP to foster the involvement of smaller producers there will most likely be a need for concerted effort in establishing cooperatives or associations.

Government experts of the Food Division of Department of Trade and Industry and Fisheries Development Support Division of Bureau of Fisheries and Aquatic Resources indicated that prospective foreign buyers of tilapia in Taiwan and Korea had expressed interest in obtaining supplies from Philippine fish growers, but no solid commitment had been reached, at that time. In addition to trade and export promotions, government agency efforts have tended to center on the formation and strengthening of fisherfolks production/marketing associations to meet generally accepted export standards and protocols. These standards often vary in important ways based on the destination, e.g., Korea, Japan, European Union or U.S. Also, based on many negative experiences with cooperatives in the Philippines and other developing countries worldwide, recently these associations tend to have looser arrangements than their predecessors. Government supply and utilization tilapia data further corroborated that export experience by Philippine growers prior to 2006 was quite insignificant. This picture has changed somewhat in the last couple of years when tilapia exports reached 50 metric tons in 2007 and 300 MT in 2008 (Table 2).

Fresh fish and seafood sections of hypermarkets and supermarkets are the major domestic outlets for live and fresh tilapia with sizes ranging from 300-500 grams. Typically, these markets require monthly volumes ranging from 500 to 1,000 kilograms; a level substantially above the quantities produced by Philippine growers. This need for a consistent, high volume is an important constraint and is a crucial reason for producer/marketing associations mentioned above.

Seasonality and market windows

The seasonality of export markets can also impose constraints. Targeting a particular market window can prove lucrative, if such windows provide exceptional price premiums. Market windows typically occur based on either production constraints during certain times of year -

temperature in northern latitudes and dry seasons in the tropics - or exceptionally high demand, usually related to Easter, New Year or other cultural holidays. This seasonality is often exacerbated by the common fact that both the consumer and producer experience it. Thus, price premiums persist based on strong economic realities. In addition, market windows can close very quickly, meaning that there may be a very tight time frame that is being targeted and competitors may be attempting a similar strategy.

Monthly prices of fresh tilapia at both retail and wholesale levels show a seasonal pattern with relatively constant prices for most of the year (Table 3); the exception is the last quarter of the year associated with the Christmas holiday season and social events in the Philippines. In this peak season, tilapia are often harvested and sold at sizes well below minimum market sizes, e.g., 5-6 pieces per kilogram, imposed throughout the rest of the year. Garcia and Salayo (2008) and Rodriguez et al. (2009) also found evidence of a similar seasonal integration in the retail and wholesale prices of tilapia.

Moreover, retail and wholesale prices are strongly and positively correlated with each other (88.29%), but both prices are weakly correlated with price spreads (Table 4). The covariation of retail, wholesale prices and price spreads across months revealed that wholesale prices and price spreads are more unstable than retail prices. The behavior of both prices and price spreads may indicate price averaging (varying margins across goods to maintain price stability) and/or leveling (varying margins across time to maintain price stability) practices of marketing firms similar in the case of Australian fresh vegetable markets (Griffith et al. 1992). Such practices may explain the sluggish customers' response in repeat-purchase markets (Sibly 1995).

Product form

Filleted, smoked and other processed forms of tilapia are also offered through the hypermarkets and supermarkets (Figure 1). By-products of filleting including head, belly and skin are usually sold to specialty shops and restaurants. These markets have not specified any volume requirements since the common arrangement is by consignment. These smaller, specialty markets are a part of the supply chain that individual producers can successfully use.

These alternative product forms - frozen, fillet, live, smoked or processed - will considerably constrain the set of appropriate technologies. Each of these will imply differences in harvested size and quality in terms of time from pond to consumer. Also, and very importantly, will be the location of processing. Fish processing for export markets will foster the development of enterprises that will have further income and employment benefits for the country. In many cases the distance from the pond to the processing facility will not be substantial and specialized vehicles will be needed.

Destinations

Both the length and cost of transport will greatly affect the competitive position of Philippine tilapia exports. In addition, cultural traditions are often important in terms of the product form and time period associated with selected destinations. As mentioned above, cultural events are often times of high fish consumption.

Supply Chain

Supply chain can be seen as a given structure of collaborating organizations working together in satisfying customer demand, and managing supply chains is a conscious development and guidance of these relationships in order to gain competitive advantage for the collaborating chain members over other industry players (Gunasekaran et al. 2004). It is a value-adding approach that will help small farmers enhance their income and raise productivity by transforming them from mere supplier of raw produce into a producing “middleman” in the supply chain of getting the raw products or commodities processed and transporting it to consumers (Boland 2009). He also stressed that with the continuous shifting to a global economy, the international market for value-added products is growing. Market forces have led to greater opportunities for product differentiation and added value to raw commodities because of: (1) Increased consumer demands regarding health, nutrition, and convenience; (2) Efforts by food processors to improved their productivity; and (3) Technological advances that enable producers to produce what consumers and processors desire.

In the case of tilapia markets, value-added products such as fillet, dried, processed or smoked tilapia are sold at premium prices but its distribution has still been limited to hypermarkets, upscale hotels and restaurants, specialty shops and some major supermarkets (Figure 2). Linking the small farmers through supply chains would certainly provide them growth opportunities.

Implications for production systems

Scale issues

The size of the operations sufficient to supply the consistent volumes and quality for export markets is wanting. Sufficient hectarage in proximity to processing and hatchery operations (Agbayani, R., U. Hatch, U. and E. Belleza, 1996). will be necessary. Supply of skilled farm managers may also be a constraint. The coordination and management associated with exports and supermarkets will far exceed that volume needed for local consumption largely due to need to stagger harvest to obtain the ended consistent flow of product that meets market specifications. For small producers to be involved such export and supermarkets, it is highly likely that some form of cooperatives will be essential.

Farm management

Input intensity will likely increase with the growth in export markets. Increased stocking densities and feeding rates will be needed to meet volume and harvest size requirements. These higher stocking densities and feeding rates will in turn increase need for improved water quality management, particularly aeration and exchange. Power for pumping and aeration will substantially increase costs and equally important economic risk. Increased length of growing cycle will further exacerbate an already high risk farming system. This increased risk is likely to be a further detriment to small farmer participation.

RECOMMENDATIONS

Recommendations from this research center on: (1) facilitation of the formation of producer/marketing associations, (2) provision of subsidized loans and (3) development of storage, processing and refrigeration infrastructure.

Facilitation of the formation of producer/marketing associations with the assistance of extension service will be crucial in increasing small farmer chances of establishing themselves in

supermarkets and fast food chains. Associations could assist with marketing, financial services and processing availability; several alternatives will be investigated and small producer input will be crucial in their likelihood of success.

Provision of low or no interest loans for operating or investment is a commonly used method of creating incentives for new endeavors. Unfortunately, the history of repayment of subsidized loans to small farmers is not good. Any government programs of this type will need to be prepared for the financial impact of high default rates.

Infrastructure to facilitate maintenance of quality from pond to final consumer will be an investment that the Philippine government will likely need to foster in some fashion.

LITERATURE CITED

Agbayani, R., Hatch, U., and Belleza, E. 1996. Economic Analysis of Prawn Culture in the Philippines, I: Nursery Operations. *Asian Fisheries Science* 9:117-126.

Boland, M. 2009. How to become involved in adding value. Agricultural Marketing Resource Center. <http://www.agmrc.org/businessdevelopment/getting-prepared/value-added-agriculture/articles/how-to-become-involved-in-adding-value.cfm>

Engle, C., Hatch U., and Swinton, S. 1988. Factors Affecting Retail Grocery Demand for Seafood Products in East-Central Alabama and West-Central Georgia. *Journal of the Alabama Academy of Science*. 59:1-16.

Garcia, Y., and Salayo, N. 2008. Price Dynamics and Market Integration in Major Aquaculture Species in the Philippines. Awardee at the 20th National Research Symposium of the DABAR, 2-3 October.

Griffith, G.R., Jamandre, W.E., and Piggott, R.R. 1992, A note on price leveling and price averaging in Sydney retail vegetable price spreads. *Review of Marketing and Agricultural Economics*, 60(1):43-55.

Gunasekaran A., Patel C., and McGaughey, R.E. 2004. A framework for supply chain performance measurement. *Int. J. Production Economics* 87:333-347.

Hatch, U., and Kinnucan, H. 1993. *Aquaculture: Models and Economics*. Westview Press, Boulder, CO.

Hatch, U., and Hanson T. 1991. Economic Viability of Farm Diversification Through Tropical Freshwater Aquaculture in Less Developed Countries. International Center for Aquaculture. Auburn University, AL (unpublished).

Medley, P., Nelson, R., Rouse, D., Hatch U., and Pinto, G. 1994. Economic Feasibility and Risk Analysis of Pond Produced Australian Red Claw Crayfish (*Cherax quadricarinatus*) in the Southeastern United States. *Journal of the World Aquaculture Society*. 25:135-146.

Nerrie, B., Hatch, U., Engle C., and Smitherman, R. 1990. The Economics of Intensifying Catfish Production: A Production Function Analysis. *Journal of World Aquaculture Society*. 21:216-224.

Olowolayemo, S.O., Hatch U., and Zidack, W. 1992. Potential U.S. Retail Grocery Markets for Farm-Raised Catfish. *Journal of Applied Aquaculture*. 1:51-72.

Rodriguez, U.P.E., Garcia, Y.T., and Dator, M.A. L. 2009. Seasonal Integration and Co-integration in Selected Philippine Fish Prices Philippine Agricultural Economics and Development Association (PAEDA) Biennial Convention at the Bureau of Soils and Water Management Convention Hall, 22-23 October

Sibly, H. 1995. Price Dynamics in Repeat-Purchase Markets. *Economic Record*. Vol. 71

Zidack, W. and Hatch, U. 1991. An Econometric Estimation of Market Growth for the U.S. Processed Catfish Industry. *Journal of the World Aquaculture Society*. 22:10-23.

Table 1. Market Requirements for Tilapia

Description	Export			Specialty shops			Supermarkets		
	Size	Volume	Price (PhP/kg)	Size	Volume	Price (PhP/kg)	Size	Volume	Price (PhP/kg)
Live fish									
Large	n.a*	n.a	n.a	400-500 g/piece	100 kg/day	83	400-500 g/piece	1000 kg/day	112
Medium	n.a	n.a	n.a	300-400 g/piece	100 kg/day	77	300-400 g/piece	1000 kg/day	95
Whole fish (chilled)	1 kg @	60 tons/mo**	160						
Fish fillet	X	X	X	250 -350 g/pack	any amount	280	250 -350 g/pack	any amount	312
Smoked	X	X	X	250-350 g/pack	any amount	209	250-350 g/pack	any amount	330
Dried (daing na tilapia)	X	X	X	30 g/piece	any amount	150	X	X	X
Butterfly fillet	X	X	X	70g/piece	any amount	250	X	X	X
Fillet by-products:	X	X	X				X	X	X
Head	X	X	X	1 kg	any amount	30	X	X	X
Belly	X	X	X	1 kg	any amount	50	X	X	X
Skin	X	X	X	1 kg	any amount	350	X	X	X

• not applicable

** not sustained due to breach of contract by growers

Table 2. Tilapia Supply and Utilization Accounts

	SUPPLY (MT)			UTILIZATION (MT)			CONSUMPTION		
	Production	Imports	Gross Supply	Exports	Feeds and Waste	Processing	Total Net Food Disposable	Per Capita kg/yr	Per Capita gm/day
2001	135,627	0	135,627	0	4,069	0	131,558	1.69	4.63
2002	152,985	0	152,985	0	4,590	0	148,395	1.87	5.12
2003	168,132	0	168,132	0	5,044	0	163,088	2.01	5.51
2004	177,790	0	177,790	0	5,334	0	172,456	2.09	5.73
2005	195,504	0	195,504	0	5,865	0	189,639	2.22	6.08
2006	241,775	0	241,775	0	7,253	0	234,522	2.7	7.4
2007	278,819	20	278,839	52	8,365	0	270,422	3.05	8.36
2008	299,813	20	299,833	300	8,994	0	290,539	3.21	8.79

Source: Bureau of Agricultural Statistics, 2009

Table 3. Monthly Means and Covariations of Retail and Wholesale Prices; Retail-Wholesale Price Spreads (Php, 2001-2008)

Month	Prices			Covariation		
	Retail	Wholesale	R-W Spread	Retail	Wholesale	R-W Spread
January	66.04	50.61	15.42	12.30%	12.60%	16.61%
February	65.20	50.96	14.25	13.55%	12.81%	19.53%
March	65.59	49.99	15.60	12.41%	11.86%	17.82%
April	66.00	49.70	16.29	11.44%	12.54%	15.31%
May	65.97	49.99	15.98	11.33%	12.19%	12.77%
June	66.67	51.45	15.22	10.48%	9.68%	22.40%
July	67.71	51.97	15.73	11.18%	10.26%	28.60%
August	68.18	52.39	15.78	11.62%	13.30%	7.44%
September	68.29	51.79	16.50	12.68%	15.72%	7.71%
October	68.59	52.04	16.56	12.99%	16.52%	11.01%
November	68.23	51.79	16.44	13.52%	15.69%	9.38%
December	69.76	54.70	15.06	13.51%	16.29%	10.02%
Average	67.18	51.45	15.74	12.25%	13.29%	14.88%

Source: Bureau of Agricultural Statistics, Department of Agriculture (Various Issues)

Table 4. Correlation of Retail, Wholesale and R-W Spread

	<i>Retail</i>	<i>Wholesale</i>	<i>R-W Spread</i>
<i>Retail</i>	1		
<i>Wholesale</i>	0.88290436	1	
<i>R-W Spread</i>	0.352548709	0.128137708	1



Figure 1. Fresh tilapia on display with other products at a supermarket