ECONOMIC EFFICIENCY OF ORGANIC MILKFISH AQUACULTURE AT GUIMARAS ISLAND

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ABSTRACT

This study was conducted to determine the economic analysis of 19 milkfish aquaculture operators in Guimaras to ascertain profitability, sustainability, and productivity of organic intensive aquaculture. Majority of the milkfish growers were sole proprietors and uses extensive production system. Financial performance was measured using Return on Investment (ROI) and Payback Period (PBP) and inferentially described using Pearson's Chi-Square. The organic intensive milkfish aquaculture production system significantly gained the highest ROI and lowest in PBP, followed by extensive, semi-intensive and inorganic intensive aquaculture system which significantly gained the lowest return on investment and significantly highest in payback period. The intensive milkfish aquaculture system that introduced organic feeds commensurate a significant higher productivity and profitability compared to other milkfish aquaculture system. Greater efforts are made with respect to the sourcing of organic raw materials for the feed industry for sustainability of the growth of the aquaculture sector in the province and Philippines but its formulations must be further improved for better feed conversion efficiency and to minimize environmental impacts.

Keywords: Milkfish, Aquaculture System, Organic, Profitability, Productivity, and Sustainability

INTRODUCTION

Background of the Study

Feeding is employed when natural food, enhanced by fertilization, becomes inadequate. The aquaculture feed industry depends on local rice, corn and copra meal and imported soybean meal and wheat by-products. Fishmeal is either imported or locally sourced. Fish farmers use commercially manufactured feeds, farm-made feeds as well as raw, unprocessed feedstuffs. Farm-made feeds or single-feed ingredients are used as feed for milkfish, shrimps, crabs, and tilapia in extensive and modified extensive farming systems (Chavoso, 2007).

Commercial feeds are used in the semi-intensive and intensive culture of milkfish, tilapia, and shrimp. In 2004, there were 505 registered feed mills in the Philippines. Of these, 395 were commercial feed manufacturers, while the remainder was smaller, non-commercial feed producers. Of the 395 commercial feed manufacturers, 78 (20 percent) produce aqua-feeds. The production capacity of the aquafeed milling industry is 3.81 million tones/year, which far exceeds the 2003 production of approximately 204,395 tones. The major constraints facing the aqua-feed industry are the high and volatile costs of raw materials that lead to high feed costs and reduce the demand for feed. Collectively, these factors affect fish production. Data for 2003 show that some 28,800 tons of commercial feeds were consumed by tilapia, milkfish and tiger shrimp. However, these figures exclude farm-made feeds, imported feeds and feed sales by the smaller feed producers (Chavoso, 2007).

Fish production costs are significantly lower in extensive systems (Php19.27/kg), which rely mainly on fertilization and are highest in intensive systems (Php34.44/kg) due to high feed input and installation of life support systems. The intensive type of aquaculture gained significant lower ROI than extensive but as to stocking density, intensive was significantly higher than extensive. The high variable cost of intensive aquaculture (cost of feeds) greatly influence profitability in which fish farmers tends to increase fish farm gate price in order to sustain aquaculture production and operation (FAO, 2007).
Therefore, it is an aim of this paper to determine the Economic Efficiency of Organic Milkfish Aquaculture as a support to the program of Guimaras province.

Objectives of the Study

The study determined the Economic Efficiency of Milkfish Production in Guimaras and an option for Organic Aquaculture. Further, the study : (1) determined the profile of Milkfish Aquaculture farmers in Guimaras, (2) determined the economic performance of Milkfish Aquaculture in Guimaras, when classified as Inorganic Intensive, Extensive and Semi-Intensive systems, and (3) determined the significant difference on the Economic Performance of Milkfish Aquaculture in Guimaras when grouped according to: Organic Intensive System, Inorganic Intensive System, Extensive System and Semi-Intensive System.

METHODOLOGY

This study made use of descriptive research design. This method is an application of the results and testing the efficiency of theories and principles. It refers to scientific study and research that seeks to solve practical problems. Applied research is defined as systematic study to gain knowledge or understanding necessary to determine the means by which a recognized and specific need may be met. The investigation of some phenomena to discover whether its properties are appropriate to a particular need or want. In contrast, the basic research investigates phenomena without reference to particular human needs and wants. Applied research is used to find solutions to everyday problems, cure illness, and develop innovative technologies. Unlike basic research, applied research aims to address and answer real-world problems. Importantly, applied research is, like basic research, based on previous theory (Assessment of the Department of Defense Basic Research 2005).

The study was conducted in the municipalities of San Lorenzo, Sibunag, Buenavista, Jordan, and Nueva Valencia, Guimaras province. The participants of the study were the 19 operators of aquaculture ponds intended for Bangus or milkfish production. These fishpond operators were identified by collecting profile data from a survey conducted in the area using appropriate procedures. The fishermen and operators of the fish cage (net pen) and pond aquaculture identified in the selected areas served as the samples of this study. This was utilized since the characteristics of the total population were the same as to the actual respondents.

The study utilized snowball sampling method utilizing key informants (KI's), in which a referral of one to the next milkfish aquaculture operators was dependent and only those identified operators who passed the criteria set by the researcher was included in the study, specifically, the willingness to participate and with the time allotment provided to the respondents during the time of the interview.

The data were gathered in the selected areas, with a Key Informant's (KI's) who were practitioners and recommended by a reliable sources. The researcher personally collected the data from each participant. The willingness to participate and the time allotment of the respondents were considered to ensure the gathered data was valid and reliable. The data collected was encoded, tabulated and organized for statistical and financial analysis. In addition to the interviews conducted, secondary data were gathered used relative to the information such as capitalization; size of the fish farm; types of aquaculture system; types of ownership; production in kg, Fish farm gate price/kg, Variable cost and fixed cost.

To determine the profile of Milkfish Aquaculture Farmers, frequency, percentage, mean and range were used. To determine the economic performance of Milkfish Aquaculture in Guimaras, when classified as Intensive, Extensive and Semi-Intensive systems, the Return on Investments and payback period was computed. To determine the economic performance of Organic Intensive Milkfish Aquaculture in Guimaras, Return on Investments and Payback period was computed. To determine the significant difference on the Economic Performance of Milkfish Aquaculture in Guimaras when grouped according to: Organic Intensive, Inorganic Intensive, Extensive and Semi-Intensive, Pearson's Chi-Square Test at 0.05 alpha level was used.

RESULTS AND DISCUSSIONS

Data in the table 1 presents the profile of milkfish growers. Among the 19 respondents who participated in the survey, they were distributed in terms of different aquaculture production system such as extensive production system with 12 (63.2%) respondents, followed by semi-intensive production system with four (4) or 21.1% and the least was intensive production system with three (3) or 15.8% respondents. This only meant that the fishpond production practices in Guimaras involve large area of coverage among the owners. In terms of ownership, majority were solely owned by single individuals with 15 or 78.9%, followed by three (3) or 15.8% owned by public and one (1) or 5.3% owned by a corporation.

Table 1. Profile of the milkfish growers

Profile of the Milkfish Growers		Frequency	Percent
Types of aquaculture production system	Extensive	12	63.2
	Intensive	3	15.8
	Semi-Intensive	4	21.1
Mode of		19	100
Ownership	Sole Proprietorship	15	78.9
	Corporation	3	15.8
	Public	1	5.3
Total		1	100

In terms of capitalization of the milkfish growers when categorized as to the form of ownership and aquaculture production system, results revealed that the corporate form of ownership has a mean capitalization of Php1,200,000.00 and for semi-intensive production system, while the sole proprietorship milkfish aquaculture was practicing different aquaculture production system in which for extensive type, the mean capitalization was Php366,703.00 having a range from Php 120,000.00 to Php 750,000.00 while the semi-intensive system has Php591,356.00 with a mean capitalization of at least Php80,000.00 to Php900,000.00, but the public intensive and semi-intensive milkfish aquaculture system have a mean capitalization of Php80,000.00. The result implies that variation in capitalization requirements for milkfish aquaculture was based on the various considerations of aquaculture production system, culture, environment, and form of ownership. Data are presented in Table 2.

Table 2. Capitalization of the milkfish growers in Guimaras by ownership and production system for 3 years operation

		Capitalization of Different Aquaculture Systems Extensive (n=12)	Intensive (n=3)	Semi-intensive (n=4)
Corporation (n=3)	Mean	--	--	1,200,000.00
	Minimum	--	--	--
	Maximum	--	--	--
Sole proprietorship (n=15)	Mean	366,703.00	1,254,754.00	591,356.00
	Minimum	120,000.00	40,000.0	80,000.00
	Maximum	750,000.00	1,500,000.0	900,000.00
Public (n=1)	Mean	--	80,000.00	80,000.00
	Minimum	--	--	--
	Maximum	--	--	--

The Financial performance of the Milkfish Growers in Guimaras

Table 3 shows the financial performance of the Milkfish Growers in Guimaras in terms of different aquaculture production system. Findings revealed that in terms of Return on Investment (ROI), inorganic intensive aquaculture gained 0.29 wherein it was lowest among other systems followed by an extensive system with 0.34 ROI and semi-intensive system gaining 0.30 ROI. The payback period (PBP) of the production cycle for an extensive system was 2.97, semi-intensive was 3.61 and an inorganic intensive system was 4.42 years. The results meant that organic intensive milkfish aquaculture system gave a higher profitability and productivity compared to other aquaculture systems of milkfish (Table 4).

Table 3. The Financial performance of the Milkfish Growers categorized as to aquaculture production system

Economic Data	Semi-Intensive	Aquaculture Production System	
		Extensive	Intensive (Inorganic)
Production (in kg)	7,581.27	4,502.78	3,584.41
Fish Farm Gate Price (Php)	87.11	80.00	96.45
Sales (Php)	660,404.43	319,967.55	345,698.42
Total Production Cost (Php)	494,585.64	222,529.77	215,729.69
Capitalization (Php)	544,074.07	284,375.00	446,666.67
Profit/Crop (Php)	165,818.79	97,437.78	129,968.73
Return on Investment	0.3	0.34	0.29
PBP (production cycle)	3.61	2.97	4.42

Financial Performance Analysis

The distinction between fixed and variable costs is useful when conducting partial budget analysis, which investigates the impact of small changes on profit. For hazards and managerial decisions with longterm impacts, fixed costs and variable costs are needed to generate financial statements for the budget period. In addition to profitability, measures of solvency, liquidity and cash flow can be derived from financial statements including enterprise budgets, income statements, cash flow statements and balance sheets over a budget period. Variable costs include production costs, costs of goods sold and even expenses not directly tied to the production of products or services but that vary with production volume. The variable costs associated with a hazard can include a decrease in sales resulting from unsalable products. For market hazards, variable costs could include increases in the cost of seed stock, brood stock, feed or water. Production threats could include low food conversion ratios (FCR) that result in increased feed requirements or lower production output. Additional labor could also be required in response to production threats.

Classifying costs as either fixed or variable will depend on the nature of a farm's business. For example, in an economics study (Kamet al., 2002), rent was treated as a variable cost because the amount of rent charged was based on a percentage of gross revenue. While a salaried personnel is considered fixed costs, hourly labor and commission based compensation are variable costs. Consequently, cost items like personnel expenditure may require further detail to specify the portion that is fixed vs. variable (e.g. salary vs. wages).

Data in Table 4 presents the significant differences on the financial performance of the Milkfish Growers when grouped according to selected profile variables such as Aquaculture production system and types of ownership. In terms of average payback period and the average return on investment of milkfish growers in three different aquaculture systems found to have a significant difference given x2 value of 126.03 and 126.31, respectively with the same 0.00 alpha values. The result means that aquaculture production system of milkfish aquaculture production significantly affects the financial performance in terms of average return on investment and payback period as indicators. Further, the result simply suggests that utilization of organic feeds for extensive aquaculture significantly gave a higher promising return on investment compared to the semi-intensive and intensive system.

Depending on the level of management inputs (especially in feeding, fertilization and liming), pond culture systems can be classified as extensive, semi-intensive, or intensive. Return on investment for each other differ depending on the level of input. The result is supported by the result of the study of Amos and Bolorunduro in 2000, that using extensive culture system when food base of a pond is exclusively dependent on nature without supplementation (either by feeds or fertilizer) the culture system is an extensive one. Extensive culture attracts less cost, 1 but often less productive and less profitable. In terms of Semi-intensive culture system: in this system, there is occasional supplementary feed addition and natural food supply is augmented with animal's manure. This attracts more cost but better productivity and profit are assured compared with the extensive culture system. Intensive culture system: this system demands the highest level of management input. Protein rich feeds are intensively applied following appropriate recommended rates. The ponds are occasionally disinfected against parasites and diseases. Fish grow very fast when intensively managed and grow least in extensive management. Intensive culture system requires high expertise. It also demands a high level of supervision. Investment cost is comparatively higher because of the higher cost of feeds but introducing a lower cost of feeds (nutrient content was certain) for intensive aquaculture will commensurate higher productivity and profitability.

Table 4. The significant difference on the financial performance of the Milkfish Growers classified according to different aquaculture system

Financial Performance	X^2	Aquaculture System p-value	Remarks
Average Payback period	126.03	0.00	Significant
Average Return on Investment	126.31	0.00	Significant

>0.05 level of significance

CONCLUSIONS

The variation in capitalization requirements for milkfish aquaculture was based on the various considerations of aquaculture production system, culture environment, and form of ownership. The extensive milkfish aquaculture system commensurate a significant higher productivity and profitability compared to other aquaculture practices.

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