Potential for Queen Conch Grow-out Facilities

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ABSTRACT

A study was conducted to assess the feasibility for establishment of queen conch, *Strombus gigas*, grow-out facilities. Hatchery seed (1.5 cm) for pond culture and juveniles (8 cm) for cage or pond culture are available through the Caicos Conch Farm, TWI Ltd., a commercial scale culture facility. In addition, markets for conch ranging in size from 2.5-16 cm have been established. Grow-out system cost and yields estimates for both pond and cage culture were determined. These included evaluations for capital requirements, scale of production, size of unit at input, stocking densities, and final market product. Current standing as well as future research and development needs are addressed.

KEY WORDS: Aquaculture, Grow-out, *Strombus gigas*

RESUMEN

Se ha llevado a cabo un plan de producción para valorar el establecimiento de viveros de reina concha, *Strombus gigas*. Se dispone de la simiente de cultivo (1.5 cm) por cultivo de estanque y juveniles (8 cm) por jaula o cultivo de estanque, a través de la Granja de Concha de Caicos, TWI Ltd., un vivero a escala comercial. Además, se han establecido mercados de concha que varían en tamaño de 2.5 a 16 cm. El costo del sistema de crecimiento y su rendimiento, tanto para estanque como para el cultivo de jaula, fueron determinados. Estos incluyeron evaluaciones para requerimientos de capital, escala de producción, tamaño de la unidad en "stock", densidades de"stock" y mercado de producto final. Tanto la situación actual como el desarrollo y la investigación futuros necesitan ser tratados.

PALABRAS CLAVES: Acuicultura,caracol reina, *Strombus gigas*

INTRODUCTION

The queen conch, *Strombus gigas*, supports one of the most important benthic fisheries in the Caribbean region second only to the spiny lobster (Hahn 1989, Appeldoorn 1994). However, due to increases in fishing pressure, most stocks are overexploited and the historical range of the queen conch has been significantly reduced (Creswell 1994). As a result, both commercial and research culture facilities have been established, serving a dual role of supplementing the declining fishery and as seed source for replenishment efforts (Appeldoorn and Rodriguez 1994). The Caicos Conch Farm, TWI Ltd., Turks and Caicos, BWI is currently the only full-scale commercial facility involved in the culture of the queen conch. The Caicos Conch Farm was established in 1984 and raises *S. gigas* from the fertilized egg mass through the adult stage. Their hatchery produces one and a half million juveniles per year for both pond and cage culture. The Caicos Conch Farm has developed a high value niche market for which they produce specific size conch. To expand this opportunity to grow-out farmers, they have proposed to sell hatchery produced seed as well as guarantee buy back of the product for marketing through their established wholesale distribution network.

A financial feasibility study was undertaken to compare the relative costs of producing various market size juvenile conch in pond and cage culture. Production costs were compiled from actual annual costs for pond operation at the Caicos Conch Farm, and cage costs were estimated from ongoing cage grow-out studies. Operating costs, gross revenues, net profits per cycle, average yearly profits, and investment needs were compared for the two systems, and a series of scenarios were generated to examine maximized pond and cage use with a base production facility of 20 ponds or cages. A sensitivity analysis considered the effect of changes in the cost of shipping, feed, fuel and labor as well as the effect of differences in survival rates.

RESULTS AND DISCUSSION

Market Potentials

As described above, the Caicos Conch Farm has established a high value market for conch ranging in size from 6.5 – 16 cm. They will sell potential grow-out farmers hatchery-produced seed, provide technical support, and buy back end products for processing and marketing. The Caicos Conch Farm will sell 1.5 cm grow-out seed for $0.16 (US) each and larger 6.5 cm seed for $0.24 (US) each (shipping paid by farmer). They will buy back the product at a rate of $0.45 (US) for 8-10 cm conch and $2.00 (US) for 16 cm conch (shipping paid by the Caicos Conch Farm). Product sold direct to the retail market would be expected to garner a price of approximately 40% over wholesale.

Ninety five percent of the Caicos Conch Farm's past two years of sales have been in the Island Princess (IP, 8 - 10 cm) market category for live and shucked product. Aquarium (AQ, 3 cm) and Ocean Escargot (OE, 6.5 cm) conch constitute the majority of the rest of the sales products. There is a large demand for the Caribbean Queen (CQ, 16 cm), but the Caicos Conch Farm has only been able to produce a small continuous supply of this product to date. The 2002 season will see an expansion in this market potential. For these reasons, the following projections have concentrated on production from grow-out (GO, 1.5 cm) and OE size seed to IP and CQ markets.

Operating Costs for Ponds *vs.* Pens

Operating costs for ponds, including the variable costs of labor, feed, supplies, and fuel were estimated at $273 (US) per pond per month. The cost does not incorporate interest on the operating capital or any fixed depreciating costs, taxes, etc. Similarly, cage costs were estimated at $100 (US) per cage per month.

Feasibility Analysis

With the given pond and cage operating cost information, several production feasibility scenarios were generated to determine the most cost effective use of a 20 pond or 20 cage culture facility. Of the multiple scenarios tested, only five have been included for discussion purposes. Again, no costs were included for capital acquisition, depreciation, debt service, nor were return on investments calculated. However, average yearly profits, maximum investments (from cash flow analysis), and basic capital needs are given to allow for further interpretation. Each of the five scenarios details the number and size of the conch produced for market and the length of the particular grow-out cycle (Table 1). Optimal densities, as recommended by the Conch Farm, have been used and vary throughout the course of the production cycle depending upon the size of the conch. Survival rates, provided by the Caicos Conch Farm, in both ponds and pens vary between 95-100%. For the purpose of the current analyses, all scenarios were run with the assumption of 100% survival. Three of the scenarios (two 19 month and one 6 month) were calculated for growth in cages versus ponds, using a 20-unit facility and stocking with 6.5cm (OE) seed. A fourth scenario (29 month mixed sales) incorporated 1.5 cm (GO) seed as stock. This scenario requires the use of a combination of ponds and cages to allow for the production of OEs needed for stocking into cages. The fifth scenario looked at producing OEs from GOs as an onshore alternative for cage production or further pond production. Only two ponds are needed in this scenario (Table 1). For all four scenarios in which ponds and cages are compared, the average yearly profit for cages was significantly higher than that for ponds (Table 1). This coupled to the fact that maximum investment and capitol costs are lower for the cages makes them an obvious choice for grow-out facilities where offshore operations are viable. The highest average yearly profits for ponds were seen for the 29-month mixed sales scenario (Table 1).

Table 1. Feasibility analysis of various market scenarios for queen conch grow-out, based on a 20 pond or cage facility. The 29 month Mixed Sales scenario includes the addition of 4 ponds to the 20 pens and stocks both GO (1.5 cm) and OE (6.5 cm) seed, while the OE scenario stocks GO seed and utilizes two ponds for production.

Scenario	Culture Unit	Operating Costs ($)	Gross Revenue ($)	Net Profit per cycle ($)	Avg. Yearly Profit ($)	Max. Investment ($)	Capital ($)
CQ Sales							
50,000 CQ	Cages	36,667	100,000	63,333	39,999	34,667	40,000
19 months	Ponds	76,457	100,000	23,543	14,869	70,997	120,000
Mixed Sales							
150,000 IP	Cages	87,668	167,500	79,832	50,420	56,201	40,000
50,000 CQ	Ponds	141,254	167,500	26,246	16,576	68,294	120,000
19 months							
Mixed Sales							
600,000 IP	Cages/ponds	193,487	370,000	176,512	73,039	77,293	64,000
50,000 CQ	Ponds	274,997	370,000	95,003	39,311	84,904	120,000
29 months							
IP Sales							
200,000 IP	Cages	66,666	90,000	23,334	46,668	64,667	40,000
6 months	Ponds	87,427	90,000	2,573	5,146	81,967	120,000
OE Sales							
50,000 OE	Ponds	12,116	13,667	1,551	1,861	23,570	12,000
10 months							

Sensitivity Analysis

The sensitivity analyses for pond culture reflect actual changes in feed and fuel costs based on improved technology used during the current year (2001) at the Caicos Conch Farm. The amount of feed used (i.e. cost) was increased over past years to reflect more appropriate feeding needs, while fuel costs were lowered through the addition of a more efficient pump. Values for cage culture are based on values from an ongoing experimental study and show cost changes under a variety of conditions (Table 2). Variable feed, fuel, shipping, and labor costs may all impact the potential success of a grow-out facility and will be, in part, site dependent (Table 2). Manual labor costs provide an example of the impact of the variable cost analyses. Manual labor costs in Providenciales, Turks and Caicos, BWI, the location of the Caicos Conch Farm, average $5.00 (US) per hour. In the calculations for cages the cost allocated for labor allows for one worker at a maximum of 40 weeks for the year. In areas where cheaper labor is available, an alternative rate of $2.50/hr has been calculated for comparison. This drops the total operating cost by approximately $4,000 (US) over the 19-month cycle. The sensitivity analysis not only helps define areas where costs changes may occur depending upon the particular circumstances of the grow-out farmer, but also indicates areas where improvements can be made in operating cost efficiency through either developing technology or through increases in scale which will lead to further cost reductions.

Although numerous stock/harvest scenarios can be generated to further optimize cash flows, maximize use of ponds, expand harvests (i.e. continuous), or to include other more site-specific options, the scenarios chosen included the basic criteria needed to identify viable, cost effective grow-out potentials. Based on current standing, only the production of CQs and IPs are profitable. The production of these products have different requirements in terms of time to harvest, quantity produced, and investment needed to achieve those results. Mixed sales scenarios take advantage of both products and profit more than just producing the individual product when relegated to the same space allocations. Raising OEs from grow-out produces a small savings for the effort, but requires onshore facilities. As expected, cages are more cost effective than ponds with lower operating costs and less capital investment required. Although the cages are considered in the "experimental" phase, the results of the initial studies are promising. Other options to explore include the production of 3 cm conch for the aquarium trade. Although beyond the scope of this study, market values for their maximum 3-month culture cycle show promising profit margins.

Table 2. Sensitivity analysis for queen conch grow-out based on a 20 pond or 20 cage scenario culturing CQ conch for market. 50,000 OE seed (6.5 cm) are stocked and raised for 19 months to harvest at 16 cm. In the pond scenario, the actual column reflects year 2000 costs for the Caicos Conch Farm and the expected column estimates 2001 costs with changes in feed and fuel made. In the cage scenario, the actual column reflects estimations from an ongoing cage study, where the expected column shows changes in survival, shipping, feed, and labor costs that may occur based on the locale of the grow-out farmer.

Items	Actual ($)	Changes	Expected ($)
Ponds			
Sales Revenue	100,000	Survival 100↔95%	95,000
Seed ($0.24/OE)	12,000	no change	12,000
Shipping ($0.50/lb)	1,666	no change	1,666
Feed ($0.46/lb)	13,182	127lbs/m ↔190lbs/m	19,721
Labor	30,767	no change	30,767
Fuel ($1.87/gal)	11,930	Reduced by 30%	8,351
Supplies	6,907	no change	6,907
Total Operating Costs	76,452		79,412
Revenues-Operating	23,548		15,588
Cages			
Sales Revenue	100,000	Survival 100↔95%	95,000
Seed ($0.24/OE)	12,000	no change	12,000
Shipping ($0.50/lb)	1,666	$0.50/lb ↔ $0.25/lb	833
Feed ($0.46/lb)	13,800	($0.46 ↔ $0.36)	10,800
Labor	8,050	($5.00/hr ↔$2.50/hr)	4,025
Fuel ($1.87/gal)	—	—	—
Supplies	3,139	no change	3,139
Total Operating Costs	38,655		30,797
Revenues-Operating	61,345		64,203

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