CAGE CULTURE ECONOMICS

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Introduction

Cage culture offers farmers with one or more ponds on their land an opportunity to put this idle resource to productive use. Before attempting to begin a cage culture enterprise, however, the economic feasibility of such an attempt should be assessed. The purpose of this paper is to help current and potential aquaculturists to think about and examine their own marketing opportunities and production costs associated with cage fish culture.

Marketing Opportunities

Market Identification

Market identification is a critical aspect of any successful aquaculture venture. Because there is no established marketing system for cultured fish in most states, cage culturists will need to expend considerable time and effort in developing markets for the fish they produce. Perhaps the most important point to remember is that a marketing plan should be developed before production is even begun.

Some of the questions that need to be answered in market identification include:

- What specific market will I sell to?
- What species are acceptable in this market?
- Can I raise the desired species using cage culture?
- What selling price can I obtain in this market?
- What are the form, size, volume, and frequency requirements for this market?
- Can I meet these requirements?

The more detail with which these questions are answered prior to the actual time to market the fish, the less chance of an unexpected, major, marketing problem.

Possible Markets

Producing a small number of fish limits the range of possible outlets, but prospects for obtaining a selling price that is high enough to cover production costs and still yield a profit are quite good. The following is a discussion of possible markets for cultured fish. Use it to stimulate your own ideas on how you might search for potential markets in your location.

Live haulers. Live haulers don’t take title to your fish, but for some fee or a percentage of the selling price, they will transport your live fish to a market. This selling method requires no transportation or processing on your part, but payment may be more
difficult and delivery will be totally out of your control. Contact the aquaculture specialist or aquaculture industry association in your state to find out if they have a list of live haulers. Call the haulers to find out what species and markets they serve.

Processors. If you live in an area where one or more fish processors are located, you may be able to sell to them. Processors typically operate in established markets where prices to producers just barely cover production costs. In order to make a profit selling to one of these processors, your production costs must be competitive with the larger producers who supply the majority of the processor’s fish. This outlet for your fish eliminates your responsibility for processing but typically does not provide for much profit potential.

Distributors. Most distributors want sizable volume with frequent delivery, but some, like the Chicago Fish House, are willing to take smaller lots in order for them to fully supply their customers. The Chicago Fish House will buy live fish on ice, which you must transport. They are interested in several different species including hybrid striped bass. Other distributors may want processed fish.

Grocery stores and restaurants. Local, independent, retail establishments often are willing to buy locally produced foods, including fish. They may be interested in live or fresh fish harvested once a year out of your cages, or in frozen fish stored in your freezer and delivered over time. Any fresh or frozen fish sold to these outlets likely will have to be processed. Contact stores in your area to explore how it might be possible for the two of you to come to an agreement.

Specialty stores. Perhaps there is an ethnic grocery store or health food store in your area. These stores may be interested in buying fish from you that would appeal to their distinctive customers. This type of "niche" market can be quite profitable. Like other retail outlets, they may want weekly deliveries, however, they may be more interested in unusual species and willing to pay well for them or they may pay a good premium for your higher quality or organically-produced fish.

Direct to consumer. This may be the most lucrative market for producers of small quantities of fish harvested once a year. Advertising, whether in the local newspaper, on a company bulletin board, by word of mouth, or by some other method, will likely be important in selling your entire lot of fish. Roadside stands or farmers’ markets may also be viable options in your area. Direct sales of live fish, while potentially the most profitable marketing option available, may take some time to develop. For this market you may want to produce a species which is a popular sport fish or has a familiar name.

Fee-fishing operations. Many fee-fishing operations buy live fish every year to restock their lakes. They may not want to buy live fish in the fall, however. Fee-fishing operations are relatively common in the Midwest and buy a variety of species.

In general, keep in mind that established markets tend to offer slim profit opportunities and require you to be very cost-competitive. This means that if you want to cage culture and sell catfish profitably, you will probably have to sell direct to consumers or develop some other niche market. This should not be difficult. No matter what species you want to raise, you will have to develop your own market for your fish. Determine ahead of time which species offer adequate profit opportunities.
When pitching your fish to potential buyers, be sure to stress your product's quality. If you are selling catfish or other bottom dwellers, be sure to indicate that the fish were raised completely away from mud. In all cases, point out that your fish were grain-fed, and cage-raised in a pollution-free environment.

Processing

Fish sold fresh usually must be processed (dressed). If this is the case for you, arrangements must be made for the fish to be processed, either by you or someone else. Processing fish yourself will entail acquiring the appropriate equipment and labor, along with complying with any health regulations. Some aquaculturists have found it more cost-effective to hire out the processing, while others do it themselves. Health regulations are likely to become more stringent as Congress is being pressured to mandate federal inspection of fish and seafood. Legislation in this area is expected within the next couple years. State and local regulations will probably become more strict as well.

Financial Analysis

Enterprise Budgeting

Enterprise budgets provide a simple method of organizing and analyzing production costs and returns. Potential cage culturists need to invest some time and effort in determining as accurately as possible their costs and returns. Analysis of the estimated figures will give a reasonable prediction of whether the venture into cage fish culture will be a profitable one. Once the venture is underway, actual figures can replace the estimated once to reveal the true economic picture. Cost and return figures should be updated whenever new information is available to keep abreast of the financial situation.

Tables 1 and 2 are examples of enterprise budgets for the cage culture of two species, catfish and hybrid striped bass. The numbers contained in the tables are estimates of what the costs and returns would be for cage culturing fish in a five acre pond. Several assumptions (death loss, production time, feed conversion, etc.) have a significant impact on profitability. Actual costs, returns, and productivity factors will be different for every operation and probably for each year. Accurate record keeping will help the producer to determine the actual figures. The following is a discussion of the data and calculations contained in the example enterprise budgets.

Production factors. This is the group of numbers or assumptions upon which the budget is based. In order to analyze financial profitability, producers need to determine such things as how many fish can be grown in their pond, how fast the fish will grow, and how many pounds of feed each fish will eat. Most of these production factors are placed up front in the budget tables, while others (death loss, feed conversion) are contained in the calculations. A few assumptions are indirectly given such as: 1) the fish will all be grown in one batch and harvested at the same time, 2) the fish will be sold live, and 3) death loss will occur after the fish have been fed out to market weight. The production factors often will be the most difficult for the producer to determine accurately, but are very important in analyzing profitability.

Variable costs. If the quantity used of a resource is varied during the production period based on the quantity produced or if a resource is purchased and used only when
production occurs, the cost of this resource is classified as a variable cost. In the example budgets, items such as fingerlings and feed are considered variable.

**Fixed costs.** Fixed costs are costs that are independent of the level of production, and have to be paid whether or not production occurs in a particular year. An expenditure on a resource whose quantity is not varied during the production period is a fixed cost. Examples include cages, aerators, and hauling tanks. Generally, fixed costs are spread out over the expected life of the production input involved. This allows the producer to take into account the long-term view of profitability.

**Returns.** Three different returns are calculated in the budgets. Each provides different, useful information to the producer. Gross returns indicate how much cash will be generated as a result of fish sales. Gross returns less variable costs reveals how much money will be left over after paying the variable costs. This money is then available to pay for fixed production costs and a return to the producer's labor and management. If this figure is negative, production should not be undertaken. In the short run (one or two years), production should occur if all variable costs are covered. However, for long-term success, fixed costs as well as variable costs must be covered. Net return is the amount available after all expenses are paid, and is compensation for the producer's labor and management input. If the producer must hire someone else to perform these functions or if he or she is unwilling to undertake a venture without assurance of a satisfactory return for these functions, then a cost for labor should be included; in variable costs for hired labor or in fixed costs for owner labor.

**Break-even price.** The break-even price is the figure to look at when deciding whether or not to undertake the cage culture venture. If the expected market price is equal to or above the break-even price, then the producer will break even or make a profit on the venture.

**First year investment plus variable costs.** This figure is the dollar amount the producer must come up with before the first year of production to buy all necessary equipment and pay the first year's operating expenses.

**Record Keeping**

Consistent, accurate record keeping is indispensable to determine the productivity and profitability of the cage fish culture operation. Good record keeping habits will help the producer be involved or acquainted with not only costs of production and market prices and their patterns, but also with fish behavior, growth, and fish interactions with the environment. Fish are sensitive to their environment, so fatal conditions can occur abruptly and spread rapidly. Good record keeping will help the producer be a good manager on a daily basis, and so be able to anticipate and quickly detect any problems. Table 3 is a sample record keeping sheet, containing spaces for the producer to keep track of both important economic and environmental data. Each producer should have a record keeping sheet appropriate for the operation.
Table 1. Enterprise Budget for the Cage Culture of Catfish.

Pond size: 5 acres.
Production: 7,500 lbs. (1500 lbs. per acre).
Stocking rate: 343 fish per cage.
Production time: 5 months.
Fish harvest size: 1.25 lbs.
Cage size: 3-1/2' x 4', cylindrical.
Cage number: 7500 lbs. + 1.25 lbs. = 6000 fish + 240 (4% death loss) = 6240 fish
6240 fish + 343 = 18.2 cages + 1 (emergencies) = 19 cages.

Variable Costs

Fingerlings: 6240, 6-8", @ $0.30 $1872
Feed: 7500 lbs. fish + 300 (death loss) = 7800 lbs. fish
7800 x 2.0 feed conversion = 15,600 lbs feed @ $0.20 3120
Chemicals: $5/cage x 19 cages = $95 95
Interest on operating capital: $5087 for 5 months @ 12% annual rate 254

Total Variable Costs $5341

Fixed Costs

Cages: 19 cages, frame/flotation $20/cage, wire $5/cage,
netting $25/cage, total materials $50/cage,
$50 x 19 cages = $950 over 10 years $95
Boat: used or floating platform, $300 over 10 years 30
Aerator: 2 @ $75 = $150 over 5 years 30
Oxygen meter: $300 over 5 years 60
Licenses, permits: annual expense 10
Hauling tank: $500 over 7 years 71
Misc.: scales, dipnets, rope, buckets, annually 45
Interest on equipment: $2255 @ 12% annual rate, 1 year 271

Total Yearly Fixed Costs $612

Total Yearly Fixed and Variable Costs $5953

Gross Return: 7500 lbs. @ $1.30 $9750

Gross Return Less Variable Costs $4409

Net Return (Gross return less total costs) $3797

First Year Investment plus Variable Costs $7867

Break-Even Price: Total Costs + Production
$5953 + 7500 lbs. = $0.79 per lb.
Table 2. Enterprise Budge for the Cage Culture of Hybrid Striped Bass

Pond size: 5 acres.
Production: 7,500 lbs. (1500 lbs. per acre).
Stocking rate: 343 fish per cage.
Production time: 6 months.
Fish harvest size: 1.50 lbs.
Cage size: 3-1/2' x 4', cylindrical
Cage number: 7500 lbs. + 1.50 lbs. = 5000 fish + 350 (7% death loss) = 5350 fish
5350 fish + 343 = 15.6 cages, 15 + 1 (emergencies) = 16 cages

Variable Costs

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fingerlings: 5350, 4-6&quot;, @ $0.75</td>
<td>$4,012</td>
</tr>
<tr>
<td>Feed: 7500 lbs. fish + 525 (death loss)</td>
<td>6,260</td>
</tr>
<tr>
<td>8025 x 3.0 feed conversion = 24,075 lbs</td>
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</tr>
<tr>
<td>feed @ $0.26</td>
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</tr>
<tr>
<td>Chemicals: $3/cage x 16 cages = $80</td>
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</tr>
<tr>
<td>Interest on operating capital: $10,352 for 6 months, @ 12% annual rate</td>
<td>621</td>
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<tr>
<td>Total Variable Costs</td>
<td>$10,973</td>
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</table>

Fixed Costs

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
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</thead>
<tbody>
<tr>
<td>Cages: 16 cages, frame/flotation $20/cage,</td>
<td>$ 80</td>
</tr>
<tr>
<td>wire $5/cage, netting $25/cage, total</td>
<td></td>
</tr>
<tr>
<td>materials $50/cage, $50 x 16 cages = $800</td>
<td></td>
</tr>
<tr>
<td>over 10 years</td>
<td></td>
</tr>
<tr>
<td>Boat: used or floating platform, $300 over 10 years</td>
<td>30</td>
</tr>
<tr>
<td>Aerator: 2 @ $75 = $150 over 5 years</td>
<td>30</td>
</tr>
<tr>
<td>Oxygen meter: $300 over 5 years</td>
<td>60</td>
</tr>
<tr>
<td>Licenses, permits: annual expense</td>
<td>10</td>
</tr>
<tr>
<td>Hauling tank: $500 over 7 years</td>
<td>71</td>
</tr>
<tr>
<td>Misc.: scales, dipnets, rope, buckets, annually</td>
<td>45</td>
</tr>
<tr>
<td>Interest on equipment: $2105 @ 12% annual rate, 1 year</td>
<td>242</td>
</tr>
<tr>
<td>Total Yearly Fixed Costs</td>
<td>$ 579</td>
</tr>
<tr>
<td>Total Yearly Fixed and Variable Costs</td>
<td>$11,552</td>
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</tbody>
</table>

Gross Return: 7500 lbs. @ $2.50

Gross Return Less Variable Costs

Net Return (Gross return less total costs)

First Year Investment Plus Variable Costs

Break-Even Price: Total Costs + Production

\[
\text{Break-Even Price} = \frac{11,552 + 7500 \text{ lbs.}}{7500 \text{ lbs.}} = 1.54 \text{ per lb.}
\]
Table 3. Cage Culture Record Keeping Sheet.

<table>
<thead>
<tr>
<th>Year</th>
<th>Stocking Date</th>
<th>Stocking Size</th>
<th>Harvest Date</th>
<th>Harvest Weight</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Temperature/Oxygen Reading</th>
<th>Total Feed</th>
<th>Dead Fish</th>
<th>Weather Conditions</th>
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</thead>
<tbody>
<tr>
<td>Week : S : M : T : W : R : F : S</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>