

The Ohio State University South Centers

Ohio Aquaculture Industry Analysis

The Ohio Department of Agriculture

Executive Summary

2010

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The state of Ohio is rich in agricultural heritage. The food and agriculture sector annually generates \$98.2 billion in Ohio and has been identified as the state's largest industry. The agricultural sector has been one of the few industries during the recent recession that has maintained economic stability. Aquaculture or "fish farming" is one of the fastest growing segments within the agricultural sector worldwide. Aquaculture sales in Ohio have tripled from \$1.8 million to \$6.6 million in recent years. Nationally, Ohio ranks first in sales of yellow perch for food and is the No. 1 bluegill producing state. Ohio also ranks fourth in sales of bait fish and largemouth bass sold for sport and fifth in number of baitfish farms.

Ohio has significant potential to become one of the leaders in U.S. aquaculture production. Ohio has the natural resource base (water availability), human capital (labor), proximity to the major consumer markets (East coast, Midwest and Ohio's metropolitan cities) and competitive production advantages for specific fish species (i.e. bluegill, yellow perch and largemouth bass) to accomplish this goal.

Expansion of aquaculture in Ohio can have significant economic impact on our state's economy. A rapidly expanding aquaculture industry requires concurrent expansion of related industries in order to succeed. Examples of related industries include fish feed production facilities, specialized trucking firms, and additional fish processors. In aquaculture, it is generally agreed that gross farm gate sales can be multiplied by 7.5 to assess total economic impact resulting from the production of aquatic products. This means that in 2007, aquaculture had an estimated economic impact of \$49.5 million in Ohio.

The Ohio aquaculture industry represents less than one percent of the food fish (.14 percent) and less than one percent of crustacean sales (0.10 percent) in the United States (USDA, 2005). Ohio is a very small competitor in the national industry, and production rates do not meet current market demand. This positions the Ohio aquaculture industry for significant growth potential within the state and national markets. This study identifies the current Ohio aquaculture industry barriers, production methods, marketing strategies, and provides recommendations for acceleration of Ohio's aquaculture industry. When predicting industry growth, industry leaders estimate it will take five years to ten years in order to see a significant growth pattern or advancement. The growth timeframe depends on the acceptance of the various recommendations and implementation period.

Identified Barriers to Ohio Aquaculture Industry Acceleration and Recommendations

Restricted capital and income from business

A barrier to many innovative aquaculture production plans is access to capital. The average annual sales from the industry do not sustain a growth strategy or allow significant cash flow to sustain a business. Many traditional capital sources are hesitant to lend to livestock-based entities, mainly due to collateralization issues and death loss. It is difficult for industry entrance or growth without significant access to both debt and equity financing options for start-up and expansion opportunities. Because of this lack of capital, many prospective producers have not entered into production, and current aquaculture entities have not expanded.

Recommendations:

- Ohio Legislature dedicate additional financial and support resources to Ohio Department of Agriculture for aquaculture industry/supply chain development activities.
- Create an Agriculture-based loan fund through a state supported initiative.
 - *The Ohio Department of Agriculture has completed and designated aquaculture as a signature focus of the new revolving loan program.*
- The State of Ohio develop a “loan guarantee program” that covers the twenty-five to thirty percent gap in Loan-to-Value ratio that the traditional loan programs require in a collateralization value. This concept is similar to traditional business gap financing programs and the Small Business Administration loan guarantee program currently in place for traditional business ventures.
- Provide educational training to financing institutions about the aquaculture industry in correlation with the roll-out of the loan guarantee program. This industry is “unproven” when compared to traditional livestock ventures. Significant educational outreach to financing organizations will be necessary and vital to the success of producers accessing adequate capital.

Knowledge deficit and access to technology

As with many industries, a lack of technical or applied knowledge in the industry is a barrier. Many Ohio producers struggle with what would be considered basic principles of aquaculture. Therefore, the lack of knowledge, or limited knowledge, is a barrier to their success. Some areas of importance for educational focus include water quality/water chemistry, fish nutrition, and aeration. There is a lack of understanding of basic water chemistry. Producers are often not knowledgeable about the best fish feeds and often do not have access to these. Producers often do not know the critical need for providing supplemental air/oxygen to the ponds, do not know what type of aerator works best for their operation, or have been given erroneous information on what aeration equipment does and does not do.

Recommendations:

- Development of a state-wide curriculum for new and emerging aquaculture farms in the areas of water quality, fish nutrition, and equipment. This curriculum and educational material should be available via the web through a series of podcasts, a CD delivery method, a series of semi-annual workshops, and a standard resource packet. Multiple organizations such as Ohio Department of Agriculture, Ohio Farm Bureau, and Ohio State University Extension should be involved with this curriculum delivery and educational initiative.
- Creation of a start-up informational packet, including:
 - Start-up outdoor facility business plan template
 - Start-up indoor recirculating facility business plan template
 - Existing outdoor facility business plan template for growth financing
 - Financial projections template documents
 - Scientific data/recommendations on water quality, aeration systems and other identified issues that need addressed in regards to aquaculture facility operations
 - Resource guide; listing of financing opportunities, assistance organizations, resources and access to additional information.
- State-wide conference – a joint conference between The Ohio Department of Agriculture, Ohio Farm Bureau, The Ohio State University, The Ohio Department of Development, the Ohio Aquaculture Association, and the Fish Farmers of Ohio should be planned for 2011.

Fingerling production and supply

Having access to adequate fingerlings within Ohio is a key factor to the industry acceleration and this aspect should be the initial and core focus of the execution of the Ohio aquaculture strategic plan. This need for fingerlings presents an opportunity for industry growth. An entrepreneur can enter into the Ohio aquaculture supply chain as a fingerling producer and gain a significant market share in a relatively short time period.

Recommendations:

- Explore the development of a fingerling production cooperative in order to provide a steady, quality supply of fingerlings to producers.
- An educational packet about starting a fingerling production facility, business planning, and financial assistance available for this venture.

Marketing

Based upon the Ohio Aquaculture Strategic Plan retail survey results, a significant interest exists in the selling and consumption of Ohio-raised fish and prawn; but with Ohio's current production rate, the demand cannot be met.

Another marketing barrier is the requirement for refrigeration units at farmers' market retail locations.

Recommendations:

- Utilize the current Ohio infrastructures for marketing of Ohio aquaculture products, exploring the current direct marketing channels and taking advantage of the increase interest in local foods.
 - **MarketMaker** is a program that connects producers and buyers throughout the food supply chain. A campaign to encourage existing and emerging aquaculture producers to utilize this program should be included in future marketing efforts.
 - Utilize **Ohio Proud**. Aquaculture producers through the state could take advantage of this program by selling their product with this well-known branding attached.
- When an adequate supply of Ohio aquaculture production is established to meet the demand of consumers, a state-wide consumer education and promotion program about Ohio-raised fish and prawn should be launched.
- A cooperative formation for distribution and marketing is an option for execution of this promotion recommendation. A successful marketing plan for Ohio's aquaculture producers to model after would be that of Ohio Signature Beef, a member-owned cooperative.
- Capitalize on the "local foods" trend by marketing through Ohio farmers' markets. One potential constraint is the requirement for refrigeration units. The Farmers' Market Management Network recently issued a letter of opinion on storage regulations.
 - The Ohio Department of Agriculture can initiate an opinion to the Ohio Health Departments stating that coolers and ice packing are adequate methods for aquaculture products at farmers' market establishments, understanding that the local health departments have the authority to still require refrigeration units at these markets, the recommendation of coolers and ice may enhance probability of not requiring the units for short-term storage at farmers' markets.

Genetics

Ohio has limited domesticity of some of the most commonly raised fish, or, inferior strains are being passed off to Ohio producers as "top quality" fish. These fish fail to perform adequately and fail to get a majority to market size in a profitable time frame. An increase in accessibility to genetically improved fingerlings will significantly improve our Ohio industry outcomes and production rates. Significant genetic research is being conducted by The Ohio State University, with market entrance of the new genetic strains anticipated within two to three years.

Recommendations:

- The state could provide assistance to the individual(s) willing to enter into this new venture in the form of loan guarantees, access to capital, assistance with state grant funding and additional support as necessary.
- The availability of new genetically enhanced fingerlings will assist with the closing the current gap within the Ohio aquaculture supply chain.
- Development of a pilot facility, structured as a public/private partnership, for the production of genetically enhanced fingerlings.

Need for a Pilot Facility

Research has shown that a pilot growing/processing and distribution facility is necessary to prove that the aquaculture model can reach full potential in the state of Ohio. Because of the lack of access to capital, this pilot facility could be a joint venture between Ohio Department of Agriculture and private industry. Existence of the facility would serve multiple purposes such as developing a supply chain of a genetically enhanced strain of fingerlings, provide education and networking with potential producers through the dissemination of data gathered from the initial growing cycle, and developing a market throughout the state.

Recommendations:

The pilot facility should initially be centrally located within the state and should have four primary operating components:

- Indoor recirculating system
- Processing and distribution facility
- Marketing division
- Facility development division to assist potential producers with development of infrastructure on their farms, as well as to educate and potentially recruit investors for expansion of similar facilities into the four corners of the state.

Ohio production and methods vs. the top five aquaculture production states by number of farms based on the 2005 Census of Aquaculture (USDA, 2005)

State	Sales (\$1,000)	Total Aquaculture Farms	Farms Utilizing Ponds	Combined Pond Acreage	Farms Utilizing Recirculating Systems	Combined Volume of Recirculating Systems
Ohio	978	55	47	576	15	431,150
Alabama	100,391	215	209	3,632	4	83,400
Arkansas	82,595	211	207	6,756	8	381,100
Florida	3,641	359	166	10,437	61	3,730,757
Louisiana	NA	873	293	2,312	6	N/A
Mississippi	248,466	403	403	9,963	5	954,000

Ohio production and methods vs. the five neighboring states by number of farms based on the 2005 Census of Aquaculture (USDA, 2005)

State	Sales (\$1,000)	Total Aquaculture Farms	Farms Utilizing Ponds	Combined Pond Acreage	Farms Utilizing Recirculating Systems	Combined Volume of Recirculating Systems
Ohio	978	55	47	576	15	431,150
Indiana	N/A	18	N/A	443	8	181,500
Kentucky	2,341	65	256	548	9	154,200
Michigan	2,398	34	163	320	3	N/A
Pennsylvania	8,951	56	658	497	11	1,011,970
West Virginia	1,145	21	96	41	3	N/A

SWOT Analysis

This analysis illustrates the apparent strengths, weakness, opportunities and threats that exist within the Ohio aquaculture industry, present and future.

<p>Strengths:</p> <ul style="list-style-type: none"> - Market interest for Ohio raised fish products - Opportunity for indoor system industry establishment - State of Ohio agency industry support - Industry is prime for growth - Nationwide market demand 	<p>Weakness:</p> <ul style="list-style-type: none"> - Current supply does not satisfy market demand - Lack of access to adequate fingerlings - Supply chain infrastructure is inadequate to meet large scale market distribution - Distribution and processing facilities are inadequate for large scale production - Current Ohio aquaculture producers are more "hobby" than established businesses - A significant capital investment is required for aquaculture business start-up - Currently, financial institutions view the aquaculture industry adversely due to the risk and undefined markets for the product - Statewide support organizations are loosely formed and lack structure - Marketing strategies for current or potential industry are weak
<p>Opportunities:</p> <ul style="list-style-type: none"> - Market demand for Ohio raised aquaculture products - Industry atmosphere will support indoor system implementations - US aquaculture industry is growing - Focus on local foods is strong within Ohio and a current focus of US in general - Farm raised products are increasing in demand - Aquaculture industry is a current focus of US in general - Farm raised products are increasing in demand - Aquaculture industry is positioned for growth similar to the past trends of the poultry or swine industries. - Genetics research is being conducted within the state - Ohio can become a leader in fingerling production, which is a nationwide weakness - Industry is prime for growth - Industry is optimal for cooperative formations to assist with industry advancement 	<p>Threats:</p> <ul style="list-style-type: none"> - Other states contiguous to Ohio are also focusing on this industry, Ohio needs to position for being a leader and first to market - Lack of entrepreneurial interest in indoor facilities and fingerling production businesses - Failure to establish a significant and adequate supply chain to support the industry growth with processing and distribution - Lack of cooperation between current and established famers to assist with industry growth and advancement - Financial industry's cooperation and willingness to address lending opportunities within this industry

Summary

Significant opportunities are present within the industry and growth potential is evident. Willingness of producers and new entrepreneurs is the key to successfully accelerating the Ohio aquaculture industry. Partnerships between support organizations are necessary to execute the recommendations contained within this strategic plan. This industry could diversify many current operations that have experienced an economic downturn. Additional business opportunities exist within the supply chain, including:

- Fingerling production facilities
- Feed mill facilities
- Facility construction
- Production suppliers
- Processing facilities
- Distribution facilities
- Indoor system suppliers

Once the infrastructure and supply chain for the aquaculture industry are sustainable, the businesses involved in the cluster will be reliable operations and maintain their presence within the state.

The job sector affiliated with the aquaculture industry includes:

- Fish Management Technicians
- Fish Hatchery Technicians
- Soil and Water Conservation Service Technicians
- Water Resource Management Technicians
- Distribution Technicians
- Processing Technicians
- Feed Mill Technicians
- Protein Additive Operations Technicians

The more technical and higher level jobs with experience include:

- Fish Hatchery Owners/Operators
- District Fish Management Biologist
- Facilities Management
- Processing Facilities Owners/Operators
- RAS facility Owners/Operators

These are a few examples of the job creation opportunities associated with the Ohio aquaculture industry. The potential for additional job creation and unique position development exists with the continued acceleration of the industry.

Another economic development factor is the bi-product of algae in the aquaculture industry. The increase in availability can assist the growing biofeedstock industry interested in algae for oil production. Algae is a source of natural food for fish but algae blooms can cause significant problems in aquaculture by depleting the oxygen content of the water. This depletion can cause fish kills and significant loss of resources and revenue. However, in recent months there

has been a new interest in algae production for energy and also as a potential protein source for animal agriculture. This brings about the possibility for significant synergy between the aquaculture industry and the emerging biofuels industry. It is possible that algae could become a significant byproduct of aquaculture production.

This economic activity surrounding the state's aquaculture businesses will be helpful with Ohio unemployment rates, and also a valuable economic development driver. The market suggests significant interest in Ohio-raised aquaculture products and potential for substantial growth in this industry.

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