



Ontario Aquaculture
Research and Services Coordinating
Committee

2004 Strategic Report
(For the Period 2005 – 2009)

Presented to the Ontario Animal Research and Services Committee

September, 2004



Introduction

The Ontario Animal Research and Services Committee (OARSC) is one of nine sub-committees reporting to the Ontario Agricultural Services Coordinating Committee. The OARSC has been mandated to lead a strategic priority setting process every four years to provide recommendations to the Ontario Ministry of Agriculture and Food (OMAF) regarding animal research in Ontario. OMAF uses the recommendations to:

- Direct the development of the animal research program funded through the OMAF/University of Guelph Agreement.
- Establish priorities for OMAF funded competitive research programs such as the New Directions Research Program, the Food Safety Research Program and the Alternative Renewable Fuels Research and Development Fund.

OMAF has an active role in communicating these strategic priorities through:

- Submission of an annual report to the Canada Committee on Animals and the Canadian Agri-food Research Council (CARC).
- Forwarding the report to the University of Guelph and to other organizations as recommended by the OARSC.
- Posting the report on OMAF's website.

The Ontario Animal Research and Services Committee is comprised of 12 species sub-committees including aquaculture, beef, broiler, dairy, deer and elk, egg layers, equine, fur-bearing, goat, pork, turkey and sheep. Each sub-committee is comprised of representatives from industry, academia and government. The 12 species sub-committees of the OARSC worked to develop strategic priorities and recommendations for their respective industries in the first half of 2004.

Executive Summary

The main issues facing the industry continue to arise from the confused regulatory framework surrounding aquaculture in Ontario. Direction and hope for improvement in that area may come from the federal level, where the Department of Fisheries and Oceans has formally recognized support for Aquaculture through the formation of the Aquaculture Management Directorate. Part of the new Directorate's goal involves working with provincial governments to improve the regulatory framework for aquaculture. Key personnel in the Directorate have an excellent perception of the problems inherent in achieving their goals. This report has adopted the term "social licence" used by Mark Burgham, Director of Public Engagement and Government Relations for the Directorate. Gaining and maintaining the "social licence" of the public is essential to aquaculture's development and economic success. Building widespread public acceptance enables removal of barriers to growth. For Ontario fish farmers, the "social licence" is one of the key issues to be addressed over the next four years.

Industry Statistics

In 2003, the Ontario aquaculture industry produced approximately 4,550 tonnes (10.03 million pounds) of rainbow trout for human consumption, with a farm-gate value of \$18.2 million. Limited quantities of tilapia and Arctic charr were also produced (approximately 180 tonnes) and other species including brook trout, bass and other fish (approximately 25 tonnes). The industry generated approximately 240 person-years of direct employment plus another 250 person-years of indirect employment. The total economic contribution of the industry to Ontario's private sector is estimated at \$60 to \$65 million.

The industry consists of approximately 190 establishments, with most located in southern and central Ontario. Although the number of farms in the northern regions of Ontario is small, their annual production is in the order of 80% of the provincial total, making this geographical region a significant contributor to our net output of farmed-fish.

Our predictions are that annual production of rainbow trout will decline to approximately 4,200 tonnes in 2004, as a result of production failures at several farms. Tilapia and Arctic charr production are expected to remain at approximately 200 tonnes next year.

Ontario Aquaculture Strategic Review

1. Subcommittee Mandate

The Ontario Aquaculture Research and Services Coordinating Committee (OARSCC) was established in 1985. OARSCC provides a forum for the exchange of ideas between the industry and those government agencies that administer relevant legislation, or which provide services to fish farmers. The committee also serves as one of twelve species subcommittees of the Ontario Animal Research and Services Committee, which is part of the umbrella Ontario Agricultural Services Coordinating Committee. This structure is a component of a well-established system of committees that coordinate agricultural research and service priorities at both the federal and provincial levels.

OARSCC strives to identify and establish, on an annual basis, high priority requirements for aquaculture research and service programs in Ontario, with the goal of encouraging the orderly expansion of the industry. The committee also endeavours to ensure liaison and communication between those agencies and groups that have a primary interest in the long-term development of aquaculture in Ontario.

2. Progress made on Recommendations from the 2000 OARSC Strategic Report

Recommendations:

- 1) Increase activity in environmental impact research.
- 2) Increase activity in nutrition and bioenergetics research.

- 3) Increase activity in health management and disease research.
- 4) Increase activity in food products and processing technology research.
- 5) Increase activity in improving welfare of farmed fish.

Research has been initiated dealing with all five of these recommendations. Details are available in the OMAF Agreements Information system, as well as the Aquaculture Centre website.

3. Review of OMAF support to Ontario Aquaculture research

In addition to the research addressing the listed recommendations, OMAF continued to support ongoing, longer term work on genetics and breeding of rainbow trout.

4. Review of other research support to the Ontario Aquaculture industry

Environmental impact research and nutrition and bioenergetics research in Ontario have received funding from the Aquaculture Collaborative Research and Development Program, initiated and run by the Federal Department of Fisheries and Oceans.

5. Review of research capacity for the Ontario Aquaculture industry

Ontario is blessed with significant science capacity to support aquaculture research and development. In particular, the University of Guelph has world class fisheries and aquatics faculty and research programs, as well as state-of-the art infrastructure to support a wide variety of research programs.

Since its establishment in 1991, the Alma Aquaculture Research Station (AARS) has fostered research, education, testing of products and technology transfer that is relevant to Ontario aquaculture. To date, one hundred and four research projects have been conducted at the AARS in the areas of nutrition, fish health, growth and reproductive physiology, reproduction and management, breeding and genetics, fish behaviour, culture methodology, engineering and systems design, waste management, telemetry, and product development. These projects have involved more than 321,000 eggs and 555,000 fish of three different species (rainbow trout, Arctic charr and Atlantic salmon). In addition, the AARS has provided 258,300 eggs and 31,650 fish to support 110 research and educational projects at other research and teaching facilities in North America. In 2003-04, fifteen experiments involving rainbow trout and Arctic charr were either initiated or in progress.

6. Major trends and/or issues facing the Ontario Aquaculture industry over the next 4 years

1) Regulatory Framework

At the provincial level, there has been no progress in addressing the confusing and unevenly applied assortment of regulations being applied to aquaculture. In the northern part of the province, the newly formed Northern Ontario Aquaculture Association (NOAA) has enjoyed improved dealings with some personnel from the Ontario Ministry of Natural Resources, potentially enabling progress for cage culture operations in future. The Ontario Ministry of the Environment is restructuring regulations governing water taking permits, and a real risk exists that land-based fish farms may be further constrained as a result.

Federally, the Department of Fisheries and Oceans has further formalized recognition and support for aquaculture through the establishment of an Aquaculture Management Directorate. As part of its agenda the Directorate hopes to work with provincial agencies to improve the regulatory framework for aquaculture. Clearly, this could have significant benefits for Ontario fish farmers.

2) Economic Viability

Improvements in management regimens, health maintenance, nutrition, and genetics have kept commercial scale fish farms profitable in spite of rising input costs, competition from imports, and increasing costs due to growing regulatory burdens. As with all food production, maintaining a reasonable level of profitability will be a constant challenge for Ontario farmers who are held to higher standards, particularly in the areas of food safety and the environment, than many producers of imports.

3) Environmental Issues

The controversy over the environmental impacts of aquaculture continues. It is becoming clear that objective science is not sufficient to silence industry critics. Increasingly, the challenge will be to prevent regulatory agencies from responding to persistent, ideologically motivated groups and organizations rather than the facts surrounding an issue. Public relations and politics will supersede reality regarding the environment to an even greater extent in future, and failure to recognize this and respond appropriately will have negative consequences for fish farmers and other commercial livestock producers.

4) Social Licence

Maintaining the ongoing ability to operate in Ontario will require enhancing the generally favourable public perception that the industry currently enjoys. Even aquaculture critics concede that much, if not all, of our seafood will eventually be farmed. Part of the

challenge to today's fish farmers comes from environmental idealists insisting on the development of an industry with zero environmental impact, a concept that cannot realistically be applied to commercial scale food production of any sort. Broadly based public acceptance of aquaculture can constitute the political force that is required to offset the influence of unreasonably zealous environmental activists on regulatory agencies. Building on the increasing media and public awareness of the health benefits of consuming fish is essential in gaining solid, widespread acceptance for aquaculture. This can provide the basis to counter industry opponents who have started to exploit food safety fears in their campaigns against the farming of fish.

7. What is the vision for the Ontario Aquaculture industry over the next 4-year period?

Industry members contributing to this report agreed that controlled growth consisting of an approximate 15% annual increase in provincial production over the next four years would be ideal. If achieved, that would constitute some measure of catch-up relative to the last 8 years of effective 0% growth under Ontario's unofficial moratorium on significant aquaculture expansion. In view of the province's growing population and market opportunities, that goal appears relatively modest.

8. What are the gaps or barriers that must be addressed to realize the stated vision?

First and foremost, the regulatory barriers constraining the industry in Ontario must be addressed. It is extremely frustrating that many years of industry/government working groups have been unable to produce significant progress in the area of regulatory reform.

The industry must continue to improve health management and lower input costs to remain economically viable. Lowering feed costs is a key component for profitability. Costs stemming from regulatory requirements must not be allowed to become a back-door route for suppression of the industry if such requirements are excessive or based on an unjustifiably precautionary stance by a regulatory agency.

Environmental opponents of aquaculture must continue to be addressed with facts, particularly as more evidence of the industry's sustainability becomes available from ongoing research that is specific to Ontario. Effectively communicating this information to politicians and the public will be the chief challenge. Gaining a "social licence" for fish farming involves garnering solid widespread support for the industry. Such support will be necessary to counter food safety issues that are becoming a common tactic of attack for aquaculture critics.

2005 –2009 Strategic Research Recommendations

A research recommendation describes an area of research that is of sufficient scope to encompass a number of research projects or a large multidisciplinary project and is linked to a desired outcome. Recommendations should be listed that will further the industry by addressing the identified gaps and barriers and move the industry towards realizing the stated vision.

SUMMARY OF RESEARCH RECOMMENDATIONS (Listed in order of Priority - #1 being of greatest importance)

Priority Order	Title of Recommendation
1	Environmental Impact Research
2	Nutrition and Bioenergetics Research
3	Health management and Disease Research
4	Genetics and Breeding Research
5	Welfare of Farmed Fish
6	Food Products and Processing Technology Research
7	Economic Analyses and Industry Profiling
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RECOMMENDATION DETAIL

RECOMMENDATION # 1

Title: Environmental Impact Research

Background: In Ontario, current guidelines governing water quality impacts from aquaculture operations do not address mass loading of nutrients discharged from a production facility in relation to the assimilative capacity of receiving waters. Given the variability existing both in types of production facilities (inland, cage, recirculation) and their receiving waters (cold, warm, streams, lakes), use of the mass nutrient loading approach to regulate fish farming appears to be the optimal method for protection of the environment while allowing for orderly development of aquaculture. For inland operations, such an approach would end the discrimination currently inherent in the regulation of point source nutrient inputs on watersheds, while much greater non-point source inputs are overlooked. For cage farms, regulation through nutrient loading would offer operational flexibility and the opportunity to progress towards a management model involving site rotation, which would benefit both the environment and production. The need to move forward with an improved regulatory approach is especially urgent for the cage sector, the segment of the industry with the most growth potential. Governments must, however, recognize that the cost of developing such a regulatory approach is well beyond the resources of the industry at its present size. The decision to undertake the necessary research involved would require an acknowledgement by all government agencies that the development of a successful aquaculture sector is desirable and beneficial for Ontario.

Objectives: Investigate various approaches to quantify environmental impacts of fish farming activities specifically to develop techniques to estimate the impacts on assimilative capacity of various receiving water systems. Assimilative capacity assessments should take into account expected regenerative capabilities of sites, where applicable, using data from actual investigations of decommissioned facilities.

Outcomes: Addresses the regulatory barriers holding back the industry, and aids in gaining social licence.

Referral Organizations: Ontario Ministry of the Environment, Ontario Ministry of Natural Resources, Environment Canada, Fisheries and Oceans Canada

RECOMMENDATION # 2

Title: Nutrition and Bioenergetics Research

Background: Feed costs in aquaculture constitute up to 60% of the unit cost of production for raising carnivorous fishes of the salmonid family. Therefore this is the variable that holds the most promise for significantly improving profitability of large, commercial scale rainbow trout farms in Ontario. Lower feed costs per unit of production would raise the relative significance of transportation costs, thus providing a competitive advantage over imports. Additionally, diet reformulation provides an opportunity to reduce nutrient outputs and alleviate environmental concerns.

Objectives: Investigate alternative protein sources for salmonid feeds to reduce dependency on expensive fish and soybean meals. Simultaneously, waste production implications of alternate protein sources must be taken into account, considering the potential to decrease phosphorus and nitrogen outputs while avoiding the creation of new problems.

Outcomes: Addresses economic viability and environmental issues.

Referral Organizations: Ontario Ministry of Natural Resources, Fisheries and Oceans Canada

RECOMMENDATION # 3

Title: Health Management and Disease Research

Background: More effective control and detection of economically significant diseases is essential to lowering costs of production. Public awareness of the use of antibiotics and other therapeutants in livestock production is increasing and fish farmers need to demonstrate the safety of their disease management practices to end consumers. The lack of registered therapeutants is a problem for the industry that may not be readily overcome due to the small market potential that aquaculture presently offers for a therapeutant relative to the large expense involved in obtaining registration approvals. This necessitates the exploration of alternate means of disease treatment and prevention.

Objectives: Determine the pathobiology and effective management of diseases which are of economic significance to fish farming in Ontario, including newly emerging diseases in species which may become commercially important to the industry, as well as the common gill and skin diseases of salmonids. Investigate the efficacy of commonly utilized chemo-therapeutants, the biological dynamics of these compounds in the environment, and their persistence and clearing rates from fish when used prior to harvest. Determine whether alternatives to chemo-therapeutant treatment, such as vaccines and modifications in husbandry practices, may represent more effective means

of disease control. Develop new detection and epidemiological techniques for on farm use.

Outcomes: Addresses economic viability and social licence, as the public becomes increasingly aware of farmed animal health maintenance and disease treatment.

Referral Organizations: Fisheries and Oceans Canada, Environment Canada, National Research Council Canada, Ontario Ministry of Natural Resources

RECOMMENDATION # 4

Title: Genetics and Breeding Research

Background: Ontario rainbow trout strains may have a number of superior characteristics with respect to growth, body conformation, and disease resistance relative to imported strains. However, we still know very little about the genetic make-up and potential for improvement of performance of our rainbow trout stocks. Undesired sexual maturation in production fish is one of the industry's key problems and frequently impacts producer profitability.

Objectives: Determine genetic variability, specific parameters, and gene-environment interactions affecting growth performance, disease resistance, and maturation characteristics in Ontario rainbow trout, with the aim of improving those stocks.

Outcomes: Addresses economic viability.

Referral Organizations: Fisheries and Oceans Canada

RECOMMENDATION # 5

Title: Welfare of Farmed Fish

Background: Objective methods of measuring animal response are needed for evaluation of the effect that current and alternative husbandry practices have on behaviour and stress in aquatic animals. This information will allow fish farmers to develop and adopt optimum culture practices and respond effectively to ethical concerns regarding the holding and husbandry of fish.

Objectives: Develop objective methods for assessing the general welfare of farmed fish through quantitative evaluation of their physiological responses to various management practices. Establish husbandry protocols that maximize the health and welfare of farmed fish without sacrificing production performance or profitability for the farm operation.

Outcomes: Addresses an area that will become increasingly important for aquaculture's social licence.

Referral Organizations: Ontario Ministry of Natural Resources

RECOMMENDATION # 6

Title: Food Products and Processing Technology Research

Background: Ontario aquaculture does not offer the variety or refinement of retail products that other red and white meat industries have. Final product forms have been dictated as much by processing machinery availability as by consumer or market preferences. As the industry grows, product diversification will be required to appeal to a broader consumer base.

Objectives: Develop and refine advanced processing and packaging techniques to add value, assure food safety and quality, and extend shelf life in order to increase the marketability of trout products. Utilize consumer testing and sensory evaluation studies to improve our understanding of consumer preferences.

Outcomes: Addresses economic viability.

RECOMMENDATION # 7

Title: Economic Analyses and Industry Profiling

Background: Production management, forecasting, and planning all require a sound database of factual information about past and current industry status. This enables the identification of management factors contributing to profitability, providing the opportunity to enhance them.

Objectives: Maintain an accurate and updated database of the provincial industry allowing for economic analyses of industry performance and comparison with other sectors, from a provincial, national, and international perspective.

Outcomes: Addresses economic viability.

Ontario Aquaculture Research and Services Coordinating Committee Membership 2004

- Under Title please indicate Chair, Vice-chair, Co-chair as appropriate

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