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Taking stock: A profile of Canada's aquaculture industry

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Simply put, aquaculture is the farming of plants or animals in marine or fresh water. It is the aquatic form of agriculture, and is often referred to as “fish farming”.

Aquaculture is a relatively new commercial activity in Canada, but it has been around for a long time. In fact, aquaculture stretches back to early civilizations.

More than 4,000 years ago, the Chinese were raising common carp, according to records. Hieroglyphics in the tombs of the Pharaohs describe the farming of tilapia in ancient Egypt, while the Romans built small ponds for raising moray eels, fish and cultured oysters in 100 BC.

Fish farming in its modern form was introduced in 1733 when a German farmer successfully gathered fish eggs, fertilized them, and then grew and raised the fish that hatched.

In Canada, it is only during the past 30 years that this form of agriculture has become an important supplier of fish and other aquatic products. With the depletion of stocks available for traditional fishing activities, coastal areas turned to aquaculture as a means of economic stability.

Vista on the Agri-Food Industry and the Farm Community contains articles highlighting statistical insights on themes relating to agriculture, food and environmental issues.

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Symbols

The following standard symbols are used in Statistics Canada publications :

.	not available for any reference period
-	not available for a specific reference period
...	not applicable
P	preliminary
r	revised
x	confidential
A	excellent
B	very good
C	good
D	acceptable
E	use with caution
F	too unreliable to be published

Aquaculture represents a relatively small segment of agricultural production in Canada, but during the past five years, the industry has grown substantially. Despite some reduction in the rate of growth recently, aquaculture has continued to show potential.

In 2004, the most recent data available, the value of the fish crop reached nearly \$527 million despite a year-over-year decline in both production and exports. The value of aquaculture exports was \$425 million.

Fish farms have become a mainstay in many coastal communities on both the east and west coasts. Salmon is the most prevalent species grown although shellfish farming has also shown healthy growth. Strong demand for fish and fish products and the declines in the fish catch of the traditional fishery suggest an increasing role for fish farms in meeting the needs of the marketplace.

This article examines aquaculture in Canada during the past few years, as well as its place in world markets, the species that dominate our production and its importance for certain regions. The paper also examines challenges and opportunities within the industry.

Production more than doubles during the past 10 years

Canada is particularly well suited to aquaculture due to its vast untamed coastline, the availability of investment capital and a skilled and educated labour force. Aquaculture production has expanded considerably during the past 10 years, although it has more recently leveled off.

In 2004, Canada's fish farmers produced 145,840 tonnes of finfish and shellfish, more than twice the level of almost 57,000 tonnes in 1994. But total production in 2004 still represented only about 15% of the 993,054 tonnes harvested by the traditional fishery.

Over the last 10 years, production in the traditional fishery has declined on a year-over-year basis. At the same time, aquaculture production has grown sometimes as much as more than 25% in a year.

In terms of value, aquaculture products were worth just over \$526.5 million in 2004, down 10.9% from 2003 but more than double the level of \$277.6 million a decade earlier. The decline was due to a sharp drop in production and exports.

In 2004, aquaculture represented only 24% of the value derived from the fishery, but it was growing at a faster pace. In 1994, for instance, aquaculture accounted for less than 18% of the value of the fishery.

A total of 73 cold-water species are licensed for rearing in the country today. They include 51 species of finfish, 18 species of marine shellfish, two species of amphibians and two species of marine plants.

Specific data on employment are not available. However, a 2004 study done for the Canadian Aquaculture Industry Alliance estimated that 454 aquaculture firms employed 5,000 to 6,000 people, most of them full-time.

Heavily export-oriented sector

Canada's aquaculture sector is heavily export-oriented, with more than 85% of its fish and seafood production heading abroad.

While the United States is the largest market, Canada also exports significant amounts to Japan and Taiwan, and lesser values to France.

In 2004, the value of exports reached \$424.9 million, more than twice their value a decade earlier. American markets accounted for almost 95% of this total.

On a global scale, Canadian aquaculture is a relatively small player. In 2000, world animal aquaculture production hit nearly 35.6 million tonnes valued at US \$50.9 billion.

In comparison, Canada produced 127,000 tonnes of aquaculture products valued at US \$404.2 million. Canada accounted for only 0.36% of total world aquaculture production, or 1.14% of total value.

Coastal regions account for vast majority of aquaculture

Aquaculture in British Columbia and the Atlantic Provinces combined accounts for 92% of the total value of Canadian production. Another 5% is located in Quebec and Ontario, while the rest is in the Prairie Provinces.

By far, British Columbia leads the pack. In 2004, its production was worth \$227.8 million, or 43% of the total.

It was followed by New Brunswick, with production worth \$181.0 million, or 34% of the total. (Coincidentally, this was almost twice the \$91.2-million value of New Brunswick's potato production in 2003.)

In third place was Prince Edward Island, with production valued at \$33.2 million, or 6%. Fish farming in Newfoundland and Labrador was fourth.

Finfish, for the most part salmon, is the mainstay in New Brunswick and British Columbia. On the other hand, a healthy shellfish industry is located in Prince Edward Island, which has an international reputation for mussels.

Prince Edward Island also has an oyster industry, but oyster production is more prevalent in British Columbia.

In central and western Canada, land-based trout operations are the most common form of aquaculture. Producers in Quebec have developed a sector which provides re-stocking fish to established outfitters for the sport fishery. In 2004, it generated close to \$8.5 million in annual sales.

Species: Salmon dominates Canadian aquaculture

In terms of tonnage, finfish account for almost 65% of world aquaculture production, while in Canada the proportion in 2004 was around 74%.

In terms of value, finfish represented 89% of both total value of world aquaculture production and of Canadian production.

The range of aquaculture products grown in Canada varies from finfish to shellfish, from arctic char to clams. However, salmon dominates Canadian aquaculture. In 2004, salmon accounted for two-thirds of total aquaculture production, and three-quarters of its total value.

Between 1994 and 2004, the value of Canadian salmon products raised in fish farms increased from \$249.0 million to \$387.0 million. Canada produces 6% of the world production of salmon, accounting for nearly 8% of the value.

Salmon are anadromous fish, meaning that they go up rivers from the sea to spawn. They are grown in two phases. During the freshwater phase, which is land-based, the salmon grow from the egg to the smolt. At this point, they are ready to be moved to saltwater pens where they will grow very quickly.

This simulates patterns in the wild in which the salmon move from freshwater rivers to an ocean habitat. However, because of the controlled situation, they reach market size much more quickly and produce a more uniform product.

Salmon are efficient feed converters, requiring only 1.2 kilograms of dry food to gain 1 kg of weight. This compares to 2.5 kg for chicken and 8.0 kg for cattle. Fish feed, must however, contain more protein than those for chicken or cattle.

The low conversion ratio hinges on the fact that fish are cold blooded. Water provides buoyancy reducing the amount of energy needed for movement and fish require few calories to maintain basic biological functions.

Other types of finfish grown in aquaculture are trout, char, Atlantic halibut and sablefish.

The most common types of shellfish raised in Canada are mussels and oysters. Together, they account for 94% of shellfish produced in Canada and 77% of their value. Other types of shellfish include clams and scallops. Again, a natural environment is simulated to promote quick growth and uniformity of product.

Consumer demand for fish on rise

Consumer demand for fish has been on the rise despite the decline in the fishery catch, perhaps reflecting consumer tastes, preferences and demographics.

Although, farmed fish still represents only a small portion of fish consumed, it remains a reliable supply source, and its market share is expected to grow in importance over time.

At the same time, as poultry and fish consumption both increase, red meat consumption is falling. This is perhaps a reflection of the growing ethnic diversity of the Canadian population, changing demographics and a more diet-conscious population.

In 1991, each Canadian consumed on average 27.88 kg of red meat, including beef, pork, veal and lamb, compared with 6.27 kg of fish.

By 2003, per capita consumption of red meat had declined to 26.90 kg, while consumption of fish had increased to 6.88 kg. This represents an increase of nearly 10% in fish consumed, which bodes well for the aquaculture industry as it competes for a greater share of the consumer dollar.

Facing the challenges

Despite its small size, aquaculture is subject to a good deal of controversy, which is surprising at first glance. It is an efficient producer of protein using existing resources and it produces a high quality consistent product throughout the year. It also requires very little land and it creates employment in what are often remote and isolated communities. Fish farming could be a workable economic alternative for depressed coastal areas affected by the decline in the traditional fishery.

The criticism relates to concerns about, for instance the environmental impacts of aquaculture operations, food safety, contamination of existing wild stocks and the loss of natural habitats.

Salmon farming in British Columbia in particular has become a major target for environmental groups. They have claimed that salmon farming damages the environment and that farmed salmon is less healthy than wild salmon.

Key to addressing environmental concerns is a need for sound information on human health, environmental protection and the socio-economic benefits associated with aquaculture production.

Canada has the potential to be a world aquaculture leader. Aquaculture is a new-economy industry, grounded in science and technological innovation. It is a high value sector. The challenge for the Canadian industry is to create the conditions necessary to take advantage of the socio-economic potential while ensuring that the industry remains environmentally sustainable.