The Future of Salmon Aquaculture in North America

Key Points

✔ There is little doubt that most of the future growth in world salmon supplies will occur because of aquaculture, rather than increased harvests of wild salmon stocks. Salmon aquaculture will continue to develop in Northern Europe and to a lesser degree in North America (particularly Canada) but currently Chile has the greatest potential for growth.

✔ Aquaculture offers great advantages over capture fisheries, such as consistency of supply, year-round availability, greater quality control, and the possibility of longer-term contracts. In addition, the aquaculture sector is more attentive and has a greater capacity to respond to market demands. For example, large restaurant chains and supermarkets will increasingly source their supplies of fresh salmon from aquaculture. Wild salmon appears to be moving more toward the market extremes (Knapp 2001). On one hand, wild salmon are being sold into niche, high-end markets (e.g. Copper River salmon), and on the other hand, the bulk of the wild salmon is moving into certain low-end markets, such as frozen and canned fish (esp. pinks and chums). Because aquaculture contributes to low salmon prices, the economic incentive to enter into traditional salmon fisheries is reduced (Anderson 1985).

✔ Over the last two decades the global industry has been affected by cyclical movements of prices but consolidation processes and diversification into other species could bring some stabilization in the next years. Provided certain environmental concerns related to the integrity of wild stock populations and fishmeal content in salmon diets largely can be addressed, the future of the global salmon industry appears to be continued growth.

✔ However, the same cannot be said of the aquaculture industries in North America given the competition with overseas producers, heavy regulatory pressure, and confrontation with environmental groups. The U.S. ocean-pen salmon aquaculture industry may see some growth, but it will more likely contract in the near future. The Canadian ocean-pen aquaculture industry may see some growth in the future, but farmers will continue to struggle with stringent government regulations and opposition from environmental groups, particularly in British Columbia.

Farmed Salmon Production Trends

There is little doubt that most of the future growth in world salmon supplies will occur because of aquaculture (Anderson 2002). This is a fact recognized even by opponents of aquaculture development. According to FAO statistics, salmon aquaculture exceeded landings from capture fisheries for the first time in 1996. By the year 2001, aquaculture already accounted for more than two-thirds of world salmon supplies (FAO 2003). While world salmon fisheries have hovered around 0.8 million metric tons during the last 10 years, farm production has grown at an annual average rate of 11% in the same period. All indications are that this trend will continue in the future.

Commercial salmon aquaculture started in Norway more than 25 years ago and for many years Norway was the dominant farm-raised salmon producer. However, the combination of ideal environmental conditions, widespread availability of suitable sites, and a favorable business climate fostered by a supportive government make Chile the country with the highest potential for future growth. FAO world statistics for 1999 indicate that Norway’s production exceeded Chile’s by around 150,000 pounds. However, two years later Chile had closed the gap and matched Norway’s production at slightly over 500,000 pounds. Chile has the potential to become the largest salmon producer in the world.
Bjørndal (2002) estimates that the average annual growth rate for the Chilean industry in the near future will be in the range of 20-30%, considerably lower than the historical average (annual growth was 55% between 1984 and 2001) but still rapid for an industry that is maturing. Expansion will hinge on infrastructure development (roads, shipping ports, processing plants) in the southernmost regions of the country, where environmental conditions for salmon aquaculture are ideal. Japan and the United States have traditionally been the most important markets for Chilean producers and they will continue to be in the foreseeable future. The United States will likely be the target of increased salmon production from Chile as a relatively strong U.S. dollar will continue to favor seafood imports. Chilean exports to Latin American countries such as Brazil have increased in recent years, but these alternative outlets will remain small in comparison to the predominant U.S. market. Attempts to gain a sizable share of the European market have been difficult to date given the stiff competition with Norway. This situation is unlikely to change in the forthcoming years.

**Trends in Product Development**

The future salmon industry will require the development of innovative products to satisfy the existing needs of the market. A major breakthrough already occurred with the introduction of chef-ready pinbone-out (PBO) fillets in the mid-1990s by Chilean producers, which paved the way to increasing production of salmon fillets as compared to whole fish. In the United States, for instance, fillets have been the predominant product form since the year 2000. New product development will imply a greater degree of processing in the producing countries. In this regard Chile will have a competitive advantage over other countries (Norway, Canada, Scotland) because of its lower labor costs. To date, U.S. processors have had difficulty in competing with the PBO fillet.

Future marketing strategies for farmed salmon will most likely exploit convenience and the health-related attributes of salmon as compared to competing protein sources such as beef and chicken. These strategies will focus not only on the individual consumer but also on the needs of large-scale purchasers such as chain restaurants and supermarkets. Aquaculture has been favored by major seafood purchasers because of its consistency of supply, year-round product availability, and high-quality assurance. This segment of the market, particularly chain restaurants, is increasingly demanding a wider availability of convenient, ready-to-serve, portion-controlled products. Aquaculture will most likely satisfy these market demands through continued innovation in product development. In contrast, the marketing efforts of the wild suppliers have focused on negative environmental and health-related attributes of farmed salmon (such as the risk of the presence of contaminants) and the positive image of ‘wild’ salmon.

**Technological Improvements in Aquacultural Production**

Technological improvements in salmon aquaculture have resulted in a consistent decline in production costs over the last two decades. Farm operation has improved to the point that labor and energy costs represent now a very low share of total costs. Improvements in feeding systems and feed management have also considerably reduced feed costs, but to a lesser extent than other operating costs. As a result, feed is expected to become a greater share of total cost in the near future, even though overall costs of production will continue its downward trend. Almost every imaginable aspect of salmon farming (breeding, feeding systems, disease management) will see improvements through continued investment in technology.

There has been some recent controversy on the use of fishmeal in commercial salmon feeds. Critics argue that feeding carnivorous fish such as salmon leads to a net loss of fish supplies because salmon farms consume more fish (as feed) than they produce (Naylor et al. 2000). Industry advocates maintain that salmon are very efficient converters of feed into edible flesh, consuming only 1.1-1.5 pounds of feed for every pound of meat produced (Forster and Hardy 2001). In comparison, chickens require about two pounds of feed for every pound of meat that is produced. Other authors (Asche and Tveten 2004) refute the existence of a ‘fish meal trap’ limiting growth since increased demand for feed cannot affect reasonably well-managed fish stocks in reduction fisheries, and even if stocks are mismanaged, fish feed demand will not have an effect as long as the fishmeal and oil markets are integrated with the similar but much larger vegetable meal and oil markets.

Although the fishmeal dispute may remain unsettled in the near future, feed companies are continuously looking for alternate ways to reduce the proportion of fishmeal in salmon feeds. In fact, fishmeal content has been reduced from 70% in 1972 to 35% today (Loder 2003). Salmon feeds will continue to shift away from fishmeal towards plant ingredients (soy, rapeseed oil, and corn gluten) as protein sources while reducing the amounts of key fish oils to the extent possible. New feed technologies will also reduce the amount of nutrients that is leached from feed pellets.

Disease management is another aspect of environmental concern that will see substantial improvements in the future. The development of vaccines has brought about large reductions in the use of antibiotics and other chemicals. In Norway, the use
of antibiotics in salmon farming has been cut by 98.8% since the mid 1980s as a result of vaccination, making Norwegian salmon rank lowest in the world in use of antibiotics per kg of meat (IntraFish 2003). Disease outbreaks in salmon farms will be better managed in the future, and this will contribute to reduced risk of exposure to wild populations.

Salmon farmers have diversified into other species such as cod. Wild cod stocks have virtually been depleted in much of the North Atlantic region and as such there appears to be a clear opportunity for aquaculturists in this nascent industry. Considerable investments in R&D have already been undertaken in France, Norway, and Scotland. Diversification into production of other species may contribute to reduce supply growth of salmon, and strengthen prices for salmon (Roberts 2003).

The North American Salmon Farming Industry

Although farmed salmon is likely to extend its dominance over global supply, ocean-pen salmon aquaculture in North America will continue to face numerous obstacles. Low-cost producers (e.g., Chile) will present formidable competition for domestic salmon farmers. The industry will also be subject to increased regulatory oversight (e.g., Endangered Species Act on the East Coast) and confrontation from environmental organizations on issues such as fish escapes and transfer of diseases to wild populations. Conflicts with other coastal resource users will continue to arise. Given continued strong opposition to salmon farming, Alaska’s moratorium on ocean-pen aquaculture will not be lifted in the foreseeable future. This will limit aquaculture in Alaska to the hatcheries which are used to release salmon to enhance the harvest of the commercial salmon fisheries. Despite this restriction, the salmon-ranching industry in Alaska is now considered its “largest agricultural industry” (Farrington 2004, p2.). While the U.S. ocean-pen salmon aquaculture industry could see some growth (possibly offshore or land based), it will more likely contract in the near future.

The Canadian ocean-pen aquaculture industry may see some growth in the future, but farmers will continue to struggle with stringent government regulations and opposition from environmental groups, particularly in British Columbia (PricewaterhouseCoopers 2003). Salmon pricing cycles will cause further consolidation of the industry, putting some companies out of business and forcing reorganization in the surviving firms. Currently, most Canadian salmon is exported as whole fish but more value-added processing such as PBO fillets is likely to occur in the future.
References


IntraFish. 2003. Norwegian antibiotics usage reduced by 98.8%. http://www.intrafish.com/articleID=36685


