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Aquaculture in Iceland – history and present status

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SUMMARY

For centuries the Icelanders have known of the possibility to transfer live freshwater fish into fishless streams or lakes. Apart from this, aquaculture began in Iceland just before the year 1900 with the first attempts to fertilize and hatch salmonid ova and to release the emerging fry into rivers. Aquaculture in Iceland involved mainly hatching of salmonids and restocking of rivers until 1950. In 1951 an era of small scale rearing of salmonids to a size ready for consumption began as rainbow trout was imported from Denmark and reared in the fishfarm Laxalón. Just before 1980 a large scale building up of fish farming of salmonids began.

The main forms of farming are: smolt production (fresh water), cage farming (sea), rearing in landbased tanks (sea or brackish water) and ocean ranching (the ocean around Iceland). In 1990 over eight million smolts were produced, 2864 tons of salmon, 24 tons of rainbow trout, 69 tons of Arctic charr and 20 tons of brown trout. The industry is in severe financial difficulties due to low market prices and production problems.

A slow buildup of the infrastructure for aquaculture began in 1932 with a new law concerning freshwater fisheries and fishing of salmonids at sea. Just before 1980 building up of infrastructure accelerated, especially concerning education, research and development. Future of aquaculture in Iceland depends much on further development in techniques, marketing of presently used species and new species.

Key words: aquaculture, Iceland, salmonids.

RÉSUMÉ

Aquaculture en Islande, histoire et situation presente

Les Islandais connaissaient depuies des siècles la possibilité de transférer des poissons d'eau douce vers des cours d'eau ou des lacs dépourvus de poissons. En dehors de cela l'aquaculture a cependant réellement débutée en Islande, peu avant 1900 avec les premiers essais de fécondation, de production d'oeufs et de lâchers de juvéniles dans les rivières.

Jusqu'en 1950, les pratiques aquacoles ont consisté principalement a ensemencer les rivières en oeufs de salmonidés. En 1951 a débute une période d'élevage à petite échelle des salmonidés jusqu'à la taille commerciale avec de la truite arc-en-ciel importée du Danemark et élevée dans la pisciculture de Laxalon. C'est peu avant 1980 qu'a commencé la construction à grande échelle de fermes aquacoles de salmonidés. Les principaux types d'élevage sont: la production de smolts (en eau douce), l'élevage dans des cages en mer ou en bassin à terre (eau de mer ou saumâtre) et le pacage marin. En 1990 ont été produits plus de huit millions de smolts, 2864 tonnes de saumons, 24 tonnes de truites arc-en-ciel, 69 tonnes d'omble chevalier et 20 tonnes de truite commune. L'aquaculture rencontre des difficultés financières sérieuses dues à la chute des prix sur le marché et aux problèmes liés à la production. Une mise en place lente des infrastructures pour l'aquaculture a commencé dès 1932 avec une nouvelle règlementation concernant les pêcheries en eau douce et la pêche des salmonidés en mer. Elle s'est accélérée peu avant 1980 spécialement en ce qui concerne la formation, la recherche, et le développement.

L'évolution future de l'aquaculture en Islande dépendra de la progression des techniques, de la commercialisation des espèces actuellement présentes sur le marché ou nouvelles.

Mots clés: aquaculture, Islande, salmonidés.

YFIRLIT

Fiskeldi á Íslandi í fortíð og nútíð

Íslendingar hafa kunnað að flytja lifandi ferskvatnsfisk í fisklaus vötn og ár í margar aldir. Fiskeldi hófst hins vegar ekki fyrr en seint á síðustu öld þegar fyrst var reynt að frjóvga og klekja út laxahrognum og sleppa kviðpokaseiðunum í ár. Allt þar til 1950 var eingöngu klakið út laxahrognum til þess að rækta upp ár. Árið 1951 var regnbogasilungur fluttur til landsins frá Danmörku og fiskeldisstöðin að Laxalóni hóf framleiðslu á neyslufiski. Rétt fyrir 1980 hófst hröð uppbygging eldisstöðva fyrir lax. Helstu eldisaðferðir eru seiðaframleiðsla í fersku vatni, eldi í sjókvíum, eldi í strandstöðvum í sjó eða hálfsöltu vatni og hafbeit. Árið 1990 voru framleidd meira en 8 milljón sjógönguseiði, 2864 tonn af laxi, 24 tonn af regnbogasilungi, 69 tonn af bleikju og 20 tonn af urriða. Verðfall á mörkuðum og erfiðleikar í framleiðslu hafa valdið fiskeldisfyrirtækjum miklum bú-sifjum.

Ný lög um veiðar í ám og vötnum og laxveiði í sjó voru samþykkt 1932. Síðan þá hafa lög og reglugerðir varðandi fiskrækt/fiskeldi smám saman séð dagsins ljós. Um 1980 voru samþykkt víðtæk lög um menntun, rannsóknir og þróun í fiskeldi. Framtíð fiskeldis á Íslandi er háð frekari þróun í tækni og markaðsöflun fyrir gamlar og nýjar eldistegundir.

HISTORY

Until recently aquaculture in Iceland has mainly involved stocking or stock enhancement of rivers and lakes. Harvesting until about 1970 was mainly through sports fishery (rod fishing) and to some extent gill net fishery. Rearing of fish to full marketable size began in 1951 when the fishfarm Laxalón imported rainbow trout from Denmark. Most of the present fish farming operations began operation after 1980. Following is a list of key events until present (Institute of Freshwater Fisheries in Iceland):

Year 1000 (approx.). One of the Sagas, Gull-Þóris Saga, which was written in the 14th century, tells the story of a young man, Gull-Þórir (Gold-Thorir), and his friends who brought live fish from a lake to a little stream. The fish thrived in the stream and supported good fishing after the event. After this the stream was called Alifiskalækur (Cultured-fish-stream). The Saga is not considered accurate as a reference but indicates a certain knowledge at the time when it was written.

Year 1881. Árni Thorsteinsson writes a review article about stock enhancement and cultivation of fish.

Year 1883. Einar Fridriksson makes the first attempt to fertilize and hatch salmonid ova.

Year 1884. Arthur Feddersen assists in the construction of the first hatcheries in Iceland.

Year 1885. The first release of cultured fry into rivers Bugða and Laxá in Kjós.

Years 1922–1930. Scaled up hatching of salmonid fry and their release into rivers. Directed by Þórður Flóventsson.

Year 1932. All fishing of salmon at sea stopped by a new law.

Year 1935. University of Iceland takes over research in aquaculture.

Year 1944. First attempt to feed fish made in district of Borgarfjörður in north-east of Iceland.

Year 1946. Director of Freshwater Fisheries takes over research and development in aquaculture. His office later became the Institute of Freshwater Fisheries.

Year 1951. Rainbow trout imported to Iceland and reared in the fishfarm Laxalón. This represents first commercial rearing of fish in Iceland to full size for food consumption.

Year 1952. First attempts to feed salmon fry

and to produce salmon parr in Elliðaá hatchery.

Year 1961. Establishment of the State Experimental Fishfarm in Kollafjörður. The farm was managed by the Director of Freshwater Fisheries. Developed methods to produce salmonid juveniles (fry, parr, smolts) as well as release methods into rivers and lakes. Initiated and developed methods in ocean ranching.

Year 1972. First attempt to raise salmon in seacages in fjord Hvalfjörður on the west coast of Iceland. The attempt was done by the Fisheries Association of Iceland.

Year 1977. A fish pathologist hired by the Institute of Experimental Pathology at Keldur to work on prevention of fish diseases.

Year 1978. First landbased fishfarm, Eldi hf., established near Grindavík in south-west of Iceland.

Year 1981. Hólar Agriculture College offers education in aquaculture.

Year 1985. The Marine Research Institute in cooperation with Íslandslax hf. begins research in rearing marine fish and invertebrate species. In 1988 the Marine Research Institute established a research station for marine aquaculture near Grindavík in the south-west of Iceland.

Year 1987. The Institute of Freshwater Fisheries and the Agricultural Research Institute start a project in cooperation with research institutions in Norway, Sweden, and Faroe Islands concerning selective breeding of salmon for ocean ranching. In 1989 projects regarding selective breeding of salmon and Arctic charr for on growing were initiated by cooperation of the Agriculture Research Institute, the Institute of Freshwater Fisheries, the Hólar Agriculture College, the Research Council of Iceland, and several fishfarms in Iceland.

RECENT PRODUCTION AND PRESENT NUMBER OF FISHFARMS

Aquaculture in Iceland has mainly involved salmonids. Production has been limited until recently when it began to increase as the number and size of the fishfarms grew after 1980. Due to a long production cycle and difficulties in the production the quantity of farmed fish has been far less than initially projected. Tables 1–3 show the production of farmed salmonids since 1980 (Institute of Freshwater Fisheries in Iceland).

In 1990 the number of fishfarms in Iceland was:

- Smolt production farms 53 farms
- Ocean ranching sites 13 farms
- Landbased units 22 farms
- Cage rearing farms (some connected to landbased units) 18 farms

Table 1. Production of salmon (tons).
1. tafla. Framleiðsla á laxi (tonn).

Year	Salmon total	Cages	Landbased tanks	Ocean ranching
1980	11	3		8
1981	26	10		16
1982	72	40	15	17
1983	147	115		32
1984	131	106	1	24
1985	149	85	6	58
1986	188	106	17	65
1987	530	267	223	40
1988	1233	629	424	180
1989	1598	706	774	118
1990	2864	877	1739	248

Table 2. Production of trout (tons).
2. tafla. Framleiðsla á silungi (tonn).

Year	Rainbow trout	Arctic charr	Brown trout	Trout total
1983	25			25
1984	30			30
1985	12	1	2	15
1986	150			150
1987	139	3	11	153
1988	136	10	10	156
1989	150	10	37	197
1990	24	69	20	113

Table 3. Production of salmon smolts (thousands).
3. tafla. Framleiðsla á laxaseiðum (fjöldi×1000).

Year	Total production	Released for ocean ranching	Remaining smolts – used for on growing[a)]
1986	1910	300	1610
1987	4581	950	3631
1988	9576	2000	7576
1989	10023	4058	5965
1990	8147	5600	2547

a) It is not certain that all these smolts actually entered the on growing units.

Most of the fish were produced by about 20 farms. Five ocean ranching sites produced most of the ocean ranched salmon.

The smolt farms are generally located near a good source of freshwater and geothermal heat. This is most common in the south and south-west as well as in the north-east of the country. Landbased farms are most abundant in the same parts of the country on the coastline. Present cage farms are mostly to be found in the eastern part of the country.

PRESENT STATUS IN FISHFARMING IN ICELAND

Most of the fishfarms produce Atlantic salmon. Production of Arctic charr has increased considerably in the most recent years. Due to low market prices and difficulties in the production many farms are experiencing severe financial difficulties. This is signified in frequent bankrupties over the last three years.

The country offers good potential in aquaculture. This is supported by availability of ample fresh and salt water, geothermal heat and good general knowledge of how to process fish. However, better methods are needed to harness these facilities. Better stocks, improved techniques and higher market prices are necessary to allow aquaculture in Iceland to prosper. In line with this the government of Iceland and the private sector have recently increased their efforts in research and development in the field.

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