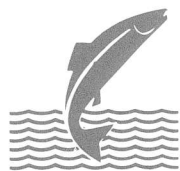


HELGASON & BJÖRN BJÖRNSSON

ACULTURE IN ICELAND.

Eintak bókasafns

VMST- R / 86026



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AQUACULTURE IN ICELAND.

Fiskeldi / Aquaculture

Arni Helgason and Björn Björnsson:

AQUACULTURE IN ICELAND

The interest in fish farming in Iceland has increased vastly in the last few years, and in the country there are great expectations linked with the possibilities of establishing a competitive production of farmed fish. These hopes are particularly based on the country's abundance of geothermal energy and high quality well water, which can be utilized for fish farming at a relatively low cost.

Fish farming in Iceland is presently confined to farming of salmonids. Atlantic salmon (Salmo salar) is of greatest importance but rainbow trout (Salmo gairdneri), brown trout (Salmo trutta), and arctic char (Salvelinus alpinus) are farmed as well on a small scale. However, other species are also under consideration, e.g. halibut, eel, mussel, and Macrobrachium.

METHODS:

Based on the type of production the Icelandic fish farms can be divided into two major categories but within these categories there are several groups depending on the farming method.

1. Producers of juvenile salmon

All producers rely on use of geothermal energy and produce mainly 1-year salmon smolts.

2. Producers of adult salmon for consumption

2.1 Farming of salmon in sea pens

Typical "Norwegian method" where 30-50 g smolts are grown to a marketable size of 2-4 kg at natural sea temperatures. Production time upto 28 months.

2.2 Farming of salmon in land based units

On-growing from smolt size to 2-4 kg in land based tanks. Sea water is pumped into the tanks and either heated with geothermal energy or used at ambient temperatures (5-10 °C) from wells. Production time is expected to be approximately 12 months shorter than in cage-rearing (2.1).

2.3 Mixed rearing

A combination of 2.1 and 2.2. The fish are grown to a size of approximately 1 kg in land based units and then transferred to sea cages where they are grown for 6-8 months to a size of 2-2.5 kg.

2.4 Ocean ranching

Salmon smolts are released into the ocean from an ocean ranching site. In 1-2 years time some of them return to the site as adult salmon where they are trapped and slaughtered.

PRODUCTION:

The majority of fish farms in Iceland are newly established and most have not completed their first production cycle. The few exceptions are smolt farms, but smolt production has a 30 year tradition in the country.

In April 1986 there were 70 salmon farming sites registered in the country as opposed to 47 in 1985. These companies are involved with one or more types of salmonid culture. The production figures for 1984-85 are:

Type		1984	1985
Parr	*1000	1000	1000
Salmon smolts	..	790	822
large smolts	..	11	5
Juvenile trout/char	..		460
Salmon from culture	tons	107	91
Ocean ranching	..	24	58
Adult trout/char	..		12

The production figures above do not truly reflect the investment in aquaculture that has taken place in Iceland. The capacity in smolt production in 1985 was upto 5 million smolts and in the near future it is expected to increase further. Many of the companies will have their first production in 1986-87. Substantial expansion is also occurring in cage rearing and ocean ranching.

Ownership of Icelandic aquaculture companies is quite variable. Some of the companies are owned jointly

by Icelandic and foreign partners, but by law foreigners are not allowed to hold more than 49% of the stock.

At present the value of Icelandic aquaculture production is small. The estimated gross value of the 1985 production is 113 millions IKR (approximately 25 millions DKR).

RESEARCH:

In Iceland there are several governmental institutions and a number of private consulting companies that participate in aquaculture research. The governmental institutions are listed below along with a brief description of the current programs in aquaculture and the names of the scientists involved.

1. Institute of Freshwater Fisheries (Veidimálastofnunin) P.O. BOX 5252, Hverfisgötu 116, 125 Reykjavík.

- production of juvenile salmonids

- ocean ranching

- cage-culturing

(Arni Isaksson, Arni Helgason, Jónas Jónasson)

2. Marine Research Institute (Hafrannsóknastofnunin) P.O. BOX 390, Skúlagata 4, 121 Reykjavík.

- ongrowing of halibut (Björn Björnsson)

- environmental monitoring, e.g. measurements of temperature, salinity and currents (Jón Ólafsson)

- culturing of mussels (Sólmundur Einarsson, Hrafnkell Eiríksson)

3. Icelandic Fisheries Laboratories (Rannsóknastofnun Fiskidnadarins) P.O. BOX 1390, Skúlagata 4, 121 Reykjavík.

- development of fish feed (Sveinn Jónsson, Jónas Bjarnason)

4. National Center for Hygiene, Food Control, and Environmental Protection (Hollustuvernd Ríkisins) P.O. BOX 5276, Sidumúla 13, 125 Reykjavík.

- pollution caused by aquaculture (Gunnar S. Jónsson)

5. Institute for Experimental Pathology (Tilraunastöð Háskólans í meinafraedi) Keldur v. Vesturlandsveg, P.O. BOX 8540, 110 Reykjavík.
 -fish diseases (Sigurdur Helgason, Eva Benediktsdóttir, Arni Mathiesen)

6. Agricultural Institute (Rannsóknastofnun Landbúnaðarins) Keldnaholt, 112 Reykjavík.
 -selective breeding (Stefán Adalsteinsson)

7. National Energy Authority (Orkustofnun) Grensásvegi 9, 108 Reykjavík.
 -water supply: freshwater, seawater, and geothermal water (Freysteinn Sigurdsson, Guttormur Sigbjarnarson, Einar Tjörvi Eliasson)
 -water chemistry (Hrefna Kristmannsdóttir)

8. The Fisheries Association of Iceland (Fiskifélag Islands) Höfn Ingólfsstraeti, P.O. BOX 820, 121 Reykjavík.
 -production of adult salmon in fresh water (Ingimar Jóhannsson)

9. University of Iceland (Háskóli Islands) Grensásvegur 12, 108 Reykjavík.
 -fish physiology, smoltification of salmon (Logi Jónsson)

10. The National Research Council (Rannsóknarád Ríkisins) Laugavegi 13, 101 Reykjavík.
 -future developments of aquaculture in Iceland
 -allocation of research funds (Vilhjálmur Lúdvíksson)

ADMINISTRATION:

The institutions mentioned above are under the following ministries:

- Ministry of Agriculture (1,6)
- Ministry of Fishery (2,3,8)
- Ministry of Health (4,5)
- Ministry of Industry (7)
- Ministry of Education (9,10)

PERMITS:

Before an aquaculture company can start to operate it must apply to three governmental institutions for the necessary permits:

1. National Center for Hygiene, Food Control, and Environmental Protection (Hollustuvernd Ríkisins)
2. Nature Conservation Council (Náttúruverndarrád)
3. Institute of Freshwater Fisheries (Veidimálastofnunin)

The first institution grants a permit on the bases of anticipated pollution problems and the risks of health hazards; the second one on the bases of the likely natural damages on the intended aquaculture site; and the third institution makes sure that the company has the legal rights to use the land and the water supply and checks that the building plans have been accepted by the proper authorities. The aquaculture company can not get the normal loans unless these institutions have granted their permits.

EDUCATION:

In Iceland the possibilities of education and training in aquaculture are somewhat limited. At the University there are no courses offered in aquaculture, but some basic aspects of aquaculture have been taught at a small agricultural school in the northern part of Iceland (Baendaskólinn ad Hólum í Hjaltadal, 551 Saudárkrókur) and in a small secondary school in the southern part of Iceland (Kirkjubaejarskóli, 880 Kirkjubaejarklaustur). This year(1986) one or two high schools in south-west of Iceland may also offer a course in aquaculture.