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**IMPORT OF FURUNCULOSIS TO NORWAY WITH ATLANTIC SALMON SMOLTS
FROM SCOTLAND**

by

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ABSTRACT

In early summer 1985 the Norwegian Veterinary Authorities authorized the import of about 250.000 Atlantic salmon smolts from a fish farm at the west coast of Scotland to the Namdal region north of Trondheim. Immediately after arrival the smolts came down with furunculosis, a disease that until then did not occur in Norway. No special measures were taken and the disease soon spread to Norwegian smolts previously stocked in the same farms. Also farms that had not imported smolts became infected. 24 farms were affected by the disease, whereas restrictions were imposed on all together 30 farms. In November of the same year the Veterinary Authorities ordered the infected farms to slaughter out all their fish before June 1st, 1986.

IMPORTATION EN NORVEGE DE LA FURUNCULOSE PAR DES SAUMONS ATLANTIQUES D'ECOSSE

RESUME

Au début de l'été 1985, les autorités vétérinaires norvégiennes autorisaient l'importation a la region de Namdal, au nord de Trondheim, d'environ 250.000 smolts de saumon atlantique d'une pisciculture de la côte Ouest d'Ecosse. Immédiatement après leur arrivée, les smolts succombèrent à la furunculose. Aucune mesure particulière ne fut prise et la maladie s'étendit bientôt aux smolts norvégiens stockés préalablement dans la même pisciculture. De plus, les piscicultures qui n'avaient pas importé de smolts furent infectées. 24 piscicultures furent affectées par la maladie tandis qu'une réglementation restrictive fut imposée à un ensemble de 30 piscicultures. En novembre de la même année, les autorités vétérinaires ordonnèrent que les piscicultures infectées éliminent tous leurs poissons avant le 1er juin 1986.

INTRODUCTION

The Norwegian production of farmed Atlantic salmon has increased dramatically in recent years. In 1980 the total production of farmed salmonids was 7.500 tons, in 1986 the total production reached 50.000 tons. Unfortunately, the smolt production in Norway has not kept up with the demand, and a considerable amount of smolts have been imported, most of them from Sweden.

According to the Norwegian Fresh Water Fish Disease Act of 1968 which includes anadromous fish, import of live fish and fish eggs is prohibited. However, exemption from this prohibition can, and has, been widely given.

The Fresh Water Disease Act is enforced by the Veterinary Authorities under the Ministry of Agriculture. The general con-

ditions to be fulfilled to obtain an exemption from the import ban are as follows: The exporting fish farm must have been under regular health control by a governmental laboratory for at least 3 years immediately prior to export. The health control must be carried out according to the examination methods given in the "Report of the FAO/OIE Governmental Consultations on an International Convention for the Control of the Spread of Major Communicable Fish Diseases". On the basis of these examinations the exporting farm must be free of specified diseases including furunculosis. Further the specified diseases must not have been found in the water supply of the fish farm, and live fish nor fish eggs must not have been introduced to the exporting fish farm for the last 5 years. Also the hygienic standard of the exporting fish farm must be satisfactory.

SMOLT IMPORT FROM SCOTLAND

Early in 1984 a group of Norwegian fish farmers applied for a licence for import of Atlantic salmon smolts from a certain site in Scotland. The Scottish farm had a record of furunculosis, which is a common disease in Scotland, in 1982 and 1983. The Scottish farm had improved its freshwater supply during 1982 such that it no longer contained migratory salmonids thought to be the principal source of furunculosis infection. In 1983 furunculosis was found in the seawater part of the farm only. In spite of these records, after inspection of the farm and under the condition that the smolts for export should be transferred to sea water and kept isolated for 40 days prior to the transfer to Norway. The smolts were tested twice bacteriologically during the quarantine period. No Aeromonas salmonicida was found during this time. An import licence was granted and the smolts were transported to Northern Norway (Troms) and no furunculosis was either reported or suspected following shipment.

In 1985 a group of fish farmers from Nord-Trøndelag applied for import licence for Atlantic salmon smolts from the same Scottish farm. Import licences were again granted; this time

under the condition that the smolts were to be kept isolated in fresh water at the farm of origin for 40 days prior to transfer to Norway.

The smolts were transported from Scotland to Norway around June 1st and distributed to 24 fish farms in the Namdal region (province of Nord-Trøndelag). Mortalities started soon after arrival and the furunculosis diagnosis was verified about 10 days later.

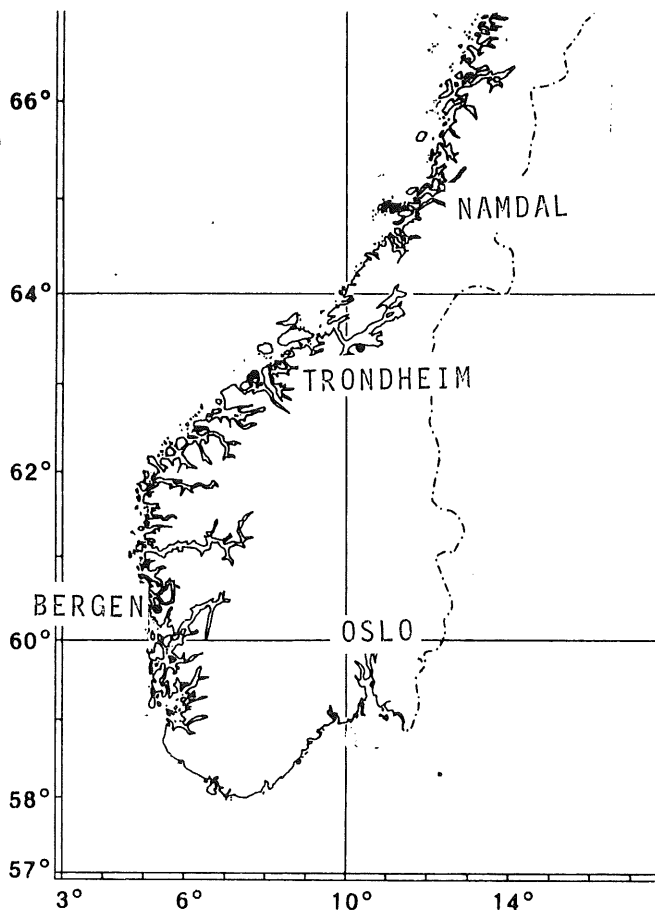


Fig. 1. Map indicating import area

FURUNCULOSIS OUTBREAKS

Of the 24 farms in the region receiving imported smolts, 17 suffered furunculosis outbreaks in this fish with mortalities rang-

ing from 5 to 90%. In most cases the cages with Scottish smolts were separated from the main farm, but in spite of this precaution the disease spread to local smolts in 9 of the affected farms. In the local smolts mortality rates were from 3 to 28%. In 18 farms also the 1984 yearclass of Atlantic salmon was affected by the disease, but in this group the mortality rate was lower, around 1 to 2%, only in two farms reaching 10 and 14% respectively. Three of the farms that got the disease in their 1984 yearclass had not imported Scottish smolts themselves. There also was some concern on the salmon run in the river Namsen, as free-living fish coming back to the river had to pass through the furunculosis infected areas.

As this was the first furunculosis outbreak in Norway for years, there was little experience in treating the disease. The fish farmers were given the impression that this was not a particularly serious disease and that it could be treated with medication in the same way and as efficiently as vibriosis. This, however, was not the case. Oxytetracycline was widely used, and in several cases resistance seemingly developed. Also tribrissen, furasolidone and chloramphenicol were used. Oxilinic acid is not registered in Norway, and only in September some was allowed in to treat the most persistent outbreaks.

As soon as the furunculosis diagnosis was verified, restrictions of movement were imposed upon all farms that had imported smolts from Scotland and also on farms that had close connections with one of these. The Fish Disease Act mentioned previously gives the Veterinary Authorities the possibility of taking drastic measures to prevent further spread of listed diseases. In the early stages of the furunculosis outbreaks no such measures were taken. The mortalities stopped in early autumn and it was generally assumed that the danger was over. In late November, however, the Veterinary Authorities ordered all fish in the farms where restrictions were imposed to be slaughtered before June 1st, 1986. Fish not fit for consumption, juveniles and eventually eggs were to be destroyed. Thereafter the farms should be disinfected and the sites not be restocked until further notice.

The logic behind the slaughtering order, was to avoid new outbreaks with increasing temperatures during the summer of 1986, and thereby lowering the infection potential in the region.

The killing of all fish in the affected farms was accomplished and brought severe financial difficulties to many of the farms. Shortly afterwards the fish farmers opened a court process against the Ministry of Agriculture to obtain compensation for their losses. The judgement of the provincial court of Namdal (Namdal Herredsrett) went in favour of the fish farmers.

FATE OF THE SMOLTS AT THE HOME SITE

As furunculosis was subsequently diagnosed in smolts remaining on the original farm and in smolts transferred from that farm to other units in Scotland, there is no doubt as to the disease source. From a Norwegian point of view it is of interest to follow what happened to the smolts that stayed in the home farm.

At the time of the export to Norway, the fish staying at the home farm had been transferred to its landbased sea water part. Here they were kept in large circular tanks at a density of less than 40 smolts pr. cubic metre. Furunculosis was diagnosed also in this fish and was treated with oxilinic acid. Mortalities were negligible. During winter 1986 occasionally a few fish died and the bacterium causing furunculosis Aeromonas salmonicida was isolated from the carcasses. The author inspected this fish in May 1986, the fish looked healthy and growth seemed normal. The striking difference with Norwegian fishfarms, was the low stocking density. During early summer the largest specimens, about 10% of the total, were removed for sale. The remaining fish were graded twice and were each time treated prophylactically with oxilinic acid. No unnormal mortalities occurred and the ongrowth continued as normal. Some of the fish were selected and kept for broodstock, the rest were slaughtered for consumption at planned time (late autumn - early winter).

AFTERTHOUGHTS

The experience with the import of furunculosis to Norway in 1985 clearly shows the necessity for extensive precautions when movements of fish are concerned. It also underlines the importance of the work that has been accomplished by ICES through its Working Group on the Import and Transfers of Marine Organisms, the Code of Practice concerning the same and the protocol documents for security measures to be taken if movements of fish must take place. The necessary precautions clearly were not taken in the case described here. The furunculosis remained undetected because the smolts were not "stress tested". So not only should established protocols be followed but, in something as important as movement of live fish from a previously infected source, the very best and sensitive testing methods should be used.

In Scotland and Ireland it is said that smolts of Norwegian origin are more susceptible to furunculosis than are local smolts. It should therefore be expected that local Norwegian smolts would be extremely susceptible to the disease, but seemingly this was not the case.

It is too early to say how the furunculosis situation will develop in Norway. In autumn in 1985 furunculosis was found in a freshwater site with effluent to a riversystem. The freshwater site was cleared out during winter 1986 and all sea trout in the river was eradicated. In 1986 furunculosis was found in 3 fish farms in the Namdal region, these farms had not had any known contact with presumably infected fish. Also Aeromonas salmonicida was found in one free-living salmon caught for broodstock in the region. It probably will take years before one can be relatively sure that the freelifving fish is not carrying the disease.

