

## Sustainable fin fish farming on islands, - the example from the Faroe Islands.

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### Summary

Outbreaks of Infectious Salmon Anaemia (ISA) caused a dramatic declination in the production from 52.000 tonnes gutted weight in 2003 to 15.600 tonnes in 2006 in the salmonid fish farming industry in the Faroe Islands. This motivated a restructuring of the industry. New management practices and regulations were developed, where the main elements are zonation, single year classes, fallowing between production cycles and strict regulation of all transport. Under this new management system and a generally improvement of the husbandry the production has increased to nearly 20% above the maximum production prior to the ISA-crisis, but from 25% fewer smolts. However, increasing abundance of sea lice are a growing challenge, and adjustments in the management are expected.

### Introduction

The history of salmonid fish farming in the Faroe Islands dates back to the late 1960-is, and it grow into an industry consisting of many relatively small operators during the 1980-is. At its maximum, there were 63 fish farming companies. The production is mainly of Atlantic salmon, but until 2010 also some rainbow trout. The production increased gradually up to 52.000 tonnes in 2003 (Fig. 1) with some setbacks due to disease outbreaks an unfavourable market situations, which each time caused a reduction in the number of companies. In 2003 the aquaculture accounted for approximately 1/3 of the total export value from the Faroe Islands.

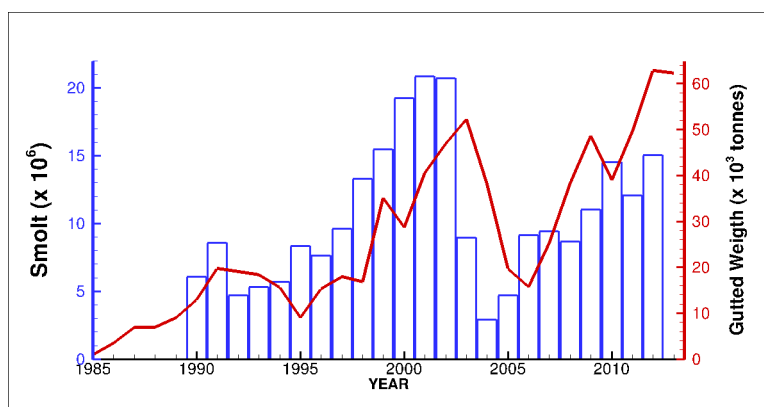
The first ISA outbreak was in year 2000 and caused the industry major challenges in the following years. The production declined to less than 15,600 tonnes in 2006 (Fig. 1), and the number of operators decreased to 6. This motivated a restructuring of the industry, and new management practices and regulations were developed. The first of these new regulations were implemented in 2003, and later slight adjustments were incorporated. The main elements in the new regulations are zonation, single year classes, surveillance, fallowing between production cycles and strict regulation of all transport. Some points of the development are described below.

### Material and Methods

#### Environmental conditions

The mean sea water temperature in the Faroe Islands is relatively stable and varies from around 6 °C in mean temperature in the coldest month, March, to around 10 °C in the late summer. This makes the sea around the Faroe Islands very appropriate for farming cold and temperate water fish as salmon, but also for survival of many parasites and pathogens.

The tidal currents on the shelf and in most straits between the islands is relatively strong with slack water in bays and fjords, where most of the



*Figure 1: Total annual production of salmonids in the Faroe Islands in gutted weight (line) and number of stocked smolt (bars). Source: Until 1995 from the news bulletine Alitiðindir published by [www.fiskaaling.fo](http://www.fiskaaling.fo), and thereafter from Statistics Faroe Islands ([www.hagstova.fo](http://www.hagstova.fo)).*

fish farming sites are located (Simonsen and Niclasen, 2011). However, in recent years the sites are moved towards the mouth of the fjords into more exposed environment. This improves the water quality in the farms, and since the sites are relatively shallow, the increased exposure of ocean waves adds to the removal of waste on the bottom under the cages (á Norði and Patursson, 2011). However, the stronger currents also increase the possibility for fast disease transfer, although the concentrations are spread and thinned out equally fast. Of more concern is a tidal driven residual flow clockwise around the islands, which close a loop around the northernmost cluster of islands within a period of 2-6 weeks. This fact together with the short geographical distances strengthen the focus on prevention of diseases and quick response in case of diseases.

#### Main point in the new regulation

Managements zones (MZ) were established, which generally are identical to a single fjord or bay separated by areas with well mixed waters mainly due to strong tidal currents. The exception are three straits, which contains 2-4 management zones, but by lateral agreement between the operating companies the activities has mainly been coordinated as in a single MZ. Each MZ may include one or more farms, which are restricted to limited areas issued by the authorities.

Only a single generation is allowed within a MZ and at least two months following period is required in the entire MZ between each production cycle. There are strict procedures for all transport between zones and between farms and land, which are under surveillance of the authorities. Benthic monitoring are mandatory in late summer. If given measures exceeds threshold values, then actions like restriction in feeding, moving the farm or early slaughter of the fish may be issued by the authorities.

Before restocking the farmer has to submit a contingency plan to the authorities. One of the requirements is documentation that the farm is able to safely remove dead fish corresponding to 1% of the biomass pr day, and to remove the entire stock within 14 days in case of detection of harmful disease. Samples for analysis for a number of diseases are taken monthly, and veterinary inspection are mandatory at least four times annually for sea cages. There are limitations for the allowed fish density in the cages, with the maximum of 25 kg m<sup>-3</sup> for fish larger than 3kg, and the authorities can set restrictions on the biomass within a MZ.

#### **Results and discussion**

Under the new management system the Faroese fish farming industry has steadily increased the production to more than 62,000 gutted weight in 2012 and 2013, which corresponds to approximately 72.000 tonnes in total weight. This production is obtained with 25% fewer smolts than used in the maximum production of 52.000 tonnes prior to the ISA crisis, and most key figures like mortality, growth rate, feed factor, etc. have improved substantially.

These results may partly be explained by the new regulation, but a generally improved husbandry practice, and that the smolts generally are bigger when stocking the cages, are likely also of significant importance. Of importance is also that the number of operators is limited, now in 2014 the number companies is reduced to 4, which shorten the process for required adjustments in the management system as well to implement national wide actions.

In the recent years an increased abundance of salmon lice has caused increasing challenges for the Faroese industry. This may be related to the fact that the options for chemical treatment are declining as they become less efficient, but the increased biomass may also have some impact. This however call for new improvements in the husbandry and the management.

#### **References**

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