Fin Fish Farming: Significant Diseases and Trends:
Leo Foyle

Department of Veterinary Pathology, College of Natural Sciences, School of Agriculture, Food Science and Veterinary Medicine, University College Dublin, Ireland

The 'Blue revolution' is on its way! The speaker stated that capture fisheries and aquaculture have grown significantly over the last 30 years with global fisheries doubling its annual production since 1970 and aquaculture steadily increasing its production by approximately 10% per annum over the same time period. In the USA, aquaculture now exceeds the combined production of lamb, mutton and veal and by 2020 the Chinese authorities expect fish to become the country's main source of protein. China is the most important nation in aquaculture and has shown the largest growth (>70% in 2002). Traditionally, small local production was important in China but intensive multinational farms are now rapidly developing.

Currently, finfish dominate the aquaculture industry with a 50.4% share which is valued at 14.8 billion dollars. Of this share catfish, carps and cyprinids account for 16.7 million tonnes per year whilst salmon and trout account for the relatively small amount of 1.8 million tonnes.

There are two basic types of fish farm systems: freshwater and seawater. The latter can also be located on land. An example of a seawater salmon farm in Bergen, Norway that contains approximately two thirds of the total farmed population of fish in Ireland was shown. Often freshwater salmon farms incorporate artificial lighting regimes in order to speed up maturity.

The speaker declared that a significant factor with fish farms is the level of stress the fish can be under at times. These stresses arise from various sources such as nets and co-habitants, predators such as birds (cover and side nets are often employed as preventative measures), during transport where there can be a build up of metabolites like ammonia that can be detrimental to fish health. Then there is the risk of the spread of disease. Vaccination is important in the control of disease and disease spread, and of greater concern to some fish farmers than mortality is the main benefit of vaccination i.e. the improvement in food conversion ratio (FCR). This refers to the rate at which the fish convert meal to flesh.

In the past few decades, there has been a huge decrease in the use of antibiotics to control disease. In fact 2003 levels are as little as 0.5% of the amount used in 1987. Reasons for this include improved management and understanding of fish biology, and perhaps most significantly, due to the emergence of efficacious vaccines. These vaccines are now being used to greater effect to counter many of the major viral diseases of economic importance:

- Infectious Salmon Anaemia (ISA) – mostly found in salmon and is currently a List 1 notifiable disease
- Infectious Haematopoietic Necrosis (IHN) – the first licensed DNA vaccine to help prevent this condition in salmon

- Salmonid Alphavirus (SAV) – one of these, Salmon Pancreas Disease Virus causes necrosis of the acinar pancreas, skeletal and cardiac muscles and is probably under diagnosed outside Ireland. Responsible for a very high proportion (1:8) of deaths in farmed salmon that go to sea in Ireland. It is not notifiable making control difficult.
- Viral Haemorrhagic Septicaemia (VHS) – mainly affects rainbow trout but also turbot and was originally introduced to the USA and southern Europe from the Baltic Sea.
- Spring Viraemia of Carp (SVC) – common condition in the UK but not in Ireland. Experimental vaccines are currently being used.
- Infectious Pancreatic Necrosis (IPN) – affects numerous species in many parts of the world and is a commercially important disease. Controlling it is difficult.
- Viral Encephalopathy and Retinopathy (VER, VNN) – important in the Mediterranean, and in areas where halibut culture is common. Not significant in Ireland yet.

There are also various bacterial diseases of economic importance, many strains of which are country and species specific requiring the development of specific vaccines to suit individual fish species and individual industries:

- *Aeromonas salmonicida,* typical and atypical, the furunculosis family – the main bacterial disease in salmonid and some cod farming industries
- *Vibrio* spp. Multiple species affecting multiple fish species. The same fish species can be affected by a different *Vibrio* sp. depending on the country
- Piscirickettsia family – the major cause of disease in Chile, and of varying importance in other countries. A number of intracellular vaccines have been produced with little success to date.
- Bacterial Kidney Disease – antibiotics were used in the past for controlling the notifiable BKD but the particular pathogenesis of this bacterium is resulting in resistance becoming a problem

Another important disease is the protozoan disease, Proliferative Kidney Disease (PKD) which is of particular importance in trout farming. Vaccines are currently in development. There are also a number of other economically significant parasites affecting fish. Two such examples are *Lepeophtheirus salmonis* and the non-host specific *Caligus elongatus*.

Several diseases are currently emerging and increasing in prominence such as:

- Koi Herpes Virus – diagnosed in Ireland for the first time in summer 2005, the Asian strain of which has recently been found capable of affecting goldfish. An attenuated vaccine has been produced in Israel.
- Heart and skeletal muscle inflammation virus (HSMI) in Norway – the identity of which remains unknown at present
- Epizootic Haematopoietic Necrosis (EHN) – affecting Perch in Australia, but the related European Sheatfish and Catfish viruses, present in Europe also effect Rainbow trout and salmon

The speaker concluded by discussing some of the trends developing in the fish farming industry. One such trend is the emergence of novel species, such as the

seahorse and cod hatcheries in Carna, Co. Galway. Seahorses can be sold for up to €200-300 per fish. Aquaculture is trying to move away from the use of wild caught fish (meal) as the main component in commercial fish feed, and the area of feed technology, exploring and creating new sources of nutrition, is rapidly gaining importance. Finally, Blue water farming, exploring viable farms situated in the ocean, is becoming an increasingly popular topic.