

Code of Good Practice Regarding the Responsible use of Antimicrobials in Aquaculture





Introduction

An antimicrobial is an antibiotic, antiviral, or antifungal drug used to treat disease or infection. Antimicrobial Resistance (AMR) occurs when an antimicrobial that was previously effective, is no longer effective to treat an infection or disease caused by a microorganism.

Fish farmers have a role to play in the fight against AMR. This document outlines the practical strategies that fish farmers can take to make a difference in the fight against AMR.

For disease to occur, several conditions must be met. These include host (fish) factors, environmental factors (or stressors) and factors dependant on the characteristics of the infectious organism. Manipulation of husbandry and management practices on a farm can go a long way toward tipping the balance against disease. The key to reducing the overall use of antimicrobials in fish farms is to reduce the incidence and spread of infection and disease on the farm. Implementing the well-recognised strategies outlined in this document will keep your fish healthier and reduce the need for antibiotics in the long run.

Guideline 1: Prevention of disease is always better than cure.

Guideline 2: Veterinary Health Plans are an essential tool for farmers.

Guideline 3: Reduce and eliminate disease entry to your farm through biosecurity.

Guideline 4: Keep animals stress-free through good husbandry practices

Guideline 5: Employ a rigorous cleaning and disinfection regime.

Guideline 6: Prevent diseases where relevant with vaccination.

Guideline 7: Prevent and control parasites to enhance performance, reduce stress and prevent disease.

Guideline 8: Where treatment of disease is necessary with antibiotics, observe the **six 'rights'** of prescribing and use:

- Right Veterinary Diagnosis
- Right Fish
- Right Antibiotic
- Right Dose
- Right Duration
- Right Storage and Disposal

The Fish Farmer's Role- Practical strategies to combat the growing challenge of antimicrobial resistance at farm level

1. Prevention of Disease

Healthy fish don't need antibiotics. A top priority on the fish farm must be to prevent disease entering the farm. If disease does enter a farm and appears in one tank, pond or cage unit, cross infection to other rearing units does not necessarily follow provided good internal biosecurity and hygiene practices are implemented on farm.

2. Veterinary Health Plans (VHP)

Veterinary Health Plans are an essential tool for fish farmers. All fish farmers should develop a VHP with their veterinarian as outlined in *The Farmed Salmonid Health Handbook*. A VHP provides a document to assist in maintaining high standards of health and welfare for farmed salmonids on the farm. The plan should be site specific, developed for a particular farm or farms by the farmer in consultation with their veterinary practitioner. The VHP must be applied by the management and staff of the operation who are responsible for keeping a high health status of the fish on the farm. This includes all workers, both general operatives on the site and site managers who make decisions on fish health. In addition, the VHP should be used during training of site staff. The VHP should be frequently updated (at least annually) following regular (monthly) visits by the veterinarian to the farm.

3. Good Biosecurity

Good biosecurity is extremely important in fish farming to reduce and eliminate disease entry to your farm. Diseases can enter fish farms via infected fish, supply water, infected feed or materials, etc. The use of bore-hole water or gravel filters in hatcheries greatly reduces the likelihood of diseases entering the hatchery, especially parasitic diseases. Further information can be found in *The Farmed Salmonid Health Handbook* at: https://www.fishhealth.ie/FHU/sites/default/files/FHU_Files/Documents/BiosecurityLeaflet.pdf

4. Husbandry

Good husbandry and farm management practices are essential for good health and welfare of farmed fish. Disease in fish is closely linked to environmental stress. Stressed fish are more susceptible to disease. It is important that the conditions that farmed fish are kept in are suitable to minimise/avoid stress. Important environmental factors to maintain healthy fish include temperature, light, the chemical composition and biological content of the water and the availability of space, amongst others. The daily recording of water temperature on a fish farm is very important. Keep fish in clean tanks or net cages at appropriate stocking densities.

Regular monitoring of the environment ensures optimal conditions.

Fish must be protected from injury and disease through good management and husbandry practices and by rapid detection and treatment of disease.

5. Cleaning and Disinfection

A rigorous cleaning and disinfection routine should be implemented on the farm. Disinfectant foot baths should be used as well as separate nets and cleaning equipment for each rearing unit. Transfer of fish between different rearing units should be limited where possible. Any dead fish in rearing units should be removed daily. Dead fish left on the bottom of a tank or cage are the most significant source of disease for other fish. Mortalities during production should be treated as category 2 animal by products as Regulation (EC) 1069/2009. As such, a number of options are available. In general mortalities are commercially rendered at approved establishments. Mortality disposal conditions are part of the establishment of a specific veterinary health plan. Further information on cleaning and disinfection can be found in *The Farmed Salmonid Health Handbook* at:

https://www.fishhealth.ie/FHU/sites/default/files/FHU_Files/Documents/CleaningandDisinfectionLeaflet.pdf

6. Vaccination

Vaccination is a cornerstone of disease prevention in modern fish farming and should form part of the Veterinary Health Plan. A strategic vaccination plan should be established for each specific site. Vaccination is usually carried out at freshwater land-based sites or lake sites even for fish destined for on-growing in the sea, such as salmon and trout. It is rarely carried out in fish in seawater. A good vaccination strategy contributes significantly to increased survival rates and profitability in aquaculture. Vaccines are authorised for a number of significant bacterial and viral diseases, such as furunculosis and Salmonid alphavirus in salmon and yersiniosis in rainbow trout. Vaccination should only be carried out by competent staff under veterinary supervision. High levels of hygiene must be maintained during the vaccination administration. All vaccines must be stored correctly and all vaccination equipment must be clean and disinfected.

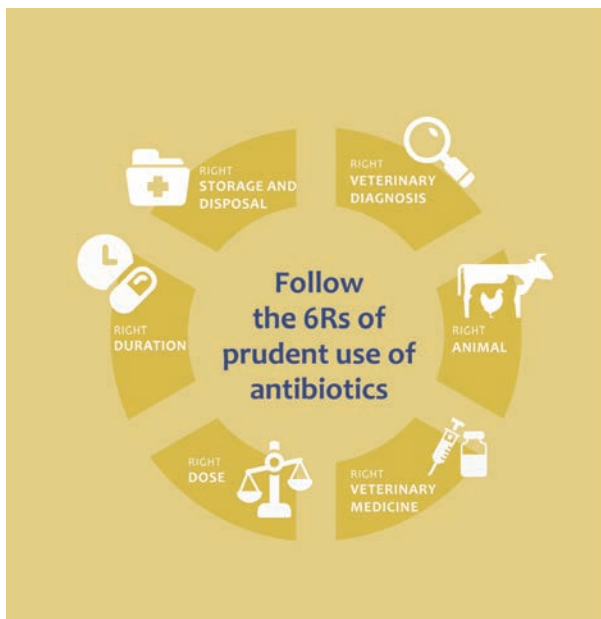


7. Parasite Control

Prevent and control parasites to reduce stress, prevent disease and enhance performance. It is important to get expert advice before using antiparasitic medicines on your farm.

8. When using antibiotics, follow the '6 Rights'

1. Right veterinary diagnosis
2. Right fish
3. Right antibiotic
4. Right dose
5. Right duration
6. Right storage and disposal



1. Right Veterinary Diagnosis

The use of an antibiotic must be based on a diagnosis of a bacterial infection by a veterinarian who has been given responsibility for the care of the fish. Ideally culture and susceptibility testing should be carried out to identify the bacteria causing the disease. Culture and susceptibility must be carried out by your veterinarian before prescribing antibiotics that are of critical importance in treating serious disease in humans (HP-CIAs). In rare cases, it may be required that treatment is commenced without a laboratory test result, but previous disease history is very important in these cases. Regular culture of specific bacteria and antibiotic susceptibility tests are important for diagnostic and prescribing purposes.

2. Right Fish

Ensure the correct fish are identified for antibiotic treatment and only the fish who have been diagnosed with bacterial disease receive the antibiotic treatment.

3. Right Antibiotic

Only use the antibiotic prescribed by your farm veterinary practitioner to treat the disease present. The instructions on the veterinarian's prescription and product data sheets and labels must be followed.

4. Right Dose

The antimicrobial must be used at the correct dose for the correct length of time to ensure effective levels at the site of infection and effective disease treatment. Assess the biomass of the fish regularly. Always assess with your vet the biomass before prescribing an antibiotic to a group of fish. This will help avoid under- or over-dosing, which can drive AMR. It is important to know if the fish are feeding and at what percentage of body weight to enable your vet to calculate the quantity of antibiotic to be incorporated into the feed.

5. Right Duration

The antibiotic must be used for the correct length of time to ensure effective levels at the site of infection and effective disease treatment. Always follow the instructions on the veterinary prescription. Always complete the course and do not finish a course of treatment early even if the fish appear better. It is very important to ensure that the correct withdrawal period is adhered to.

6. Right Storage and Disposal

Any antibiotics prescribed must be stored in the correct way in a dry, cool cabinet and separate from other chemical treatments. Retain samples of medicated feed (500g to 1000g samples for future analyses if required - keep frozen at -20°C).

Specific strategies for controlling some common diseases of farmed fish

Furunculosis

Furunculosis is an important bacterial disease in aquaculture in Ireland and many other countries. It mainly affects salmonids like salmon, arctic char, brown trout and sometimes rainbow trout, but non-salmonids like wrasse species and lumpfish are also susceptible. It can occur in both freshwater and seawater, though outbreaks are more common in freshwater. It is caused by an organism known as *Aeromonas salmonicida*.

Control

- Vaccination is an effective form of control, and unvaccinated stocks remain vulnerable where the water supply contains wild fish. There are several commercially produced vaccines available.
- Remove moribund and dead fish from infected pens/tanks at least daily.
- Biosecurity measures should be implemented.
- Horizontal transmission (through the water and infected fish) of disease and the presence of asymptomatic carriers, play important roles in the spread of the disease. These can be difficult to control.
- Oral antibiotic treatment is effective, although resistance can be observed and regular susceptibility testing is required. All antibiotic treatment requires a veterinary prescription.

More information is available at Marine Institute: https://www.fishhealth.ie/FHU/sites/default/files/FHU_Files/Documents/AquaplanDiseaseInformationLeafletFurunculosis.pdf

Yersinosis

Yersinosis or Enteric redmouth (ERM) is a bacterial disease generally affecting farmed rainbow trout growers, though Atlantic salmon are also susceptible. The disease is frequently seen when water quality is poor due to excessive organic matter. It is generally a freshwater disease, though there have been cases in salmon at sea. The disease can lead to significant losses. It is caused by *Yersinia ruckerii*.

Control

- Vaccination is effective and can be carried out on fish weighing more than 3 grams minimum weight.
- Remove dead or dying fish from ponds daily to reduce disease spread.
- Improve water quality.
- Ensure good general hygiene practices.
- Unvaccinated fish can be successfully treated with an appropriate medicated feed treatment, on foot of veterinary examination and prescription.

Piscirickettsiosis

Piscirickettsiosis or Salmonid Rickettsial Septicaemia (SRS) is a systemic bacterial disease of salmonids caused by the bacteria *Piscirickettsia salmonis*, present in Ireland and other countries. In Chile especially the disease has been a challenge for the salmon farming industry. Piscirickettsiosis is an emerging problem in salmon aquaculture in Ireland, with outbreaks occurring increasingly frequently. Clinical outbreaks can cause significant mortalities, though they are typically triggered by other conditions like environmental damage.

Control

- Vaccination against SRS can be effective but commercial vaccines are only available in some countries.
- Remove moribund and dead fish from infected pens daily.
- Biosecurity measures should be implemented to reduce spread.
- This disease is transmitted horizontally (through the water and infected fish). Events like crowding can increase transmission.
- Oral antibiotic treatment can be effective.



These guidelines were prepared with the assistance a number of experienced fish veterinarians, in particular, John McArdle MVB, Carolina Gutierrez-Rabada, PhD MSc DVM and Felix Scholtz PHD DVM. Stakeholders of the Aquaplan Forum also made valuable contributions to the content, namely: the Irish Farmers' Association Aquaculture & members of the Irish farmed salmonid industry, Marine Institute, Bord Iascaigh Mhara, Pharmaq Analytiq.

Image Sources:

David Branigan, Joanne Casserly and Marine Institute

SUPPORTED BY:



An Roinn Talmhaíochta,
Bia agus Mara
Department of Agriculture,
Food and the Marine

