Feed withdrawal or Fasting

Feed withdrawal can have a negative impact on fish welfare, however, in some situations, it is required to optimise outcomes. This may be prior to grading, crowding, vaccination or transport, to improve water quality, prior to harvest to improve product quality, or, in the event of a harmful algal or jellyfish bloom, to protect the fish.

- Feed withdrawal reduces the metabolic rate and thus oxygen. It also reduces the excretion of waste products, thus reducing the risk of microbiological contamination in harvest and improving water quality during transport or treatment.
- Withdrawal periods (commonly 24 to 48hrs) must be carefully planned according to fish size and water temperature.
- Generally, no more than 72hrs of fasting is recommended prior to harvest.
- After withdrawal, feed should be re-introduced in a way that does not compromise fish welfare and does not encourage competition: food should be dispensed and well distributed around the pen/cage and hand feeding may be employed.

Harvesting

Best practice crowding and handling are particularly important at harvest, together with appropriate fasting and humane slaughter. High levels of activity and stress close to harvesting can result in poor flesh quality in the final product. A good welfare focus, during all aspects of fish husbandry discussed above, can help produce an optimal quality product at harvest.

Monitoring Fish Health and Welfare

A robust routine health and welfare monitoring protocol should be instigated, using a selection of appropriate operational welfare indicators tailored to the site. A good monitoring strategy can help to minimise negative welfare effects and optimise outcomes over the entire cycle, leading to healthy fish and more profitable fish farming.

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December 2022

Fish Welfare During Handling

Rialtas na hÉireann
Government of Ireland

Cómhaoinithe ag an Aontas Eorpach
Co-funded by the European Union

Fish Welfare During Handling

All evidence points to fish being sentient animals that can feel pain and suffer. Therefore a high standard of health and welfare is an ethical and legal obligation: stress free fish are healthier, grow better and produce a product of superior quality. In the farm environment where some factors are out of our control, our efforts to keep fish welfare at the highest possible level can make a difference. This document outlines some general guidance for common farming practices to ensure fish welfare is maintained at a high standard.

Crowding

Crowding fish is a necessary step for many procedures; treatments, vaccination, or movement. It is a process which poses risk of stress and damage to the fish. Risks include, decreased water quality in the crowd, physical damage and stress. Excessive stress and activity in the crowd can lead to poor product quality at harvest.

The following measures are recommended to mitigate risks;

- A designated person, trained in recognising welfare issues, must monitor the fish during crowding and take corrective action if required. Critical parameters to monitor include fish behaviour and water quality. Guidelines are available for assessing behaviour in the crowd, e.g., the **RSPCA crowd intensity scale**.
- The length of any crowding period must be minimised and should never be longer than 2 hours.
- The density of the fish in the crowd should also be minimised particularly during the initial part of the crowding process as this is the period most likely to cause significant stress to fish.
- Nets must be clean before a crowding event to reduce potential water quality and oxygen issues.
- Oxygen levels must be monitored during crowding and supplementary oxygen or aeration should be available in case levels fall below ~ 7 mg/l.
- Crowding procedures should not occur if weather or environmental conditions are likely to compromise fish welfare.
- Feed withdrawal must occur at least 24 to 48 hours before the crowding event, exact duration is dependent on water temperature and fish size.

Pumping and Grading

Excessive handling and equipment used in pumping and grading can cause damage to fish skin, fins and eyes, which can expose fish to infection. Stress can further trigger underlying subclinical diseases. Moving equipment between sites without proper cleaning and disinfection can enable the spread of infectious organisms. Procedures may vary between marine and freshwater sites, but the fundamental challenges are the same.

The following measures are recommended to mitigate risks;

- Every grading event should be planned thoroughly to optimise the experience of the fish. Good communication is key, especially if multiple parties are involved, for example, both farm site and wellboat staff.
- Fish can be graded manually, passively, or automatically. Passive grading is easiest on the fish if it is possible.
- Any equipment used must be properly maintained and suitable for the fish size, with no sharp edges, sharp bends or rough surfaces. Poorly maintained pumps, pipes, nets, tables and grids all have the potential to damage fish and should be checked before use. Skin damage can lead to infections and become a significant fish health and welfare issue.
- Staff involved in grading must be trained and competent, and a designated person should be appointed to monitor fish welfare during the process.
- Pipes must have minimal joints, be properly fixed in place, and be the right length to return the fish to water as quickly and safely as possible.
- Water flow through pipes should be constant, to minimise scale loss, and fish should not be out of the water for longer than 15 seconds.
- If nets are used, they should be made of knotless mesh and no sharp edges from repairs, and they should be the appropriate size for the fish to be graded. Nets should not be overfilled as this can damage the fish.
- Grading panels used for passive grading must be properly maintained and their design appropriate for the size of the fish that are to be graded.
- Staff operating the pumps must be positioned in a way that allows them to monitor the speed at which the fish are being pumped and deployed to the graders, so the flow can be correctly controlled.
- Feed withdrawal must occur at least 24 to 48 hours before the grading event, exact duration is dependent on water temperatures and fish size.
- Grading procedures should not occur if weather or environmental conditions are likely to compromise fish welfare.

Authorised Treatments (mechanical, bath or in-feed)

The use of medicinal products for the treatment of diseases is only permitted under veterinary prescription (for organic certified stock, licenced organic operators must comply with EU Organic Regulations). Diseases that require medicines can sometimes occur secondarily as a result of an underlying issue, which must be identified. Medicinal treatments are occasionally necessary, but they can also pose a risk to fish health and welfare if not carried out correctly.

- High standards of husbandry, fish welfare and biosecurity should reduce the need for medicinal treatments.
- Early treatments greatly increase the chance of success. Close monitoring of the fish and rapid diagnosis of diseases are key to this.
- There are a small number of authorised medicines licenced for use in aquaculture in Ireland, outside this a special license is required. What we have must be used diligently.
- Prior to administering a treatment, staff must read the veterinary prescription, specific product datasheet and hazard information. All medicinal products must be properly labelled and stored.
- Withdrawal periods must be followed strictly before harvesting.
- Bath treatments pose a risk because the fish must be kept in a low volume of water for extended periods of time. At a minimum, dissolved oxygen, temperature and pH should be monitored and other parameters depending on the system. Supplementary oxygen will be necessary and levels should be maintained above 7mg/l.
- Correct water volume calculation is critical for accurate dosing.
- A staff member familiar with critical water quality limits and trained in recognising signs of distress in fish should oversee bath treatments. A contingency plan must be in place to abort treatments if necessary.
- It can take an extended period for medicines to flush out of closed systems like tanks, so it is important to be aware of the rate of water turnover. This frequently varies between individual tanks on a site.
- The right dose for the right duration is key to good treatments. Lower then recommended concentrations can drive resistance to medicines in bacteria and parasites and elevated concentrations can have adverse effects on the fish. Details on dose and duration can be found in the product data sheet or the veterinary prescription.
- Mechanical lice treatments using brushes, water jets or temperature shock, are widely used but can present a serious health and welfare challenge to the fish. They can potentially damage the external surface and mucus layer of the fish and be stressful, resulting in post treatment challenges. Careful use of these systems is advised.
- If treatments do not work as expected, or if adverse effects are apparent, it should be reported to the prescribing veterinarian as soon as possible.

Transport

Transport is a complex process that will likely include the risks associated with crowding and pumping, in addition to keeping a high biomass of fish in a low volume of water for extended time periods.

- Water quality is key. Critical factors for continuous measurement are temperature, oxygen and pH. Total Ammonia Nitrogen (TAN) and CO2 should also be monitored if possible. Diffusers (aerators) can help reduce CO2 levels and pH acidification. Sudden changes in water parameters should be avoided. No more than 2 degrees temperature change or 1.5 pH units are useful. Sudden changes can affect the fish directly, or, can indirectly make other water quality parameters more toxic (e.g. unionized ammonia).
- Long periods of time in a transport tank are acceptable for fish, as long as water quality is good. Indeed a short transport requiring multiple handling events can pose greater risks for fish welfare.
- Transport commonly occurs around smoltification (the process of adaptation of the fish to seawater from freshwater). The right timing of seawater transfer is critical. Testing chloride levels in blood samples after a saltwater challenge, or assessment of gill ATPase, are two methods that can be used. These methods in combination with the observation of other morphological and behavioural alterations can help optimise the timing of fish transfer to sea. Another important factor to consider is that the immune system is suppressed around the time of smoltification and there is increased vulnerability to diseases and injury.

Vaccination

Vaccines are an essential tool to protect fish from disease after seawater transfer. The decision of which vaccine to use will depend on past health challenges, emerging diseases and availability. Vaccines will not always protect from infection but will reduce the impact of a disease.

- Vaccines are typically injected into the abdominal cavity (by hand or machine), but dip vaccines or injection into the muscle are also possible.
- The vaccination process involves crowding, pumping, anaesthesia, injection and post-vaccination recovery. All have potential to cause injury and distress.
- Vaccination teams should have at least a member that regularly audits the activities of the team. This person can correct any potential detrimental actions, such as inappropriate location of vaccination, to ensure the best possible welfare during the process. For intraperitoneal injection, fish should be injected on the central midline 1 – 1.5 fin lengths in front of the pelvic fins.
- Regular monitoring of dissolved oxygen levels and temperature of the anaesthetic bath are required.
- The anaesthetic bath must be changed as often as needed (especially when there is presence of organic matter in the water, or the fish can take longer to get anaesthetised).