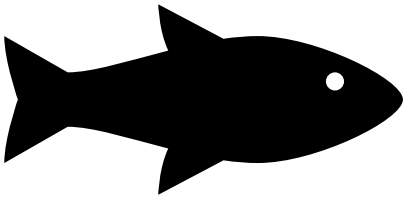
RESPONSIBLE MINIMUM STANDARDS FOR FARMED FISH



The attached *Responsible Minimum Standards for Farmed Fish* cover the key welfare requirements that are both general and species-specific. The *Principles of the Responsible Minimum Standards* should be read in conjunction with the *Responsible Minimum Standards for Farmed Fish*, as the Principles detail overarching requirements that apply to all farm animals.

About the FARMS Initiative and the Responsible Minimum Standards

The Farm Animals Responsible Minimum Standards (FARMS) Initiative's goal is for financial institutions to encourage and support animal protein producers, and other companies in the supply chain, towards meeting the Responsible Minimum Standards with respect to how farm animals are raised, transported and slaughtered. The FARMS Initiative was founded by a group of global animal protection organisations. The Responsible Minimum Standards for Farmed Fish are supported by Eurogroup for Animals and the Aquatic Life Institute.

Responsible Minimum Standards for Farmed Fish

The Responsible Minimum Standards for Farmed Fish build on the logic of the Responsible Minimum Standards for Terrestrial Farm Animals. For the latter, the FARMS Initiative has taken the principles on ***welfare risks*** and accompanying ***mitigation strategies*** set out in the IFC's *Good Practise Note* (see page 13) and developed specific requirements that emerge from these for a number of terrestrial farmed species.

For farmed fish, the FARMS Initiative used the same structure, first identifying key ***welfare risks*** and subsequently drafting ***mitigation strategies*** for addressing each risk. Many fish species are farmed and each has its own characteristics and requirements. This said, the below ***welfare risks*** and ***mitigation strategies*** are common to most farmed species. Please contact the FARMS Initiative if you require more detailed information on a particular farmed species.

The Responsible Minimum Standards for Farmed Fish should be read in conjunction with the general Principles Underlying the Responsible Minimum Standards. Although these are primarily directed at terrestrial farm animals, the sections of the Principles on stockpersons, health, temperature, fire, transport facilities and antimicrobials also apply to farmed fish.

The Responsible Minimum Standards for Farmed Fish are supported by Eurogroup for Animals and the Aquatic Life Institute whose *Aquatic Welfare Guide* provides helpful additional guidance.

Welfare risk 1: Overcrowding

Mitigation standard 1:

1.1	Fish must be stocked at densities that support good fish welfare, determined by species and life stage, and by the need to achieve good water quality and good health status, and to meet behavioural and physiological requirements. Maximum stocking densities for some species are set out in **Table 1**. Note that reduced stocking densities may be required when water parameters are sub-optimal in parts of the cage/tank.

Table 1. Maximum stocking densities for farmed fish

Species, life stage	Maximum stocking density: kg/m3
Atlantic salmon, seawater phase	10
Pangasius	10
Gilthead sea bream, seawater phase	15
European seabass, seawater phase	15

Rainbow trout, on-growers	15
Tilapia	See Resource 3 & 3b in CDC toolkit. CDC is the UK Development Finance Institution.

Welfare risk 2: Poor water quality

Mitigation standard 2:

2.1	Water quality must be kept at optimal levels. Water quality parameters include temperature, conductivity, pH, oxygen concentration, turbidity, total dissolved solids, salinity, carbon dioxide and nitrogenous compounds (such as ammonia, nitrite and nitrate) concentration. Minimum or maximum levels for certain water quality parameters are set out in **Table 2**.
2.2	Water quality parameters must be monitored daily at various depths and maintained in an optimal range for the species. Avoid rapid changes in water quality parameters. Extreme temperatures and pH values (pH is a measure of the acidity of water) must be prevented.
2.3	The flow rate of the water must be sufficient for removal of waste products and uneaten food and for fresh supply of oxygen.
2.4	Aquaculture sites should be carefully chosen or designed so as to ensure the adequate flow of clean water of suitable quality according to species' requirements.

Table 2: Minimum or maximum levels for certain water quality parameters

Species/life stage/size	Water quality parameter	Maximum or minimum level
Atlantic salmon	Temperature	10-18°C but preferably 16°C-18°C
Atlantic salmon	Oxygen concentration	70-85%
Atlantic salmon	pH	7-8.5
Rainbow trout	Temperature	Maximum 16°C Minimum 1°C
Rainbow trout	Oxygen concentration	>7mg/litre
Rainbow trout	pH	6.8-8.0
Sea bass	Temperature	Maximum 28°C Minimum 8°C
Sea bream	Temperature	Maximum 30°C Minimum 8°C

Pangasius	Temperature	27°C-30°C
Pangasius	Oxygen concentration	2.5-7.5mg/litre
Pangasius	pH	6.5-9.5

Welfare risk 3: Barren and unsuitable environments

Mitigation standard 3:

3.1	Fish must be kept in systems which meet their species-specific physical, behavioural and mental needs, including their requirements for shelter, substrate, appropriate water currents, light/dark periods, social grouping.
3.2	Where effective environmental enrichments (specific to the species) are available, they must be provided. Enrichments should be backed by research showing suitability in meeting the needs of the species according to its behaviour in the wild but adapted for captivity and appropriate to life stage.

Welfare risk 4: Inappropriate diets

Mitigation standard 4:

4.1	Fish must be fed on a diet that meets their nutritional needs according to the species and life stage.
4.2	Fishmeal and fish oil in feed must be minimised as much as possible but, where used, should be sourced from trimmings, i.e. parts of the fish discarded for human consumption.
4.3	The feeding method must minimise competition and aggression and ensure that all fish, including subordinates, have good access to feed. Insufficient amounts of feed, or feed in an unavailable form (e.g. excessively large pellets or feeding in a location where smaller fishes are outcompeted) can result in poor health and welfare. Fish should not be overfed as this can decrease welfare and uneaten feed can lead to poor water quality.
4.4	Fasting periods should only be used if necessary and when advised by a veterinarian. Fasting periods should be minimised and for no longer than is required for fish welfare benefits (e.g. to reduce oxygen requirements and waste accumulation in the water) and should not exceed 72 hours for each fish. Feed must not be withdrawn to adapt production levels to the market situation. Records need to be kept about why, when, and for how long feed was withheld from fish.

Welfare risk 5: Inappropriate handling

Mitigation standard 5:

5.1	Handling should be kept to a minimum, but when absolutely necessary, should be performed in such a way as to minimise stress.
5.2	Fish must not be exposed to air or be out of the water unless absolutely necessary. If fish are removed from water they must be kept moist, must not be exposed to abrasive surfaces, and must be properly supported (i.e. never held by the tail only). Time out of water must never exceed 15 seconds, unless fish are anaesthetised.
5.3	Fish should be moved in water where possible; e.g. using lined braille nets (that hold water), or by pumping fish in water. Pumping should minimise the risk of injury. Pumping height, pressure and speed, and the height from which fish fall when they emerge from the pump, should be adjusted to minimise injuries. Pumps should be free of sharp protrusions, kinks and bends. Fish should be monitored as they leave the pumping system for presence of fresh injuries and excessive exhaustion.
5.4	Grading should be kept to a minimum and carried out in water.
5.5	When crowding is necessary, it should be closely monitored for signs of stress and oxygenation should be provided prior to starting. Oxygen levels should be monitored continuously. If fish show signs of undue stress during crowding, immediate action must be taken, e.g. by increasing the volume of water available to them or by addition of supplementary oxygen. Any signs such as red water, free scales in the water, signs of skin/snout damage, haemorrhages on individual fish, vigorous escape attempts, 'boiling' appearance as fish struggle, and increase in swimming speeds after group swimming behaviour breaks down should lead to immediate intervention. Crowding should only be carried out for a maximum of two hours with time for fish to recover between successive crowds. Fish should not be crowded more than twice in any week or 3 times in any month.
5.6	Only anaesthetics scientifically shown to be effective and non-aversive to the fish species should be used. Anaesthetics are often needed for handling in order to minimise stress and physical damage.

Welfare risk 6: Injuries

Mitigation standard 6:

6.1	Effective steps must be taken to minimise injuries such as fin erosion, eye cataracts, skin injuries, loss of scales, skeletal deformities, and soft tissue anomalies. High mortality rates must be avoided.
6.2	Such steps include: ● avoiding high stocking densities as these can result in injuries due to aggression or fish colliding with each other or abrasion from contact with cage netting or tank walls; ● ensuring that cage netting is smooth and non-abrasive to prevent injuries to the snout, fins and scales. Freshwater enclosures should be constructed of materials that minimise the potential for injuries; ● keeping crowding, handling and grading to a minimum and using best practice in these procedures; ● minimising transport and ensuring good conditions during transport as poor conditions during transport, such as overcrowding and inadequate water quality, may result in irreparable damage to the fish, suffering and mortality; ● using feeding procedures that avoid competition and aggression.
6.3	The factors involved in causing skeletal deformities must be addressed; these include inadequate nutrition, poor water quality and the use of excessive temperatures during incubation and early rearing in order to accelerate the development of the fish.

Welfare risk 7: Disease and other health risks

Mitigation standard 7:

7.1	Disease risk should be lowered as far as possible through good management and husbandry to reduce stress, e.g. low stocking densities, minimal handling, enriched environments.
7.2	Parallel to good terrestrial farming practices, all aquaculture facilities should be registered with a suitably experienced veterinarian and have a veterinary health plan that includes health management procedures. This plan must be described in a manual, reviewed and approved by a fish health professional, and must include Better Management Practices, measures to prevent introduction of diseases, vaccinations, protocols for water quality management and health monitoring.
7.3	Vaccinations should be used where the level of disease threat outweighs the negative effect on fish welfare of the vaccination procedure.
7.4	Preventative measures against parasites such as sea lice should be foremost, but where antiparasitic treatments are required, they should be welfare-friendly, not causing pain or suffering, and minimising handling stress. The following measures should not be used to tackle sea lice: hydrogen peroxide, in-feed or bath chemicals, the thermolicer and the hydrolicer.

7.5	Cleaner fish – which are added to sea cages to eat lice off farmed salmon and trout - must not be used.

Welfare risk 8: Selective breeding and genetic modification

Mitigation standard 8:

8.1	Fish must not be selectively bred for fast growth or other production traits that result in health and/or welfare impairments.
8.2	Genetic modification must not be used to breed farmed fish (e.g. transgenic, gene-edited or triploid fish).
8.3	Hormones should not be used to make females develop as male (e.g. the use of methyltestosterone in tilapia) or to produce all female stocks.
8.4	Broodstock must be anesthetized or humanely euthanised before stripping (i.e. extraction of sperm or eggs).

Welfare risk 9: Predator control

Mitigation standard 9:

9.1	Wild animals or birds should not be killed or otherwise harmed as part of anti-predator measures.

Welfare risk 10: Transport

Mitigation standard 10:

10.1	Transport of live fish should be avoided where possible, but where absolutely necessary, transport time should be minimised.
10.2	Fish should be inspected for fitness for transport prior to loading and should not be loaded if showing signs of disease, physical damage, or unusual behaviour.
10.3	Handling during loading and unloading should be minimised and be as gentle as possible. Fish should be maintained in water where possible and the time out of water otherwise reduced to an absolute minimum.
10.4	Water quality (e.g. oxygen, carbon dioxide and ammonia levels, pH, temperature, salinity) should be appropriate for the species being transported and the method of transportation. Water quality and temperature parameters must be closely controlled and monitored and stocking densities must be sufficiently low to avoid deterioration of water

	quality, especially accumulation of carbon dioxide and ammonia and depletion of oxygen. Additional oxygen (e.g. bottled oxygen) should be available in case of delays or a lapse in quality.
10.5	The documentation accompanying the consignment (transport log) should include: a) description of the consignment (e.g. date, time, and place of loading, species, biomass load); b) description of the transport plan (e.g. route, water exchanges, expected time, date and place of arrival and unloading, receiver contact information).
10.6	Transport vehicles must be well-designed to provide a safe environment to transfer fish and allow for appropriate welfare monitoring and inspection during transport.

Welfare risk 11: Slaughter

Mitigation standard 11:

11.1	Fish must be stunned before slaughter using a non-aversive method that causes instantaneous unconsciousness lasting until death, or if unconsciousness is induced gradually, the process must be non-aversive.
11.2	In order to minimize the risk of consciousness being recovered, time elapsed between stunning and slaughter must be minimized. Concurrent methods of stunning and slaughter (e.g. electronarcosis leading congruently into electrocution) are preferred, but processes where death supervenes without significant risk of recovery of consciousness are acceptable.
11.3	All stunning and slaughter equipment must be calibrated appropriately for the specific fish to be processed (in terms of species, body size, and life stage), in order to achieve immediate and consistent loss of consciousness.
11.4	Stunning and killing methods used must be effective for the species and age/size of fish being slaughtered.
11.5	Inhumane slaughter methods must not be used and must be rapidly phased out of the supply chain. Inhumane methods include exposing conscious fish to: ice slurry, carbon dioxide in water, asphyxiation in air, bleeding without prior stunning, gutting, bathing in salt or ammonia.
11. 6	Slaughter facilities and protocols must be designed, constructed and maintained to minimise stress and risk of injury to fish.

Supplement

The below notes set out the background to some of the Responsible Minimum Standards for Farmed Fish.

All the welfare risks set out in the Responsible Minimum Standards are important, but some are closely interconnected. For example, if welfare risk 1 (excessive stocking density) is not adequately addressed, welfare risk 2 (poor water quality) increases and this in turn has an adverse impact on welfare risk 7 (disease and other health risks).

Welfare risk 1: Overcrowding

1.1	High stocking densities can lead to poor water quality, injuries and aggression. When water parameters such as temperature and low dissolved oxygen are sub-optimal in parts of the cage/tank, fish may favour some areas and avoid others according to the more/less preferable conditions, leading to crowding.

Welfare risk 3: Barren and unsuitable environments

3	Environmental enrichment is the increase in intricacy of an animal's environment to prevent negative welfare and promote positive welfare and enable fish to perform desired behaviours. Meaningful environmental enrichment proven to be beneficial to fish welfare should be provided. Effective enrichments relate to the needs of the species in its natural wild environment but adapted for captivity and must be appropriate to life stage. Effective enrichments include, depending on the species: hiding places, stones, gravel, and plants. Benefits include: reduced aggressive interactions, decreased susceptibility to disease, reduced injuries, improved cognitive capacity and exploration, reduced impact from stressors, improved foraging ability, and decreases in larval deformity and mortality.

Welfare risk 4: Inappropriate diets

4.4	Fasting: Feed is often withdrawn before handling, crowding, transport and slaughter.

Welfare risk 5: Inappropriate handling

5.1	Handling can result in scale loss, injuries to eyes, skin and fins, muscle bruising and increased incidences of disease.
5.2	Handling is stressful, particularly if it involves removal from water.

5.4	Grading: Fish grow at varying rates. In natural conditions, smaller fish can avoid aggression from larger ones by moving away, but escape is difficult in the confined conditions of intensive farming and larger fish may bully smaller ones and prevent them from feeding or even cannibalise them. To minimise this, fish are periodically segregated by size. Grading is a stressful procedure and can lead to physical injury to the fish. Moreover, it breaks the social hierarchies and bonds of the fish.
5.5	Fish are sometimes crowded to aid handling, for example prior to grading, counting, transport and slaughter. Crowding involves gathering the fish into one section of the enclosure and leads to abnormally high stocking densities. Crowding is stressful and can lead to damage to scales, skin ulceration, eye and snout damage and bruising.