



Code of **good** practice:

Explanatory Notes

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1. MANAGEMENT OF THE CODE OF GOOD PRACTICE

The Code of Good Practice for Scottish Salmonid Aquaculture (formerly the Code of Good Practice for Scottish Finfish Aquaculture) is managed by a group of experts who form the Code of Good Practice Management Group. The Code is a living document, meaning that the Management Group can decide to add, remove, or amend its contents to reflect the ever-improving status of current good practice within the salmonid aquaculture sector.

2. HEALTH & SAFETY ON FINFISH FARMS

The health and safety of farm staff and visitors to finfish farms is of vital importance to farming companies, to the sector and to the wider community. Many of the practices designed to ensure health and safety are a matter of statute. With the high level of importance attached to health and safety in aquaculture operations, reference to existing and emerging guidance and associated documentation should be sought through the Health and Safety Executive (HSE), the Maritime and Coastguard Agency (MCA) and the Environmental Health Department of the Local Authority.

3. FOOD SAFETY & CONSUMER ASSURANCE

The primary purpose of finfish aquaculture is to produce high quality food for human consumption. Many aspects of food safety are addressed through existing legislation and regulation and this Code is designed to supplement this through the application of good practice, reflecting the highest standards in food production. The Scottish finfish industry is also committed to sustainable growth, managing and minimising the environmental impact of its activities and ensuring the responsible sourcing of feed and other inputs.

3a Food safety plans based on HACCP principles

HACCP (Hazard Analysis and Critical Control Points) is a food safety risk management system that provides a methodical and evidence-based approach to controlling the highest food safety risks within a food business. It results in a plan and associated procedures that make sure that the food produced by the business is safe for consumers. It helps businesses to identify what can go wrong, help them plan to prevent that from happening and monitor practices to ensure that the system remains effective.

HACCP is the result of a collaboration between NASA, food microbiologists from the US government laboratories and the Pillsbury Corporation to ensure the microbiological safety of food on the earliest space missions. Since then, it has evolved and been adopted globally as the most effective way of controlling food safety risks.

It is a requirement of UK food law, global food safety standards and retailer standards that food safety risks are controlled. Where it is possible to comply with existing law without operating a

formal HACCP system, the use of the seven principles has become an expectation and is deemed best practice.

3b Veterinary medicines

The use of authorised veterinary medicines to support and protect fish health and welfare is a proper and legitimate element of producing animals for human consumption. The use of such treatments, and measures to ensure that any medicine residues are properly cleared from fish flesh intended for human consumption, is governed by law and, in all cases, veterinary medicines must be used in such a way as to minimise the risk of unacceptable residues being present in fish at the point of harvest.

3c Environmental contaminants

As in the wild, the food eaten by farmed fish is one route through which miniscule residues of environmental contaminants may arise in fish flesh. European, UK and Scottish law set out acceptable levels of environmental contaminants in all eaten fish species and also sets out provisions aimed at improving feed safety in the medium and longer term. Fish farmers must be able to demonstrate that the feeds used, and the fish harvested for human consumption meet the requirements of this legislation.

3d Food hygiene

In the same way as in all other foods, a wide range of microorganisms that have no implications for consumer safety can occur in fish. Additionally, some microorganisms which have the potential to give rise to risks to consumers can sometimes occur under certain circumstances. Any such risks are minimised or eliminated by observing good hygiene practice.

3e Carotenoids

A large number of carotenoids occur naturally in many different types of food, including fish, and it is natural to find them, especially in salmonid fish. Many carotenoids are known to have positive nutritional benefits, by virtue of their antioxidant properties. A small number of carotenoid-containing products are fully approved under EU and UK legislation for use in feeds for salmonid fish.

3f Origin - traceability to farm and enclosure

UK legislation requires farmers to have systems and procedures in place to allow them to identify the suppliers of their stock, to maintain traceability throughout the farming and production process and to identify other businesses that they have supplied. Although the law requires farmers to have 'one up, one down' traceability (i.e. covering things supplied directly to them and things they have supplied directly to others), they have developed and implemented systems for their farmed fish that exceed the requirements of legislation and which ensure full traceability of batches of fish throughout the whole production chain.

3g Flesh quality and nutritional benefits

The nutritional benefits of eating fish as part of a healthy, balanced diet are widely acknowledged. The Food Standards Agency advises that people should be eating at least two portions of fish a week, including one of oily fish. However, few people eat enough fish.

Oily fish, such as salmon and trout, are a good source of essential Long Chain Polyunsaturated Fatty Acids, often referred to as "Omega-3s". Farmers should ensure that fish are produced to an

agreed standard which ensures fitness for purpose for their customers and consumers. Oil rich fish such as salmon and trout should represent an important source of the essential Omega-3 fatty acids EPA and DHA.

3h Transparency and Trust

Salmonid farming is one of the most, if not the most, transparent form of food production in the UK. It is also as transparent as similar sectors globally. Important examples of the sector's commitment to this philosophy of openness are the voluntarily publishing of monthly farm-by-farm survival information and voluntary submissions of information on its use of medicines to RUMA (Responsible Use of Medicines in Agriculture alliance). Information in these key areas provide stakeholders with a clear understanding of the sector's commitment to public understanding of its activities. This high level of transparency represents a conscious strategic move to provide consumers and other key stakeholders with confidence that the sector is acting responsibly. It is reassuring that some industry initiatives, created by virtue of this Code and voluntarily adopted by its users (for example Lice Reporting Mechanisms) have made their way into statute. This document, and its members positive actions, have helped shape governance of our sector – something we believe should and will continue.

The Code's provisions sit as a foundation for the considerable number of voluntary, third-party, independently audited standards that demonstrate and drive improvements across all areas of the industry. A great many audits take place throughout the course of the year in the Scottish salmonid sector, supporting compliance with good practice and further building trust with stakeholders.

4 FISH HEALTH AND BIOSECURITY

Since its inception over fifty years ago, modern fish farming in Scotland has experienced an increasingly comprehensive and rigorous regulatory system. This is unsurprising, given the rapid rate of development of the sector and the pace at which scientific and other knowledge surrounding fish farming has been gathered. Notable within this is the regulation of different aspects of farmed fish health and welfare. While early regulation of fish health in Scotland revolved largely around UK statute, over the course of the past three decades the development and implementation of European law, including the 2006 Aquatic Animal Health Directive and associated European, UK and Scottish legislation, has taken precedence. This has brought much greater focus on the use of risk assessment in decision making and these same principles are reflected in this Code.

Like many other forms of statutory regulation, European, UK and Scottish legislation broadly underpins the good practice routinely followed on fish farms. Companies operating within the Scottish salmonid aquaculture industry have extensive practical experience of managing the health of their fish and have committed to encapsulating that good practice into the Code. The application of such provisions in the Code extends beyond the basic requirements of the law.

There is already a high level of awareness on the part of farmers and industry regulators of the potential for newly identified, emerging and exotic pathogens to appear in Scottish waters. Additionally, there is potential for global climate change, particularly as reflected in changing environmental conditions, to complicate and exacerbate well-understood fish health issues. However, industry is confident that the provisions of this Code, and its continuing development

in light of new knowledge, understanding and experience, make a significant contribution towards reducing risks to farmed fish posed by known and emerging fish pathogens.

The body of text in Chapters 1 to 7 of the Code sets out provisions that are above and beyond the minimum requirements of the law.

4a Broodstock

Broodstock and brood fish are terms used within the finfish farming industry to describe adult fish of reproductive age that are used to produce eggs and sperm, from which juvenile fish result.

Farm sites on which broodstock are held may contain multiple year classes (or generations) of fish. The Code recognises that there is a distinction between sites holding broodstock and production farms in the level of risk associated with their operation.

4b Stripping broodstock and the production of gametes

It is normal practice for brood fish to be manually or mechanically stripped (i.e. the process during which eggs or milt are removed from them prior to fertilisation). It is industry good practice to carry out appropriate testing of broodstock and their progeny for vertically transmitted diseases (i.e. diseases that can be transferred from parent to offspring).

4c Importation of fish gametes and fertilised eggs

The importation of gametes (unfertilised fish eggs and milt) and fertilised eggs is subject to legal controls. It is acknowledged that any risks to fish health associated with the movement of gametes and fertilised eggs (which, also, can be effectively disinfected) are considerably lower than risks associated with the movement of live fish.

4d Importation of live salmonids

The importation of live salmonids from outside the UK is also subject to UK and Scottish legislation.

4e The movement of live fish by wellboats and other vessels

Wellboats are custom designed and constructed vessels which are used routinely for a variety of tasks essential to the efficient running of farms. Wellboats are used to transfer smolts to sea water sites at the beginning of the marine production phase, to grade fish by size, to transfer fish between seawater farms, to transport fish for harvest at the end of the production cycle and to carry out medicinal treatments and other health interventions.

It is acknowledged that the use of wellboats to deliver fish to, and collect fish from, multiple farms can present a risk of pathogen transmission. Any risks are often considerably lower where fish movements are within defined Farm Management Areas (FMAs - see below) that have been established for sea lice management, disease control and biosecurity purposes, when compared with movements between different FMAs. Risks associated with the delivery of fish to multiple unstocked and fallowed farms in different management areas are also relatively low.

It is the joint responsibility of those supplying and receiving fish to ensure that the fish are in good health and physical condition when they are transferred on to farms, and statutory controls also exist around this.

4f Sea lice

Sea lice are naturally occurring copepod ectoparasites of wild and farmed marine fish. There are many species across the globe, affecting many species of fish. In Scotland, the two most commonly occurring sea lice species are *Lepeophtheirus salmonis* and *Caligus elongatus*. The former is an obligate parasite of salmon and sea trout and has been associated with both of these species of fish for millennia. The latter is a ubiquitous parasite of many species of wild marine fish, which may also be found on wild and farmed salmonids.

Farmers are now bound by a legal requirement to maintain specific records in relation to sea lice that may occur on farmed fish. The record keeping requirement set out in law is based upon the provisions of the Code. Although the Code no longer includes specific reference to legal requirements, it is important to note that, in the context of sea lice management and control, Scottish law is founded on principles of good practice developed and implemented by industry for over two decades and amalgamated into the body of the Code.

Since 1998, salmon farmers in Scotland have observed the provisions of 'A National Treatment Strategy for the Control of Sea Lice on Scottish Salmon Farms' (The NTS), and the provisions detailed in the NTS were then included within the Code when it was first published in 2006. As technology, understanding and risk have evolved, the NTS has also changed. Its current form (Integrated Sea Lice Fish Health Plan), whilst strongly inspired by its predecessor, focuses on all aspects of the health of fish under a farmer's care.

4g Area management

The Code strongly advocates an area-based approach to fish health management, specifically one based around Farm Management Areas (FMAs). Area-based management saw its beginnings in the mid 1990's, when the approach was developed to minimise risks presented by Furunculosis, a serious bacterial disease of salmonids caused by *Aeromonas salmonicida*, which was first described in brown trout in the late 19th century in Bavaria, Germany.

Area-based management is now the norm within the Scottish salmonid farming industry; it is the preferred approach for dealing proactively with a number of potential challenges to fish health presented by aquatic pathogens and parasites.

4h The Farm Management Area (FMA) Approach

This involves the delineation and designation of areas in which businesses undertake farming activities at one or more farm sites. Within FMAs farmers coordinate and synchronise farming activities in order to reduce and manage the risks posed by naturally occurring infectious agents and parasites that may be present in the environment, in wild and farmed fish, and in other biota. At its simplest, Area Management aims to treat groups of farms as a single farming unit, coordinating activities as much as is practicably possible. FMA policies will, in most cases, focus on the stocking of farms; the synchronising and coordination of production; arrangements for fallowing individual farms and areas; and on the management of fish health through preventative and reactive health management approaches.

In some places, an FMA may coincide with an area designated by the Marine Directorate in relation to statutory controls over listed fish diseases, but the two designations are distinctive and different in their purpose.

4i Farm Management Statements (FMS) and Farm Management Agreements (FMAg)

Farming activities within a Farm Management Area are covered by a documented FMS or a FMAg. Both types of document are important, both to Code audits and inspections by the Marine Directorate's Fish Health Inspectorate. The fine detail of FMSs or FMAgs will be tailored to the circumstances of the FMAs to which they relate, and examples of their content are set out in the various chapters of the Code. FMAg's and FMSs now sit in statute, and are another example of provision of the Code supporting the basis of legislation.

FMAs for Scottish marine farms are set out in Section 3 of the Code. The delineation of FMAs is subject to periodic review, taking into account changes in operation, ownership, production plans, and other important criteria.

4j Primary processing operations

In the context of the Code, the term 'primary processing' refers to the removal of internal organs and, as appropriate, the gills, from slaughtered and bled fish; the washing and cleaning of eviscerated fish; and the packing of washed, eviscerated fish in boxes. Although the main focus of the Code is on farming operations and the management of live fish, it is acknowledged that certain aspects of primary processing need to be included.

4k Medicinal products

Farmers have legal and ethical responsibilities to safeguard the health and wellbeing of the fish under their care. Farmers will involve their veterinary surgeon to assist them in discharging these responsibilities. Protecting the health of farmed fish sometimes involves the use of veterinary medicinal products, which are used responsibly and in accordance with relevant legislation. Therapeutic medicinal products and vaccines are complementary to sound management and husbandry.

Veterinary Health and Welfare Plans (VHWP's) and Biosecurity Plans (BP's) are important tools in planning production and in the day-to-day management of fish health and welfare. Such plans are developed taking due consideration for the overall management of all farms within a company. This helps to minimise medicine use, consistent with the protection of fish welfare, and to preserve the efficacy of medicinal products. There are also clear benefits in carrying out periodic reviews to assess the efficacy of medicines, so that the regimes under which they are applied can be modified and optimised.

The information set out in the relevant sections of the Code is similar in nature to that contained within many farm assurance schemes for terrestrial food producing animals and helps support the responsible use of medicines in finfish aquaculture. As a general principle, the handling and application of medicines should take account of the likelihood of their eventual discharge into the aquatic environment. The Scottish Environment Protection Agency (SEPA) has statutory responsibility for authorising the discharge of medicinal treatments in freshwater and marine aquaculture.

A range of medicines are available for use in farmed fish. The legal terminology for distribution categories covering all UK veterinary medicinal products is:

- Prescription Only Medicine–Veterinarian (POM-V)
- Prescription Only Medicine–Veterinarian, Pharmacist, Suitably Qualified Person (POM-VPS)
- Non-Food Animal-Veterinarian, Pharmacist, Suitably Qualified Person (NFA- VPS)
- Authorised Veterinary Medicine-General Sales List (AVM-GSL)

4l Suspected Adverse Reactions

A Suspected Adverse Reaction (SAR) is an unintended or unexpected reaction arising from the use of a licenced veterinary medicine. SARs are rare but can be observed in the animal(s) under treatment, or potentially (but extremely rarely) an individual administering the medicine to an animal.

Companies holding a Marketing Authorisation (MA) for veterinary medicines, including fish medicines, are legally obliged to report suspected adverse reactions within 15 days of receiving a report and at specified periods in the case of non-serious adverse reactions. Further information is available from the Veterinary Medicines Directorate.

4m Vaccination

As with most other farmed livestock, vaccines can be used in farmed fish to prevent diseases and reduce the need for health intervention. Vaccination of Scottish salmon and trout is now normal practice and has had a demonstrable, positive effect in maintaining fish health, while minimising the use of antibiotics and other interventions.

Good practice in relation to vaccination is described in 'Responsible use of vaccines and vaccination in fish production' produced by The Responsible Use of Medicines in Agriculture Alliance (RUMA).

5 MANAGING AND PROTECTING THE ENVIRONMENT

The finfish farming industry recognises that the environment in which it operates is an asset to be protected, now and for future generations. The designation of areas of particular environmental significance has been recognised in Scotland for many decades and certain areas in Scotland are so important in terms of marine biodiversity that they have been designated under EU, UK and/or Scottish environmental legislation. In some cases, long-established fish farms co-exist in these areas.

5a Changing Seas

Scotland is famous for its marine environment, which hosts a wide range of thriving ecosystems. As the global impacts of climate change become more apparent, Scotland's salmonid farmers have become increasingly conscious of changes to aquatic environments.

Across the last decade, salmonid farmers have observed the warming of water bodies, a shift in seasonal temperatures ranges, and a change in the occurrence and abundance of some organisms. Salmonid farms represent a novel indicator of these shifts, which may well be less obvious or apparent to others.

These changes to the environment have, in certain situations, been harmful to the salmonids reared within it. The industry, in face of these changes, has not sat still. Between 2018 and 2025 the Scottish salmon sector alone has invested ~ £1 billion in support of fish health, much of this in responding to pressures created by environmental change. The purchasing of custom designed wellboats, digital tools to monitor behaviour, and the application of new technology like bubble curtains are all examples of the sectors commitment to tackling these challenges proactively.

5b Sea Lice

Sea lice are known to have the potential to move between wild and farmed fish. The Integrated Sea Lice Fish Health Strategy and the stipulations within this Code, as well as statutory requirements inspired by its historic mandates, demonstrates the sector's commitment to maintaining control over sea lice on farms. The sector is now also additionally subject to statutory regulation through SEPA's Sea Lice Risk Framework.

5c Containment

The occasional escape of fish from farms can have negative implications for fish farming, especially when measured in terms of the cost of lost fish to the business, as well as in terms of reputation. Fish farming companies are already required to maintain records in relation to containment and breaches of containment. The Marine Directorate Fish Health Inspectorate has powers to inspect records relating to the containment of fish on farms, to assess measures in place to contain fish, prevent breaches of containment and recover escaped fish, and to ascertain risks of breaches of containment. The record keeping requirements are based upon the provisions of this Code. Industry performance in reducing breaches of containment has improved significantly over the years, with the development of pens, nets and moorings capable of dealing with changing and often extreme weather conditions where fish farming takes place. In 2015 the Scottish Government published the Scottish Technical Standard (STS), a set of technical guidelines on containment which was developed in partnership with the industry. This publicly available document (<https://www.gov.scot/publications/technical-standard-scottish-finfish-aquaculture/>) outlines minimum standards for equipment, moorings, etc and how farmers can best use these to mitigate the risk of fish escapes.

The salmonid sector has been engaged with Scottish Government on the production of the 2015 STS as well as subsequent proposals for the document to be refreshed. It is currently expected that this guidance will become statutory and will represent another successful collaboration between the sector and its regulators.

5d Interface between the Scottish regulatory system and the Code's provisions

Government and Local authority policy dictates that farm developments take place only in along the west and northwest coast and the western and northern isles. There is a planning presumption against fish farm development on the north and east coast. Additionally, all environmental aspects of the industry's activities are strictly controlled and highly regulated under statute. Implementation of regulatory and other control processes takes place via a number of Local Authority and Scottish Government Departments and agencies with Marine Directorate (MD), Local Authority Planning Departments, the Scottish Environment Protection Agency (SEPA), Nature Scot (NS) being the most prominent.

MD, SEPA and NS have the role of statutory consultees in the planning process by which new finfish farms are established and existing farms are developed.

Marine Directorate (MD) (formerly Marine Scotland inc. Marine Scotland Science and marine licensing) is part of Scottish Government and is the lead marine management organisation in Scotland. It has responsibility for a wide range of marine policies and activities including fishing, marine aquaculture, and offshore power generation. In addition to its marine responsibilities, it has responsibility for the policy, management and licensing of freshwater recreational fisheries and freshwater aquaculture.

The Marine Directorate also oversees the Fish Health Inspectorate's regulatory oversight of fish farms; carries out research to support Scottish Government policy and policy development; provides advice to Local Authorities and other agencies; and issues licences for activities relevant to aquaculture.

Scottish Environment Protection Agency (SEPA) is a non-departmental public body accountable to the Scottish Government. It is Scotland's main environmental regulator. It acts to protect and improve the environment through regulating community, business and industry activities that can cause pollution and by monitoring the quality of Scotland's air, land and water. Statutory regulation of water quality and the quality of sediments underneath and surrounding fish farms takes place through SEPA. Because fish farms are situated in marine or freshwater environments, or rely on supplies of clean fresh water, they are subject to strict regulatory controls in regard to the quality of the water and of the loch or seabed surrounding the fish farm. SEPA publishes a substantial volume of information on the way in which it regulates the Scottish aquaculture industry and on the results of monitoring, surveillance and recording.

NatureScot (NS) is also a non-departmental public body accountable to the Scottish Government. NS's remit comes from the Natural Heritage (Scotland) Act 1991 and its purpose is to promote the care and improvement, responsible enjoyment, greater appreciation and understanding and sustainable use of Scotland's natural heritage, now and for future generations. NS acts in the capacity of statutory consultee in a range of consultative processes related to aquaculture and is important in ensuring that fish farms are established and operate within the capacity of the environment, with respect to wild flora and fauna, biodiversity and visual impact.

5e Regulatory controls

Finfish farms are subject to a programme of regular inspection and monitoring by SEPA and MD Fish Health Inspectorate.

As a condition of the licence issued by SEPA under the Environmental Authorisations (Scotland) Regulations 2018 (previously the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (the CAR licence)), farms are required to carry out a substantial programme of environmental monitoring that complies with strict criteria established by SEPA, with the results being regularly reported to SEPA. This monitoring is specifically designed to ensure that farms are not having an undue, significant impact on the marine environment.

Farms in environmentally sensitive areas must meet conditions specified by NatureScot for the management of those areas.

It is now common in Scotland for information collected during inspections and surveillance carried out by official agencies to be published on the relevant agency website and on Scotland's Aquaculture website.

6 FISH WELFARE AND CARE

Fish are covered within the scope of Scottish animal health and welfare legislation and fish farmers are obliged to comply with the relevant provisions of the law. Since its inception, the Code has acknowledged the relevance of 'The Five Freedoms' as they apply to farmed fish.

High standards of water quality are essential to the welfare of fish. Fish at different stages of development may have different water quality requirements, particularly in relation to dissolved

oxygen and carbon dioxide, temperature, pH, ammonia and levels of suspended particulate material. Salmonids are known to be sensitive to variations in the conditions under which they are held, requiring high standards of environmental quality if they are to grow and thrive.

Many aspects of husbandry relevant to the welfare of farmed fish are encapsulated in other sections of the Code (e.g. Fish Health and Biosecurity and Feed and Feeding). Nonetheless, it is acknowledged within the industry that high standards of welfare cannot be achieved without adherence to principles covered under Fish Health and Welfare. In parallel, the RSPCA Assured (RSPCA-A), to which the majority of farmers within the Scottish industry subscribe, plays an extremely important role in identifying and addressing fish welfare-specific matters; and Scottish aquaculture industry members and their trade bodies work closely with RSPCA-A to ensure that there is parity between what the Code and the RSPCA-A scheme require.

6a Transfer of salmon smolts to sea

It is important that the transfer of juvenile salmonids to sea takes place only when smoltification has occurred. Smolting status assessment will aid in the identification of the transfer window. Smolting can be assessed through various different means, including, for example, biochemical or genetic tests (e.g. based on ATPase activity). Changes in body coloration and shape also provide a useful supporting indicator of smolt status.

6b Withholding feed

In the wild, salmonid fish, like other species, naturally experience prolonged periods where they do not eat. Although, salmonids have this natural, underlying, propensity to experience periods without food, it is acknowledged that the withholding of feed in farmed fish, which are accustomed to being fed regularly, may have some negative consequences for welfare. However, there are circumstances where the temporary withholding feed is necessary to support improved welfare, or for reasons of food hygiene.

Before transport or harvest, feed is normally withheld to reduce metabolic rate, reduce the demand for oxygen, prevent the egestion of partially digested food, reduce the excretion of waste products, and to eliminate the presence of food and/or faecal material in the gut at harvest, thereby reducing the risk of microbiological contamination during processing.

6c Stocking Density

The farming system in which fish are held and the farmer's ability to maintain high standards of water quality are important defining factors in determining optimum stocking density. As a general rule, stocking density may be adjusted in line with the biological and behavioural needs of fish, having regard to the prevailing environmental conditions and, in particular, water quality.

For marine salmon farms, a number of important welfare indicators, such as condition factor and fin condition, may also be taken into account in determining the appropriate stocking density for given sites. Decisions on optimum stocking density are most often informed through the experience of site managers who are highly familiar with environmental conditions on individual sites, fish behaviour and performance.

6d Recirculating Aquaculture Systems (RAS)

Recirculating Aquaculture Systems (RAS) are a development in the onshore production of aquacultured species, which has seen some uptake in Atlantic salmon production. The majority of RAS use is focused on the cultivation of the freshwater phase in the salmon's lifecycle, whilst

a few international companies are utilising these systems to produce salmon throughout their whole life cycle. In Scotland there are currently no producers using RAS beyond the freshwater phase of production.

RAS principally allows for the recycling and reuse of water in holding facilities for salmon, with only a small volume of “fresh” water added daily. Reused water is filtered and reconditioned using a combination of physical and biological filters which remove particular and dissolved wastes. Degassing and oxygenation systems will also be incorporated into the RAS.

This is different from a traditional “flow-through system” where water passes through a system once. RAS thus increases the level of control a farmer has over the rearing environment, reduces the interaction of the aquaculture system with the external environment, and thus could reduce risk to both animals and natural habitats.

This system of production requires considerable infrastructure, know-how, investment, exacting husbandry standards and round the clock staffing. However, it also allows for a much finer control of the rearing environment. Parameters that might otherwise be very difficult or impossible to control can be tightly managed (temperature, oxygen saturation etc). This control brings potential upsides for the salmon and their welfare, as well as considerable efficiency upsides for the producer, including a greater level of control over important developmental traits, such as growth and smoltification.

RAS is a tool which some producers may elect to utilize as they strive to improve the performance of their operations. That said, it is by no means the only methodology to achieve great results and, as will all tools, is in some cases not appropriate.

These systems are regulated in the same manner as other freshwater facilities across Scotland and are expected to adhere to the relevant parts of the Code of Good Practice.

6e Exclusion and control of predators

Farmers have a legal and ethical duty to protect fish under their care from harm and unnecessary suffering, and predation by piscivorous birds and mammals clearly creates circumstances under which significant harm and suffering can occur.

Both freshwater and marine fish farms can be subjected to attack by predators, with risk of mortality or the welfare of fish being compromised. Alongside this welfare concern, and the impacts on farm staff, predation can represent significant costs to farmers, directly through the immediate loss of fish, and consequentially through losses arising as a result of damage to fish, stress, disease and the loss of fish through nets being breached. The most significant predators of farmed fish are seals, otters, mink, herons, and cormorants, with some other species of birds also occasionally causing damage and loss. Many of these species of predators are protected under EU, UK and Scottish law.

It is good practice to anticipate and, where possible, prevent predation and to adopt the correct management of predation problems when they occur. The effectiveness of predator control is likely to be site specific and, in many cases, subject to regulation.

6f Predator Management Plan

The Code requires that “farms should have a site-specific predator management plan”. This document outlines to farm staff the various predators they may encounter, and the actions and management measures approved as part of the farm’s consents and licenses. There are statutory

restrictions which may limit the management options available to farmers to help them prevent predator attacks.

6g Birds

Birds such as herons, cormorants, shags and gulls may attack fish and/or raid feed stores. Exclusion measures such as properly designed and deployed top nets or tensioned underwater nets, visual and audio scarers can be used.

All wild birds are protected under the law. Licences to kill or take a limited number of certain wild birds may, in principle, be issued by Scottish Government as an additional provision to reinforcement scaring measures. If exclusion measures fail to control attacks and predatory birds are causing serious stock loss or damage, or are disturbing the fish stock, an application may be made to Scottish Government for a licence to kill a limited and strictly controlled number.

6h Seals

Seals are known to be the most significant marine predators of farmed fish in Scottish waters. Two species of seal may be present - the common or harbour seal (*Phoca vitulina*) and the grey seal (*Halichoerus grypus*) - and both are protected by the law. It is good practice for salmon farmers to use appropriate site specific measures to deter seals from taking and damaging their fish. Farmers continue to investigate new options to help safely deter seals from attacking their farms.

6i Otters

Otters may eat farmed fish and be attracted to pen sites. They may also frequent land-based farms i.e. ponds and raceways. Otters are protected under the law. In the absence of satisfactory alternatives, farmers may apply to NatureScot to allow relocation to take place.

6j Mink

Mink can kill significant numbers of farmed fish and are difficult to exclude. They are an invasive non-indigenous species and are not protected by law. They may be humanely trapped using live capture cages and dispatched. It is an offense to release trapped mink back into the wild. The most likely access point to fish farms for mink is via the walkways.

7 FEED AND FEEDING

The manufacture of fish feed is a specialised part of the animal feed manufacturing industry. Fish farmers source their feed through these specialist suppliers, who operate within the relevant feed legislation, strict regulatory controls and industry schemes designed to provide assurance to all in the production chain, the retailer and the consumer. This situation is reflected in the feed provisions of the Code.

The choice of feed used by farmers is defined mainly by the nutritional and welfare requirements of the fish being farmed. Feed formulation is defined, amongst other things, by the species, stage of growth, feed quality and safety requirements, consumer requirements and the sustainability of feed ingredients.

The statutory and voluntary controls governing the manufacture of fish feeds are extensive and detailed, being derived historically from European legislation. They cover a wide range of aspects,

including feed hygiene; permitted ingredients; ingredient quality; the addition of vitamins, carotenoids, antioxidants, binders, etc.; animal and consumer safety; marketing, traceability and labelling. Feed manufacturers also subscribe to industry schemes designed to assure those involved in the production chain, and particularly processors, retailers and consumers.

Feed formulation is critical to optimising the growth and development of the fish, the efficiency of feed conversion and the high nutritional and consumer quality of the fish being produced.

Feed ingredients are subject to rigorous controls around traceability, with many (inc. marine ingredients and some plant based ingredients such as soy), requiring defined certification relating to sustainability.

7a Feed Sustainability

Over the history of salmonid farming, the sustainability of feeds and the ingredients used to manufacture them has become more important to producers, retailers and consumers. At one time, feeds for salmonids were based largely on fishmeal and fish oil, but nowadays they contain a range of highly sustainable and nutritious marine and non-marine ingredients, and this has had the effect of both improving sustainability and increasing the feed manufacturer's flexibility in formulating diets for farmed fish.

Although the use of non-marine ingredients is a positive development that has helped to sustain the growth and development of finfish aquaculture across the globe, it is important to recognise that fish such as salmon and trout are naturally carnivorous, consuming insects, crustaceans and other fish in the wild. Continuing to have access to ingredients such as high-quality marine fishmeal and fish oil for use in feed formulations is still important for the health and wellbeing of the fish, and for the quality and nutritional profile of the fish eaten by consumers. It is more ecologically efficient and natural to use a proportion of marine ingredients in feeds for farmed fish than it is to use the same ingredients in the production of feeds for other animals that would not, normally, encounter such ingredients in their wild, natural state.

Research studies have shown that the efficiency of use of feed resources in farmed fish such as salmon and trout is very high compared with food-producing terrestrial animals and is much higher than the feed conversion in wild-catch fisheries. The increase in aquaculture production that has taken place over the past 40 years has been achieved without any trend of increase in global fish meal production, although there has been a substantial diversion of fish meal use from land-based livestock into aquaculture, and an improved efficiency in the use of fish trimmings from the human food-chain for fish meal production. Thus, on any of these measures, aquaculture has contributed positively to sustainable food production. Against this background, the focus of the Code is that fisheries from which fish meal and fish oil are derived should be properly and responsibly managed.

Professional Statements

Environmental Statement

A high-quality environment is critical to successful salmonid farming. Atlantic salmon and rainbow trout are sensitive to environmental perturbations, and significant deterioration in the quality of the aquatic environment can impact fish health and welfare. Furthermore, salmon and trout farmers have legal and ethical responsibilities to safeguard the environment in which they farm, and to ensure their activities do not have any undue impacts. Environmental stewardship is a key aspect of good farming practice.

Salmonid farming is subject to wide ranging and demanding statutory environmental regulation. The Scottish Environment Protection Agency (SEPA) is Scotland's primary environmental regulator. SEPA primarily regulate salmonid farms through the Environmental Authorisations (Scotland) Regulations 2018 (previously through the Water Environment (Controlled Activities) (Scotland) Regulations 2011). However, farmers must also comply with other environmental regulations including legislation relating to natural heritage and biodiversity. Alongside SEPA, NatureScot and Local Authority planning departments play a key role in regulating the environmental aspects of salmon farms.

To support farmers in meeting their obligations to environmental stewardship, companies invest in dedicated teams of specialist environmental scientists to oversee both the development and operation of farms. Environmental specialists are a cornerstone feature of salmonid farming businesses. They engage and protect the environment by ensuring that companies adhere to environmental and consenting regulations through licenses and a system of regulatory reporting.

Examples of actions undertaken by environmental specialists include: ensuring equipment used on farm meets license conditions, arranging sampling/ monitoring routines, designing relevant standard operating procedures for staff, reporting of monitoring results, engaging with consultations, supporting the planning and consenting for new sites, and completing Environmental Impact Assessments (EIAs).

Marine modelling (e.g. benthic, sea lice medicine dispersal modelling) is an increasingly important part in the development and operation of new farms.

Environmental Impact Assessments (EIA) are a fundamental aspect of farm development and consenting. Salmonid farmers commission detailed EIAs for their farms, which follow necessary EIA regulations. EIAs consider and assess all potential impacts that might arise from a farm development.

Alongside EIAs, farms operate to defined environmental management plans, which cover, amongst other things, wildlife interaction (predators, wild salmonids, freshwater pearl mussels), environmental monitoring protocols, and visual, noise and odour management.

Veterinary Statement

To become a member of the Royal College of Veterinary Surgeons (RCVS), which is required in order to practise veterinary surgery in the UK, every vet makes a declaration on professional responsibility (also known as "the oath"). Since 2012, the wording has been:

" I PROMISE AND SOLEMNLY DECLARE that I will pursue the work of my profession with integrity and accept my responsibilities to the public, my clients, the profession and the Royal College of Veterinary Surgeons, and that, ABOVE ALL, my constant endeavour will be to ensure the health and welfare of animals committed to my care."

Failure to abide by the standards set by the RCVS can result in significant sanctions, up to and including being struck off the professional register. Vets, whether employed by aquaculture companies or providing services to them, therefore have a unique responsibility to ensure that fish welfare is prioritised and standards maintained. If husbandry procedures or interventions are carried out under veterinary supervision or according to their guidance, it is therefore reasonable to assume that welfare standards have been considered in an appropriate manner.

Veterinary Medicines regulations also place specific responsibilities on prescribing vets. Where medicines are prescribed, it is therefore reasonable to assume that vets have considered all relevant factors and prescribed accordingly.



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