



Operating Procedure - Feed Management Ongrowing

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1. Introduction

Feeding is an integral part of the production process and has a direct impact on stock growth, stock health & welfare, product quality and the environment. Feed is the biggest product input and accounts for the majority of production costs.

Site specific Feeding Management Plans are documented in the Site Management Manuals.

2. Aims and Objectives

Aims

The aim of this procedure is to ensure, so far as reasonably practicable, that all feed is managed and used in compliance with the applicable regulations and health & safety, environmental and quality standards.

Objectives

The objectives of this procedure are:

- There is a system for the management and use of feed.
- There is a safe system of work.
- Meet Quality Assurance and customer standards.
- Product quality specifications are being repeatedly met.

3. Scope

This procedure is applicable to all personnel, contractors, visitors, vehicles and vessels operating within Kames Fish Farming.



4. Responsibilities

All members of the company team, contractors and visitors share a responsibility proportionate to their roles for the implementation of this procedure.

It is important that all managers ensure that this procedure is communicated effectively to all their team, and others working on their sites.

Operational responsibilities for tasks shall be assigned by the designated manager or supervisor overseeing the operational stages and associated tasks.

Operations Manager

The Operations Manager is responsible for the logistical support for feed transport to the designated sites and the operational support in ensuring that all the required resources and technical support are available for the operation of the site feeding systems.

Site Manager

Site Managers have the overarching responsibility for the implementation of this procedure, planning, feeding practices and feed usage on the farming sites.

Feeding Technician

The feeding technician (designated operator) is responsible for the feeding of the fish in accordance with the direction provided by the designated Site Manager and in compliance with this procedure.

Fish Health Manager

The fish health manager is responsible for assessing the performance of the fish with regards to growth, mortality, and health status. Feeding rate is often linked to performance, and changes in fish feeding patterns can be linked to mortality and growth. Feedback is communicated with the site manager that aims to optimise fish health. Additionally, in-feed emamectin benzoate (SLICE) medication can be used to combat *Caligus elongatus* lice in the summer months. This needs to be calculated with the site manager and veterinarian to ensure appropriate medication dosage.



5. Technical Information

The technical information provided in this section is not exhaustive and is aimed to provide information on the key aspects underpinning the implementation of this procedure.

5.1 Feed Suppliers

Approval Criteria
Feed suppliers are assessed by designated people within/out with the company that have the technical, scientific, quality and commercial competence in ensuring the feed supplier will meet the requirements, and a nominated director has final approval authority. As a minimum feed manufacturers are approved subject to the following criteria being met: • Accredited certification to UFAS and GLOBALG.A.P.

5.2 Feed Management Plans

It is the responsibility of the designated Site Manager to adequately plan all feeding requirements for the site using the approved diet – feeding must be such that the quality, quantity and frequency are optimal for the trout's stage of development.

Functional feed additives must be approved by the Fish Health Manager.

The site is required to have a site-specific feed management plan that is documented in the site management manual. As a minimum addresses the following points:

- Company Policy and Procedure
- Feed Supplier
- Feed Delivery Method
- Feed Storage Arrangements
- Diet and feed table.
- Guidance on feed pellet size in relation to fish.
- Guidance on quantity of feed to be fed in relation to population size.
- Guidance on dietary pigment inclusion rates.
- Feeding and monitoring system.
- Review of feeding against stock health and welfare indicators.
- Ongoing review of performance against targets (SFR, eFCR, bFCR).
- Site Specific Working Instructions

Aquasim Production Planner may be used to model the feed requirements for the production cycle based on site specific feeding factors.



5.3 Feed Ordering

It is the responsibility of the Site Manager to plan the feed requirements and ordering feed for the farming site.

Company policy is that a maximum of one month of feed stock is kept on site.

Feed Ordering Instruction	
1.	Plan the feed requirements.
2.	Raise a Purchase Order with the Kames Accounts Team.
3.	Submit order to the feed manufacturer. • EWOS and BIOMAR have customer portals for managing feed orders.



5.4 Feed Storage

Feed is either stored in sealed 1000 kg; 500 kg plastic lined tote bags or sealed 25 kg plastic bags. The 25 kg plastic bags are stacked on a pallet (40 bags per pallet) which is then wrapped with heavy duty plastic wrap. The tote bags and pallets of feed are stored inside the feed shed, so that the feed is kept dry, out of direct sunlight and away from pests. At times, feed may be temporarily stored under tarpaulin feed covers.

It is standard practice to use the feed on a 'first in first out basis', to ensure that the oldest feed is always used first – feed bags are labelled with a best before date and in the event of feed having to be used after this date, a dispensation can be made by the feed manufacturer (this must be in writing).

Medicated feed clearly labelled and stored in separate area in feed shed as well as separate silo on feed barge.



5.5 Compromised feed

Feed that has been compromised and is assessed as being unfit for consumption, shall not be fed to the stock and shall be disposed of appropriately.

Feed may be compromised due to various reasons, such as:

- Water damage
- Mold
- Pests
- Hazardous Substances
- Not used within specified use by date

Site specific disposal methods are detailed in the Site Waste Management Plans and bulk loads that are not feasible to dispose of on site, can be returned to the feed supplier to be disposed of.

5.6 Feed rations

Feed rations are calculated using approved feed tables such as the Skretting Large Trout Feed Table and RMAX Feed Table.

Kilograms of feed given per day = Specific feed rate (SFR) / 100 x Biomass (kg)

e.g. SFR = 0.8

Biomass = 50 tonnes (50,000 kg)

Feed given today = $0.8 / 100 \times 50,000 = 400$ kg of feed.

Fish health may play a role in determining the feed ration, as digestion is a metabolically demanding process requiring oxygen. During periods of higher risk such as high temperatures, presence of environmental threats (jellyfish, plankton, pollution), or low oxygen, it may be required to reduce or withdraw the feed for a time period. This time is determined by the specific threat and may exceed the maximum feed withdrawal periods from our normal operating standards.

The site manager is responsible for communicating this withdrawal intent with the Fish Health Manager and veterinarian to ensure that veterinary approval is given, and that fish health is prioritised over growth during these high risk periods.

It is recommended that a feeding ceiling of 140% above recommended chart guide is applied to prevent over feeding and feed wastage – in special circumstances it may be required to breach this parameter and in such an event, senior management must approve this breach based on a case-by-case basis.

5.7 Feed Withdrawal

Feed withdrawal is required in order to ensure the welfare of the fish stock before a variety of handling procedures such as harvesting, treatments and grading.

A maximum starvation period of 54-degree days is permitted, unless a longer period is authorised by a veterinarian or is as a result of inclement weather.



5.8 Receiving Feed Deliveries

The following process must be followed when a site receives a feed delivery.	
1.	Team on site verifies that it is the correct delivery and offloads the truck/vessel.
2.	Operator on site signs the delivery note and keeps a copy.
3.	The delivery note is filed in the designated file – refer to the Site Management Manual for details. Keep a copy of the feed label on the bag (best to staple to the delivery note).
4.	Notify the Accounts Team that the delivery has been received by emailing a copy of the delivery note to: ap.kames@kames.co.uk
5.	Record the feed delivery on Fish Talk and save the delivery note in the designated Site Management Folder.

5.9 Stop Feeding Indicators

Feeding should be stopped immediately if any of the following stop feeding indicators are identified – this is not an exhaustive list and professional judgement must be applied when feeding fish:

- Water clarity prevents adequate camera monitoring of sub surface feed response.
- No surface feed response (if no sub surface monitoring possible).
- Pellets drop – 8 m when using sub surface monitoring.
- Planned daily feed ration ceiling has been reached.
- Oxygen < 7mg/l

If water temperatures breach 15 °C, then feeding may need to be reduced/stopped and/or restricted to early morning/late evening.

5.10 Record Keeping

Accurate feeding records must be maintained for management and compliance purposes – all feed records must be maintained in the designated Site Management Folder and Fish Talk.

For compliance purposes, records of feed purchases shall be in place and held for 2 years or one year longer than the life cycle of the species farmed, whichever is longer.

5.11 Feed Quality Control

Refer to the feed manufacture quality statement for details on quality controls.

Feed samples shall be retained at least 6 months pre-harvest and retain feed samples for a minimum of six months post-harvest.



5.12 Feeding Performance Indicators

1.	<u>Fish Welfare</u> Fish welfare indicators act as a leading/lagging indicator and may included but not be limited to: • Body Condition • Mortality Rates • Size Variation • Stock Health Status
2.	<u>Flesh Quality</u> Flesh quality acts as a leading/lagging indicator and comprehensive details are provided in the Operating Procedure – Flesh Quality Monitoring Flesh quality is assessed at determined intervals throughout the production process to ensure that customer requirements are being met.
3.	<u>Feed Conversion Rates</u> Feed conversion rates act as a lagging indicator and are actively monitored to ensure efficient use of feed. eFCR (Economical Feed Conversion Rate) is the primary metric used and benchmarked against a target of 1.4 kg feed/ 1kg growth.
4.	<u>Equipment Breakdowns</u> Equipment breakdowns act as a lagging indicator and is actively monitored to minimise lost feeding time.
5.	<u>Feed Wastage</u> Feed wastage acts as a lagging indicator and is actively monitored to reduce feed costs and the environmental impact on the seabed.
6.	<u>Growth Rates</u> Growth rates act as a leading indicator to monitor if product target sizes will be met within the required time frame. Growth rates are actively tracked throughout the production process.



5.13 Medicated Feed

The Fish Health Manager shall be consulted before administering any medicated feed.

The feeding of medicated food is periodically required to treat a variety of ailments. Medications added to the food can include anti-biotics, pesticides or traditional remedies e.g. salt.

5.13.1 Therapeutant types

A variety of therapeutants are used to in feed treat fish, these are included in the Veterinary Health and Welfare Plans and/or SEPA discharge consents (where applicable) for individual sites and include:

- Slice (*Emamectin Benzoate*)
- Florocol (*Florfenicol*)
- Aquatet (*Oxytetracycline*)

5.13.2 Medicated food storage

Medicated feed is stored in either: plastic 25 kg feed bags, 40 feed bags are stored on a pallet which in turn is wrapped with a heavy-duty plastic wrap, 1000 kg plastic lined tote bags or 60L plastic containers. Medicated feeds are stored separately i.e. on the other side of the feed shed, from non-medicated feeds to avoid cross contamination, with at least one pallet space between medicated/non-medicated feed.

Medicated feed which is mixed by Cargill (EWOS) is packaged in yellow feed bags with clearly visible yellow labels to allow staff to distinguish medicated feeds from non-medicated feeds.

5.13.3 SLICE calculation

A SLICE calculator must be used to calculate the required quantity for an effective treatment.

5.13.4 Withdrawal period

Withdrawal periods are imposed on stocks of fish which have undergone an in feed treatment; these vary depending on the type of therapeutant and are measured in degree days (water temperature x days). Withdrawal periods are:

- Slice (*Emmamectin Benzoate*) - 0° days



5.13.5 Notifications & Recording

It is a requirement, as per SEPA discharge consents, that SEPA approves the discharge of medicated feed prior to its feeding and has a minimum of 2 days' notice prior to any commencement of a treatment in feed treatment. SEPA will have a longer notification period for the discharge of SLICE of at least 7 days prior to discharge.

Local fish farm area managers, as per the FPA, must be consulted regarding treatment coordination. Any in feed treatment undertaken must be recorded with all the applicable details.

5.13.6 Prescription

The discharge of medicated feed must be carried out in consultation with the prescribing vet and all calculations must be double checked by the site manager, fish health manager and prescribing vet to ensure that an effective dosage is ordered and fed. It is advised that sample weights are carried out on the stock to be treated no more than one week prior to the feeding to ensure an accurate estimation of biomass is achieved. Prescriptions must be available prior to the ordering of medicated feed and must accompany any medicated feed order.

It is standard practice to reduce the amount of feed fed (SFR) e.g. to 75 % of expected SFR, for medicated feed to ensure that fish consume all medicated pellets as they tend to have reduced appetite after a few days of feeding medicated feed.

To ensure that all medicated feed is consumed within the specified period, an additional flush feed ration must be fed as part of the treatment ration to ensure that no residual medicated feed remains in the system. The treatment end date starts once this flush feed has been consumed and the specified withdrawal period starts.



5.14 Feeding Systems

There are a variety of approved feeding systems to feed the stock, these include:

- Manual “hand” feeding
- Water pump powered feeding cannon.
- Pneumatic powered feeding cannon.
- Automatic GMT® feeding system and associated feed barge.
- Automatic Scale AQ feeding system and associated feed barge.
- Centralised Feeding Station

All systems aim to minimise feed wastage, maximise stock performance and spread feed evenly so as to reduce competition and thus dominance within the population.

5.14.1 Manual “hand” feeding

- Only use clean buckets and feed scoops.
- Measure out the appropriate quantity of feed.
- Dispense the feed into the cage at an appropriate speed, ensuring an even spread of feed over the surface of the cage. Ensure that no feed is fed outside of the cage boundaries.
- Increase or decrease the rate of feed dispensation according to the surface activity of the fish until the fish have either, reached satiation or have eaten their allocated daily feed ration.
- Ensure any open feed bags are securely covered so as to reduce the risk of adverse weather on the feed as well as prevent pests from eating it.
- Record the quantity of feed fed.

5.14.2 Water powered feeding cannon

- Ensure the feed cannon is clean.
- Ensure the water pump is in working order =. Check fuel and oil levels. Refill as appropriate. Prime the water pump.
- Direct the feed cannon into the cage, ensuring that the fish feed will not be fed outside the cage boundaries.
- Start the water pump, ensuring that all cannon spray is within the cage boundaries.
- Set the fish feed dispensing valve to an appropriate level (approximately 6 kg per minute)
- Begin to fill the hopper with feed, taking care not to overfill the hopper and spill feed.
- Move the cannon spout in a side-to-side motion, ensuring an even spread of feed across the cage surface.
- Increase or decrease the rate of feed dispensation according to the surface activity of the fish until the fish have either; reached satiation or have eaten their allocated daily feed ration.
- Stop the water pump.
- Clean feed cannon and rinse out water pump with fresh water.
- Ensure any open feed bags are securely covered so as to reduce the risk of adverse weather and to prevent any pests from eating the feed.
- Record the quantity of feed fed.



5.14.3 Pneumatic powered feeding cannon

- Ensure the feed cannon is clean.
- Ensure the engine is in working order =. Check fuel and oil levels. Refill as appropriate.
- Direct the feed cannon into the cage, ensuring that the fish feed will not be fed outside the cage boundaries.
- Start the pump, ensuring that all cannon spray is within the cage boundaries.
- Set the fish feed dispensing valve to an appropriate level (approximately 6 kg per minute)
- Begin to fill the hopper with feed, taking care not to overfill the hopper and spill feed.
- Move the cannon spout and/or cannon in a side-to-side motion, ensuring an even spread of feed across the cage surface.
- Increase or decrease the rate of feed dispensation according to the surface activity of the fish until the fish have either; reached satiation or have eaten their allocated daily feed ration.
- Stop the feed cannon.
- Clean feed cannon.
- Ensure any open feed bags are securely covered so as to reduce the risk of adverse weather and to prevent any pests from eating the feed.
- Record the quantity of feed fed.

5.14.4 Auto Feed barge System

The GMT® feeding system is a fully automatic system designed specifically for feeding fish and thus requires very little human intervention in order to feed fish effectively. However basic daily checks need to be made in order to ensure that the system is working properly.

- Check the power generator to ensure that the feed barge is receiving power.
- Check the feed barge computer to ensure all systems are operating appropriately.
- Obtain a printout from the feed computer (this includes all the necessary information that needs to be recorded).
- Before leaving the site, ensure that the fish are feeding appropriately by checking for surface activity.

5.14.5 Centralised Feeding Station

A centralised feeding station that allows for remote access to the sea water feed barges is set up and manned from the Kames office in Kilmelford.

Note	It is the responsibility of the designated Site Manager to ensure that an effective communication system is established between the site and central feed station and to ensure that no conflicting activities e.g. repair or maintenance is conducted while feeding is in progress - a permit to work system may be required as a safety control.
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6. Operating Process

This section provides a framework consisting of a process, procedure and instructions for conducting operations and associated tasks with the objective of achieving a specified outcome.

Step	Procedure	Responsibility
1.	<u>Feed supplier selection and approval.</u> - Refer to section 5 of this document. - An independent nutritionist should be consulted as part of this process to ensure that quality and nutritional requirements are being met.	Designated Director
2.	<u>Site Planning and Implementation</u> The designated site manager is responsible for planning the feed requirements for the site and managing the implementation of the feeding for the specified site.	Site Manager
3.	<u>Feeding</u> A designated Operator(s) is responsible for feeding the fish in accordance with the direction provided by the designated Site Manager. A site-specific working instruction may be in place to provide details for feeding the site. Feeding factors to consider and actively monitor: - Stock size. - Stock health status. - Stock appetite. - Water temperature. - Tidal/Water flow. - Daylight. - Water clarity. - Wind. - Oxygen	Feed Technician
4.	<u>Feeding Performance Monitoring</u> - Feeding performance is actively monitored throughout the feeding process by designated Managers. - Feeding Performance Indicators are detailed in section 11 of this document.	Designated Managers
5.	<u>Auditing</u> The feed management system is subject to an annual internal and external audit.	Designated Auditor



