



Humane Farm Animal Care's
Certified Humane® Welfare Standards

FARMED COHO SALMON

Edition 2026

FARMED COHO SALMON

HUMANE FARM ANIMAL CARE

Humane Farm Animal Care is a 501(c)3 non-profit organization whose mission is to improve the lives of farm animals being raised for food and to assure consumers that certified products meet our welfare standards.

Our initial set of standards were adapted from the RSPCA Assured program published by Royal Society for the Prevention of Cruelty to Animals in the United Kingdom. Since then, the Humane Farm Animal Care standards have been refined to provide standards for the rearing, handling, transport, and slaughter of food animals (along with Chain of Custody management for further processed products) under the Certified Humane® program and now applicable worldwide. These dynamic documents are always informed and kept updated based on scientific research*, veterinary advice, and the practical experience of the farming industry.

Animal welfare is improved when production managers adhere to the following practices:

- Access to wholesome and nutritious feed
- Appropriate environmental design
- Caring and responsible planning and management
- Skilled, knowledgeable, and conscientious animal care
- Considerate handling, transport, and slaughter

**** HUMANE FARM ANIMAL CARE'S SCIENTIFIC COMMITTEE***

Since the introduction of the Certified Humane® program in 2003, leading animal scientists, veterinarians, and producers have worked tirelessly with Humane Farm Animal Care not only to develop but also to continually update all the Animal Care Standards as advancements in science dictate. An up-to-date listing of these industry notables (our essential partners) is always available on our website at: <https://certifiedhumane.org/scientific-committee/>

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PART 1: INTRODUCTION

A. The Certified Humane® Label

The Certified Humane® program was developed to certify products derived from animals raised on farms that adhere to these standards. Upon satisfactory completion of the application and inspection process, farmers and ranchers are certified and given authorization to use the Certified Humane® trademarked logo. Program participants are inspected and monitored by Humane Farm Animal Care annually. Charges levied are to cover inspections and program costs.

Humane Farm Animal Care expects their certified farmers, ranchers and producers to adhere to all regional or national regulations governing husbandry, food production and environmental management as well as the Certified Humane® standards. If at times there is a conflict, the relevant rules set by the local or national authority will take precedence.

B. Guide to the Use of the Animal Welfare Standards

- The broad objectives of the standard are described at the beginning of each section.
- The numbered requirements are the standards. Compliance with all the standards is mandatory, except where a standard is deemed not applicable (these standards are written to cover facilities in varying geographic and temperate regions, and facilities using different systems; therefore, not all sections in these standards will apply to each facility).
- Boxed sections provide additional information or may highlight areas where the standards will be reviewed in the future.
- At minimum, HFAC requires compliance with any local, state, provincial, or national regulations for salmon production that affect the environment or safety of their product, as well as the veterinary protocols for their jurisdiction. Producers must meet both HFAC standards and the above regulations. If there is any overlap, the more stringent rule must be followed.

PART 2: FEEDING

OBJECTIVES: Fish need to have freedom from hunger and malnutrition by ready access to a high-quality diet that is appropriate to their species and allows full health to be maintained. Feed needs to be distributed in such a way that fish can eat without undue competition.

A. Feed

F 1: Wholesome, nutritious feed

- a. Fish must be fed a wholesome diet that:
 1. Is appropriate to their age, species, and production stage;
 2. Is provided in sufficient quantity to keep them healthy; and
 3. Is formulated or calculated to meet their nutritional needs.
- b. All feed must be manufactured from components that are free of active parasites or known pathogens and free of contamination.
- c. Fishmeal and fish oil, including krill or by-products in salmon feed, must come from certified and sustainable sources.
- d. Farm or seawater site managers must be aware of nutrient deficiencies and/or excesses at each site and correct them as appropriate.

See Appendix 1 for Additional guidance on fish feeding.

F 2: Free access to feed

Fish must have free access to nutritious feed every day in accordance with the production plan, except when otherwise indicated by the responsible veterinarian.

F 3: Feed records

- a. Producers must have written records and/or labels of the feed constituents, the inclusion rate and constituents of compound feeds, and feed supplements, including those records from the feed mill or supplier.
- b. Feed records must be retained for at least one year.
- c. These records must be available to the Certified Humane® inspector during inspection and whenever required.

F 4: Substances prohibited in feed

- a. No feedstuffs containing growth regulators or hormones is permitted.
- b. The use of veterinary medicinal products in fish feed is prohibited, except for essential therapeutic use (a disease outbreak or where welfare will otherwise be compromised as advised by a veterinary).
- c. All feed must be produced in accordance with all relevant legislation.

F 5: Provision of feed

- a. Feed must be dispensed and distributed in a way that fish can eat without undue competition
- b. Fish must be observed at least once a day while feeding.

- c. Fish on the periphery of the tank or enclosure must receive adequate amounts of feed.
- d. Stale or moldy feed must not be provided to fish.

F 6: Avoiding changes in feed

Efforts must be made to avoid sudden changes in the type and quantity of feed, except under the direction of a veterinarian.

F 7: Clean feeding equipment

- a. Manual or automatic systems must be kept clean.
- b. Feeding equipment must be designed, constructed, positioned, and maintained to minimize feed contamination.
- c. Automatic feed delivery systems must be maintained in good working order.

F 8: Fasting

- a. For harvest fish, fasting period up to slaughter must be kept to a minimum and not exceed 168 hours or 70-degree days, whichever comes first.
- b. Prior handling, fasting must be kept to a minimum and not exceed 48 hours for freshwater cycle and 72 hours for seawater cycle.
- c. Fasting protocol must be written in the Veterinary Health and Welfare Plan (VHWP - see HH 1).
- d. After any fasting period, feed must be reintroduced to:
 - 1. Encourage fish to resume feeding;
 - 2. Minimize waste;
 - 3. Allow easy access to feed and avoid undue competition.
- e. Records must be kept of the period during which fish were fasted and, when applicable, of when feed was reintroduced.

Although Coho salmon may not feed for prolonged periods in the wild, fasting farmed fish that is used to feed regularly can have an adverse effect on its welfare if not well managed. Studies with Atlantic salmon have shown that fasting for more than 14 days has negative animal welfare implications. Feeding during transport in wellboats is not possible, as it worsens water quality and harms salmon welfare. For this reason, this topic is under constant evaluation by the Certified Humane® Scientific Committee, which will incorporate new scientific evidence on fasting in Coho salmon as it becomes available.

PART 3: ENVIRONMENT

OBJECTIVES: The environment, including all the infrastructure in which fish are kept must support their welfare needs, be designed to protect them from fear, distress, and physical or physiological discomfort, distress and injury, and allow them to perform natural behaviors. The farm needs to be operated with respect to the natural environment and employees need to recognize their duty to care for the wider environment. All reasonable steps need to be taken to minimize the ecological impact of the farming system.

A. Equipment

Where management systems, designs, or layout of infrastructures not covered in the HFAC Animal Care Standards are being employed or considered, these must be referred to and discussed with the HFAC staff before they can be considered for certification.

E 1: Environment for fish

Tanks, sited normally in land with fresh water, and enclosures, which usually are sited in the sea, must be considered to fish welfare, personnel safety and minimize adverse effects to the environment.

E 2: Tanks

- a. Tanks must be designed, constructed, sited and maintained free from sharp edges and protrusions that may injure the fish.
- b. Inlets and outlets must prevent fish from escaping and the entry of wild animals.
- c. Lids, covers, barriers, or netting must be placed over the tanks to prevent fish from escaping.
- d. If nets are used, they must be of a suitable size to prevent fish in the tank from escaping and/or becoming entangled.
- e. All tanks must have an individual net (dip net) for removing dead or moribund fish.
- f. The water flow rate must be suitable for fish to hold their position in the water column.
- g. Tanks over five meters in diameter must be fitted with oxygen and/or water level alarms.

E 3: Maintenance of enclosures and netting

- a. The location of enclosures in estuaries or the sea must allow an adequate flow of clean water.
- b. Enclosures in the sea must be protected from extreme conditions that may damage them.
- c. The water current must not be too strong to prevent fish from holding their position in the water column.
- d. They must be easily accessed from the shore so that proper inspections can be carried out.
- e. Enclosures must have a minimum depth of 5 m, to avoid damage from ultraviolet radiation.
- f. Netting used in the enclosure construction must be smooth and provide a non-abrasive surface to prevent injuries to the snout, fins, and scales of fish.
- g. Biofouling must not be allowed to build up on the enclosure nets.
- h. Enclosure nets must be regularly checked for holes and fouling and maintained accordingly.

- i. Nets must be adequately tensioned and weighted to prevent distortion.

Properly tensioned netting is important to ensure that the full area of the pen is available to maintain the stocking density, and to act as a deterrent to predators.

- j. Net cleaning process must not compromise the welfare of the fish from either use of the equipment itself, or from the dirt/detritus that is released because of the cleaning.
- k. Frequency of net cleaning should be increased to mitigate the size and quantity of potential detritus.
- l. Enclosures in estuaries or seawater sites must allow fish to access the water surface.

B. Environmental Quality

E 4: External water quality (freshwater / brackish water / seawater)

- a. Water quality composition must be monitored with sufficient frequency, daily if necessary, depending on the system, the time of year, and the group's life-cycle stage.
- b. The water quality monitoring procedure must be as specified in the VHWP (see HH 1).
- c. If water quality falls outside the acceptable range, immediate action must be taken to identify the source of the problem and correct the situation as quickly as possible. A record of the actions taken must be kept in an auditable format.
- d. Deterioration of water quality caused by dirty nets or overfeeding must be avoided.

E 5: Contingency plan in recirculation systems

A contingency plan must be implemented for recirculation systems detailing the course of action to be taken should unexpected problems arise.

E 6: Lighting

- a. Lighting must be maintained at an appropriate level for each stage of development.
- b. Fish must be protected from stress caused by high levels of ultraviolet light or sudden changes in lighting levels.
- c. Tanks must be uncovered before transferring fish to sea to habituate them to brighter light.
- d. Enclosures must be of adequate depth (minimum of 5 m) to prevent damage from ultraviolet radiation.

E 7: Sufficient light in sites

Adequate lighting must be available at any time for use when inspecting fish and equipment.

Environmental Enrichment: *Recent studies and changing consumer expectations highlight the need for an annual review of the latest scientific evidence on this topic. Therefore, the program is committed to updating this section to reflect new scientific publications on the behavioral motivations and welfare needs of fish.*

It is recommended that fish be provided with at least one form of physical stimulation. This may include, but is not limited to, interactive submerged materials, such as ropes, artificial plants, or structural elements, strategically placed throughout the animals' environment; arrangements such as overhead covers that allow the animals to hide from conspecifics or seek shelter from unfavorable conditions; and elements that increase water complexity, such

as dynamic flow rates, oscillating current directions (per E 2f; E 3a and c), or bubble curtains.

It is recommended that fish be provided with at least one psychological stimulus. This may include, but is not limited to, stimuli that use natural or artificial lighting patterns with appropriate intensities and colors, strategically placed to provide a variety of visual appearances within the housing facility (per E 6). Feed delivery should avoid adverse behaviors (aggression, feed monopolization, etc.) while providing some level of cognitive choice through submerged dispensers or, in combination with substrate, promote foraging behavior (for some species or life stages) (per F 5).

C. Environmental Impact

E 8: Environmental Impact Plan

The site must develop and implement a written Environmental Impact Plan applicable to the site or the to the region, which must be updated accordingly compliant to local regulations.

E 9: Environmental regulations

- a. All relevant legislation, official guidelines and Codes of Practice must be strictly followed and understood for use of water and land.
- b. A review of environmental protection policies must be carried out in accordance with local regulations.

E 10: Environmental impact

- a. Careful consideration must be given to the possibility that therapeutic agents used may affect the environment, both locally and globally, and their use must be guided by legislation.
- b. All fish farms must keep a written policy on pharmaceutical waste.

E 11: Escapees

Sites and farms must have a specific containment plan to prevent fish from escaping, including recapture procedures.

Farmed fish that may escape can have an adverse ecological impact and are likely to experience welfare problems. It is therefore essential that all possible reasonable measures are being taken to prevent farmed fish escaping.

E 12: Extraneous species

Extraneous species must be handled in accordance with relevant legislation and local regulations.

E 13: Fallowing

Sites must undergo fallowing as detailed in the Environmental Impact Plan to allow benthic recovery and help reduce sea lice populations.

E 14: Aesthetic

Facilities must be kept organized and tidy, and all waste must be disposed of using an approved method. The burning of plastics is prohibited.

PART 4: PRODUCTION STAGES

OBJETIVES: The freshwater phase of the Atlantic salmon lifecycle involves several separate stages, ranging from the egg through to the fully smolted fish, where each requires detailed standards to ensure the welfare of the fish. These standards also need to ensure that the fish are fully prepared for the seawater phase of their lives.

The seawater stage of the salmon lifecycle contains several critical control points (CCPs), such as wellboat transportation to harvest. These standards are designed to address these CCPs to ensure that the welfare of the fish is not compromised during the seawater-based processes.

A. Freshwater (Pre-Smoltification) / Juvenile Fish

These standards relate to both recirculation and flow through systems and the following definitions apply:

- ***Eggs/ova:*** eyed eggs- Eggs that have reached the stage of development where the black eye spot is clearly visible.
- ***Alevins*** - Hatched eggs not yet ready for first feeding.
- ***Fry*** - From first feeding up to 1 gram.
- ***Parr*** - Greater than 1 gram and up to the start of smoltification.
- ***Pre-smolt*** - Parr undergoing smoltification.
- ***Smolts*** - Fully smoltified.

There are ongoing areas of research into the welfare of ova and fish in the freshwater cycle. Some of this research may challenge what is currently considered established practice. If new scientific evidence is shown to have a positive effect on the welfare of fish at these or other production stages, HFAC will seek to incorporate this information into future versions of its standards.

PS 1: Eggs and juvenile fish

- a. Broodstock and/or eggs must be tested for specific fish pathogens as required by relevant legislation.
- b. Ova and alevins supplied by third parties must be accompanied by complete health documentation and records for the broodstock population, as well as for the ova and alevins themselves.

PS 2: Water supply

The water supply must:

- a. Be of high quality (see PS 4);
- b. Be tested frequently to verify quality parameters;
- c. Be filtered or treated with ultraviolet radiation, if necessary.

PS 3: Freshwater stocking density

- a. The following maximum stocking densities must not be exceeded:
 1. Hatchery – 15,000 ova per basket/tray

2. Multi-level – 20,000 ova per tray
3. First feeding tank – 10,000/m²
4. Freshwater production tank:

Liveweight (mean)	Density (kg/m3)
Up to 1 g	10
> 1 - 5 g	25
> 5 - 30 g	35
> 30 - 50 g	50
> 50 g	60

- b. The site's stocking plan must demonstrate that the facility can maintain and meet the stocking density requirements as specified above.

PS 4: Freshwater quality parameters

- a. The following water quality parameters must be met:

Parameter	Ova	Alevins	Fry (first feeding – 1 g)	Pre-Smolt (> 1g – smolt)
Min. oxygen (O ₂) mg/l	7.0	7.0	7.0	6.5
% Oxygen (O ₂) saturation	min: 90 max: 110	min: 70 max: 110	min: 70 max: 110	min: 70 max: 110
Free ammonia (NH ₃) mg/l *	< 0.025	< 0.025	< 0.025	< 0.025
Carbon dioxide (CO ₂) mg/l (RAS only)	< 6	< 6	< 15	< 15
Maximum temperature °C	8.0	10.0	14.0	n/a
pH	6.5 to 8.0	6.5 to 8.0	6.5 to 8.0	6.5 to 8.0
Nitrite mg/l (RAS only)	< 0.1	< 0.1	< 0.1	< 0.1
Nitrate mg/l (RAS only)	n/a	< 50.0	< 150.0	< 150.0
Total suspended solids (Turbidity)	<15 mg/l	<15 mg/l	<15 mg/l	< 15 mg/l
* Not applicable to flow-through systems				

- b. Water management must prevent super-saturation.
- c. Temperature increases during the stages must be gradual to avoid thermal stress in fish.
- d. Water components (e.g., minerals) may be added to the environment in which fish are reared to achieve ideal water quality parameters.
- e. In flow-through systems, the total volume of water must be renewed at least once every two hours.
- f. In flow-through systems, the maximum acceptable water temperature for pre-smolt is 20-21°C during the summer cycle, with a minimum oxygen saturation of 76%. Under this condition, an action plan must be developed and implemented to manage and mitigate any potential risk of thermal stress in fish.
- g. Records of water quality parameters and treatment must be available to the Certified Humane® inspector during inspection and upon request.

PS 5: Eggs/ova

- a. Shocking eggs on a dry surface is prohibited.
- b. The shocking procedure must be recorded and excessive mortalities monitored.
- c. Eyed eggs must be transported using specially designed boxes.
- d. Eggs being transported must be kept in a container that maintains adequate humidity to prevent dehydration. Ice or other material must be used without direct contact with the ova, allowing water to drip and maintain humidity levels during transport.

- e. The incubation environment must minimize movement of the eggs.
- f. All ova must be disinfected before entering any new facility.
- g. Ova must be rinsed with water before being exposed to disinfectants or transported.
- h. Hatchery water flow and design must be such that no "dead spots" occur within it — that is, there must be sufficient flow to provide oxygen and remove waste products.
- i. Ova must be placed in the hatchery to ensure maximum survival rates and be accessible at picking.
- j. During picking, dead ova must be removed with the minimum disturbance required.
- k. Periodic inspections must be carried out to ensure the earliest possible detection of fungal infections.

PS 6: Hatchery

- a. All equipment used in hatcheries must:
 - 1. be fully operational;
 - 2. be maintained and repaired as necessary.
- b. Records of equipment servicing must be kept.
- c. There must be, at minimum, an alarm for water level and for dissolved oxygen.
- d. All alarms must be checked weekly and records kept.
- e. There must be a screen to prevent blockage of inlet valves, which must be checked at least once a day.
- f. Conditions in the hatchery environment must be hygienic and free of rough edges that could damage the ova.
- g. Where multi-layer systems, such as buckets, are used, water hygiene and ova integrity must be maintained.
- h. There must be no cross-contamination of water from one container to another.
- i. There must be a suitable substrate in place before hatching.

PS 7: Multi-level hatchery systems

- a. The maximum stocking density in each tray must not exceed 20,000 eggs per tray (tray size approx. 55 x 53 cm) with no more than three layers of eggs in depth.
- b. Each tray must have its own water inlet.
- c. Trays must be easily accessible to carry out tasks such as removing dead ova without disturbing the ova in other trays.
- d. Flow in each tray must be visible and/or measurable and must be monitored to ensure maximum ova survival. Records of survival rates must be available.
- e. Producers must be able to demonstrate that mortality was below 5% in the previous year if they intend to store more than 15,000 eggs per tray.

PS 8: Alevins

- a. The hatching substrate must provide a safe environment for alevins without high densities.
- b. All alevins must be inspected daily to remove any that have died.
- c. Moving alevins is permitted, but nets must not be used to do so when their weight is below 0.5 grams.
- d. There must be a lighting program that mimics the photoperiod and avoids abrupt changes in light levels.
- e. When water temperature is manipulated, fluctuation and the temperature gradient must be kept to a minimum.

- f. Feeding must begin once 90% of alevins have absorbed the yolk sac.

PS 9: Fry

- a. Fish must have access to sufficient feed to keep them in full health and vigor, available to satiate the fish and distributed at regular intervals daily.
- b. Daytime light levels must allow all fish in the water column to see the feed.
- c. Suspended solids load must allow visibility to the bottom of the tank.
- d. Water depth must be appropriate to the tank being used in order to maintain optimal water quality levels.
- e. As fish move up from the bottom of the tank, water depth must be adjusted to allow their natural behavior.

PS 10: Parr

- a. Any procedure involving the use of grading must be recorded.
- b. First grading should only be carried out once the majority of fish weigh more than 1.3 grams.
- c. The grading machine must be suitable for the size and type of fish.
- d. When more than one fish weighing less than 5 grams requires euthanasia, they must be placed in an anesthetic mixture as prescribed by a veterinarian, and this procedure must be recorded.

PS 11: Smoltification

- a. The Coho salmon smoltification process must be fully described, monitored, and recorded during the smoltification period (see HH 1).
- b. All fish must be fully smoltified before proceeding to the next production stage in seawater.
- c. Records of tests verifying the effectiveness of batch smoltification must be available to the auditor.
- d. The use of hypertonic water (water above 35 ppt) for smolt survival testing is prohibited.

B. Estuaries and Seawater Sites
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PS 12: Stoking density in estuaries or seawater sites

- a. All fish must come from a Certified Humane®-approved population, including any fish that spent part of its life at another freshwater site before being moved to the current site.
- b. The maximum stocking density of 15 kg/m³ in estuary or seawater cages must not be exceeded.
- c. Management measures must be established and implemented to prevent exceeding the maximum permitted density and compromising salmon welfare (e.g., alternative diet, feeding regime, early harvest).

PS 13: Water quality in estuary or seawater sites

- a. Acceptable ranges for environmental water quality parameters, as well as monitoring harmful algae, must be described in the VHWP (see E 4).
- b. Available dissolved oxygen (DO) saturation must never fall outside the ideal range. Should this occur, the event must be recorded, the cause investigated, and the corrective actions implemented must be documented.

Water temperature (°C)	Ideal saturation (%)
4	> 43
6	> 49
8	> 55
10	> 61
12	> 67
14	> 72
16	> 78
18	> 84
20	> 90

PS 14: Seawater cage design

- a. Net depth must be such that there is a space of at least 5 meters between the bottom of the net and the seabed.
- b. Whatever net design is used, the cone ratio considered in stocking density calculations must allow a swimming circle with a minimum diameter of 5 meters. This includes all types of conical nets: circle with conical base, square with conical base, and fully conical nets.

PART 5: MANAGEMENT

OBJECTIVES: A high degree of caring and responsible management is vital to good animal welfare. Managers and caretakers for both freshwater or sea water facilities must be thoroughly trained, skilled and competent in animal husbandry and HFAC Animal Care Standards.

A. Managers and Stock-keeper Training

M 1: Understanding the standards

Managers must ensure that:

- a. All those responsible for the fish have a copy of the current version of the Certified Humane® Welfare Standards for Farmed Coho Salmon.
- b. They and all personnel involved in husbandry practices are familiar with the standards and apply their content.

M 2: Training

- a. Site managers must:
 1. demonstrate that all staff working with the fish are trained and competent in the aspects of rearing and welfare relevant to their duties. Where deficiencies are identified, site managers must provide adequate training to ensure that everyone responsible for the fish has the necessary skills;
 2. ensure that all external personnel assisting with rearing, handling, procedures, and processes at the sites (i.e., grading, harvest, treatment, vaccination, and transport) have adequate training to ensure fish welfare.
- b. Written records of training for site managers and staff (including third parties) must be kept.
- c. Stock-keepers and all personnel involved in husbandry practices must be able to:
 1. be able to demonstrate competence in procedures with the potential to cause pain or distress, including the use of nets or other forms of handling, grading, and euthanasia;
 2. recognize indicators of poor welfare in fish, including abnormal behavior, physical injuries, and signs of disease;
 3. understand the needs of the fish and be aware of the risks that exist and the procedures for addressing those risks;
 4. recognize visual indicators of poor water quality (e.g., fish gasping and/or increased aggression);
 5. recognize behavioral indicators in fish caused by poor water quality or any other abnormal behavior.
- d. An adequate number of experienced staff must be available to deal sufficiently quickly with any problems that arise.

M 3: Emergency management

Site managers must:

- a. Develop and implement plans and preventive measures with procedures to follow in emergencies such as fires, leaks, disease outbreaks, extreme weather conditions, transport

problems, and any other catastrophic event that could adversely affect water quality, such as algal blooms or jellyfish swarms.

- b. Provide a notice on how to act in an emergency in an easily accessible location, highlighting the appropriate emergency contact numbers and a reference map showing the location of the unit.
- c. Ensure that all relevant staff members are fully familiar with the procedures to be implemented in the event of a fish escape, including a recapture plan.

B. Inspection and Records

M 4: Operation records

Operation records must be kept up to date and presented in an auditable format to the Certified Humane® inspector. These records must include at least:

- a. Details of the origin of the populations to allow traceability;
- b. Monitoring of any unwanted animal/species other than the target species;
- c. Grading and selection records;
- d. Equipment calibration records;
- e. Number, age, and weight/uniformity of fish in each tank/cage;
- f. Current estimated stocking densities in each tank/cage;
- g. The anticipated age and weight at which fish will be transferred to sea or slaughtered (to predict final stocking density);
- h. Details of fish and equipment inspections;
- i. Daily and cumulative mortality expressed as a percentage (with reasons stated);
- j. Daily and cumulative culling expressed as a percentage (with reasons stated);
- k. Feed consumption;
- l. Details of health problems;
- m. Details of medication/vaccines administered;
- n. Smoltification monitoring records;
- o. Records of regulatory correspondence (Sernapesca, Ssubpesca, SAG, etc.);
- p. Water quality testing records as appropriate to the system;
- q. Records of net inspections and maintenance;
- r. Training records;
- s. Details of fish movements, to allow traceability.

M 5: Monitoring fish

- a. Fish must be inspected at regular intervals at least twice a day, weather permitting.
- b. Any welfare problem observed by a worker during an inspection must be addressed appropriately and without delay.
- c. If problems are identified during an inspection, workers must act promptly to determine the cause and take corrective action, in consultation with a veterinarian when necessary.
- d. Complete records of inspections must be kept, including:
 - 1. the time and date of the inspection;
 - 2. identification of the person(s) carrying out the inspection of each group of fish;
 - 3. details of any problems identified, and any action taken, including those relating to moribund/injured/damaged fish, where the reason for the problem must be recorded.

M 6: Dead/moribund fish

- a. Removal of dead/moribund fish from the surface or from the mortality removal system must occur as frequently as necessary and, in any case:
 - 1. at least twice a week, unless adverse weather conditions put at risk personnel;
 - 2. at least daily for land-based systems.
- b. The cause of death of all fish must be classified, and a veterinarian must be consulted if the cause is unclear, based on the criteria identified in the VHWP (HH 1).
- c. Relevant staff must demonstrate competence in interpreting mortality records.

M 7: Equipment

- a. Any equipment defect must be rectified immediately or, if this is not possible, alternative measures must be taken to safeguard fish welfare.
- b. Alternative measures must be included in the "Emergency and Contingency Action Plan" section of the VHWP (see HH 1), and all staff must be familiar with them.

M 8: Complaints to Operators

- a. To be certified, an Operation must maintain systems for receiving, responding to, and documenting complaints alleging the Operation's failure to comply with *Humane Farm Animal Care* standards.
- b. Whenever an Operator receives a complaint, it must record:
 - 1. date;
 - 2. format of the complaint (written or verbal);
 - 3. complainant;
 - 4. description of the complaint;
 - 5. action taken to resolve the complaint;
 - 6. results of the measures adopted;
 - 7. supervisor's initials.
- c. Operators must notify Certified Humane® if an adverse ruling (such as suspension or revocation of certification, fine, or sanction) related to the Operation's humane management practices is levied against the Operation by another certifier or by a governmental program which regulates the industry.

PART 6: HEALTH AND HUSBANDRY PRACTICES

OBJECTIVES: Fish must be protected from pain, injury and disease. The environment in which they are raised must be conducive to supporting good health. All producers must develop a health plan in consultation with their veterinarian. Animals need to be handled in a considerate and skilled manner.

A. Health Care Practices

HH 1: Veterinary Health and Welfare Plan (VHWP)

- a. A Veterinary Health and Welfare Plan (VHWP) specific to the fish farm or seawater site must be developed, reviewed, and updated in consultation with a veterinarian:
 1. at the start of each production cycle or annually;
 2. carried out by those responsible for fish health and welfare, who may include the veterinarian, health manager, farmers, nutritionist, and other relevant staff;
 3. details of the review must be available upon request.
- b. The VHWP must include future rearing plans, risk assessment, and monitoring and control of fish health and disease.
- c. The VHWP must be treated as a living document and, therefore, if a problem is identified, it must be reviewed without delay to ensure that fish welfare is not compromised.
- d. The VHWP must establish a methodology for monitoring salmon welfare indicators (SWIs), including but not limited to: eye abnormalities (exophthalmia, hemorrhages), operculum damage, emaciation, vertebral deformities, other malformations, skin lesions, scale loss, fin damage, and sexual maturation.

HH 2: Notifiable diseases

All relevant legislation regarding notifiable diseases must be understood and adhered to.

HH 3: Preventing injuries

- a. There must be no recurring physical damage occurring on fish attributable to features of their environment, husbandry procedures or unrecognized disease challenge.

Recurring physical damage is that observed on several fish and with sufficient similarity to suggest a common cause, body lesions due to, for example, poor tank or enclosure design, methods of handling or a husbandry procedure. Different types of physical damage may also suggest a common cause.

- b. Fish condition must be continuously monitored to detect signs of disease or problems with the environment or handling practices.

HH 4: Care of sick and injured animals

Any fish showing evident physical injury or signs of disease must be:

- a. Segregated;
- b. Treated and/or humanely euthanized without delay.

HH 5: Casualty slaughter

- a. Any severely sick or injured fish, or fish that fails to recover, must be humanely euthanized without delay. This must be recorded and available upon request.
- b. During the seawater stage, in addition to anesthetic overdose, the following methods are permitted for casualty slaughter of fish:
 - 1. a priest of appropriate size for the fish;
 - 2. a mechanical percussive device.
- c. Use of the casualty slaughter methods listed in HH 5.b must result in an irrecoverable percussive blow to the fish's head so that it is rendered immediately insensible.
- d. Severely injured or sick fish must never be left to die out of water.
- e. Euthanasia for sick or injured fish must only be performed by properly trained and competent persons.

HH 6: Biosecurity

High biosecurity standards must be maintained to prevent the spread of disease between different fish populations, as specified in a written standard within the VHWP (see HH 1).

B. Handling

HH 7: Handling

- a. Fish must only be removed from the water and handled when absolutely necessary.
- b. If fish must be handled:
 - 1. the body must be given adequate support;
 - 2. live fish must never be held solely by the tail or thrown onto solid objects.
- c. The time a fish spends out of water must:
 - 1. be as short as possible;
 - 2. never exceed 15 seconds for a live fish (unless anesthetized).
- d. Fish must not be left to die out of water.
- e. Fish must not be crowded for more than two hours.

HH 8: Monitoring fish

- a. Producers must:
 - 1. humanely euthanize any extraneous/non-target fish found in tanks or cages;
 - 2. be aware of and adhere to any legislation relating to protected species.
- b. Fish must be monitored throughout the operation by a designated person who is competent and trained, and whose responsibility is to recognize welfare problems and take appropriate action when necessary.
- c. Mortality checks must be recorded as soon as possible after grading.

HH 9: Oxygen levels

- a. Oxygen levels in the water:
 - 1. must be monitored and recorded throughout all grading operations (e.g., grading, vaccination, and/or treatments);
 - 2. must not fall below 6 mg/l or 70%, with appropriate action taken should this occur.
 - 3. In cases of high temperatures > 18°C, saturation must be maintained at >76%.
- b. Supplemental oxygen and/or aeration must be available during grading.

HH 10: Pumps / Pipes / Hand nets

- a. When pumps and pipes are used, they must:
 - 1. not unnecessarily stress the fish;
 - 2. be of an appropriate size for the fish being pumped to avoid injury;
 - 3. be free of protrusions, bends, and kinks that could injure fish.
- b. Whenever pipes are used, there must be a humane method to ensure that all fish have been removed from the pipe at the end of the operation or if the equipment fails during the process.
- c. The drop from the end of any pipe must be such that it:
 - 1. prevents fish from being injured;
 - 2. allows fish to disperse without others falling on top of them.
- d. When hand nets are used, they must:
 - 1. be of an appropriate size;
 - 2. be designed to prevent physical injury;
 - 3. be kept clean, in good condition, and disinfected before use with different fish populations.

C. Treatment and Vaccination

HH 11: Injection procedures

- a. Any injection administered to fish in freshwater, estuaries, or seawater sites must be described in the VHWP.
- b. The entire injection procedure must be continuously monitored to ensure fish welfare is not compromised.
- c. Mortality checks must be recorded within 48 hours after the injection is administered.
- d. Medications administered by injection must be used in accordance with the manufacturer's instructions.
- e. No cage/tank must be crowded for grading more than twice a week or three times in a month, unless the responsible veterinarian advises otherwise.
- f. After transferring to sea, smolts must not be handled for at least 60 days (e.g., not crowded), except for veterinary treatment and/or sampling required by competent authorities.
- g. Needles must be inspected and replaced when necessary, in accordance with manufacturer guidelines.
- h. Fish sampled during inspection must only be euthanized by trained and competent staff.
- i. The designated supervisor/team leader must verify that the procedure is being carried out correctly at the start of the process and at regular intervals during the day. These checks must be recorded.
- j. The injection procedure must be inspected by a third party.

HH 12: Anesthesia

- a. All fish must be anesthetized before being vaccinated by injection, and this procedure must be carried out by trained and competent staff.
- b. Anesthetics must be used according to the manufacturer's instructions and must:
 - 1. be on site before vaccination begins;
 - 2. be administered to fish only by properly trained staff.

- c. After vaccination, any slope from the vaccination table to the recovery tank/cage must be such that fish are not at risk of hitting the bottom of the tank/cage or other fish.
- d. Care must be taken when returning recovering fish to the tank/cage after anesthesia/vaccination.
- e. There must be a team member responsible for:
 - 1. periodically monitoring oxygen levels at a minimum of 6 mg/l in the anesthetic bath and in the recovery tank to ensure that fish are recovering from the anesthetic process;
 - 2. checking water depth and flow to ensure that returning fish do not enter water with incorrect flow, depth, or quality;
 - 3. rectifying and recording any problems.

HH 13: Treatments

- a. Medication for treating fish:
 - 1. must only be administered by properly trained staff;
 - 2. must be administered strictly in accordance with the prescribed instructions, which must be on site before treatment begins;
 - 3. must be administered as directed by the responsible veterinarian and in accordance with legislation in force for use in Coho salmon.
- b. In exceptional circumstances, on the recommendation of the designated veterinarian, specific products authorized for use in other food-producing species may be administered as detailed in the VHWP, provided a valid discharge consent from the relevant government body is in place.
- c. Withdrawal periods for veterinary medicines must be strictly observed.
- d. Veterinary products must be properly labeled and stored.
- e. Records of all treatments must be kept.
- f. Any treatment that clearly has not worked or has caused an adverse reaction must be:
 - 1. recorded in the medication log;
 - 2. reported to the fish farm's or seawater site's health manager and veterinarian.

HH 14: Vaccination

- a. The VHWP must present a detailed vaccination schedule.
- b. A prior vaccination plan must be in place that:
 - 1. is agreed upon and signed by the vaccination team leader and the designated site supervisor;
 - 2. includes the number and weight of fish to be vaccinated;
 - 3. details the expected duration of the process.
- c. Vaccination teams must ensure that all staff working with the fish are trained and competent in the aspects of the vaccination process assigned to them;
- d. Site staff must ensure that all fish have been graded prior to injectable vaccination.
- e. Vaccines must be used in accordance with the manufacturer's instructions.
- f. Vaccines and/or anesthetics must:
 - 1. be on site before vaccination begins;
 - 2. be administered to fish only by properly trained staff.
- g. Water temperature for vaccination must be as indicated in the manufacturer's instructions.
- h. All fish must be adequately anesthetized before being injected.
- i. When fish are humanely euthanized during the freshwater stage, this must be done using an overdose of an appropriate anesthetic.

- j. At the end of the vaccination process, there must be an equivalence between the amount of vaccine used and the number of fish vaccinated. This must be recorded.

HH 15: Freshwater automated vaccination

- a. All fish must be pre-graded before being vaccinated.
- b. An assessment of fish condition must be carried out before the grading process begins, to ensure they are strong enough to withstand the grading procedure, where the machines simultaneously grade the fish during vaccination.
- c. Vaccination equipment must:
 - 1. be thoroughly checked after transport for damage or broken parts that could stop the process;
 - 2. be calibrated according to fish size, considering injection depth, position, angle, and vaccine dose;
 - 3. be checked at least once every hour to verify that calibration remains correct during the vaccination process.
- d. A sample of fish must be vaccinated to verify equipment calibration before starting the process. Sampled fish must be humanely euthanized to confirm vaccination accuracy.
- e. All fish must be properly anesthetized before being vaccinated.
- f. There must be continuous monitoring to ensure no fish are trapped in the pipes, and these checks must be recorded.
- i. Needles must be inspected at least every two hours and replaced if necessary, in accordance with manufacturer instructions.
- j. After transport, the machine must be thoroughly checked to ensure none of the moving parts are damaged during transport.
- k. At the end of the process, there must be a record of the relationship between the amount of vaccine used and the number of fish vaccinated.

D. Mortality, Mutilations, Genetic Selection

HH 16: Mortality recording and reporting

- a. When the fish mortality level exceeds the maximum limits shown below, this must be recorded and reported to the Certified Humane® office within the first 72 hours:
 - 1. Freshwater:
 - Ova to first feeding: 6% weekly
 - First feeding to 5g: 3% weekly
 - 5g to smolt: 1.5% weekly
 - 2. Estuaries or Seawater Sites:
 - Cumulative mortality at 30 days post-transfer to the estuary or seawater site: < 0.6%
 - Cumulative monthly mortality: < 0.7%
- b. When the mortality level exceeds the figures mentioned above:
 - 1. an investigation must be carried out to determine the cause of the mortality;
 - 2. a plan must be put in place to address the issue.

HH 17: Mutilations

- a. Mutilations involving the removal of sensitive tissue are prohibited.
- b. Marking methods that cause pain or injury to fish must not be used.

HH 18: Genetic selection and modification

- a. Transgenic techniques are prohibited during genetic improvement.
- b. Fish must not have been produced using breeding techniques that cause them health or welfare problems.
- c. Genetic modifications and edits that negatively affect fish welfare are prohibited.

E. Grading/Crowding

Optimizing husbandry practices and aquaculture environments can significantly reduce the development of size hierarchies within fish populations and therefore also reduce the need for grading. For example, evidence shows that feed distribution and ration size are very important, as is knowing how many fish there are and what size they are within the population.

Underfeeding rapidly results in the development of a hierarchy that, if allowed to persist, can cause welfare problems for some fish.

Lighting strategies can also reduce or eliminate the need to grade maturing populations.

HH 19: Grading plan

- a. Grading must only be carried out when absolutely necessary.
- b. A written grading plan must be agreed upon between management and site staff and/or the grading operator before operations begin. This plan must become part of the VHWP (HH 1).
- c. The grading plan must include:
 1. the reason grading is necessary;
 2. a pre-grading risk assessment;
 3. the number of fish to be graded per day;
 4. the location of fish populations before and after grading;
 5. the pre-grading fasting period;
 6. the health status of the fish;
 7. the equipment to be used, including the type of grading machine;
 8. the expected timeline for completion of grading;
 9. the required number of staff and the tasks to be performed;
 10. the physical characteristics of the site, such as water temperature, tides, and weather conditions;
 11. training records for the grading team;
 12. the requirement for a post-grading health check;
 13. post-grading mortality records;
 14. the agreement and signatures of the site manager and the grading team leader.

HH 20: Grading equipment

- a. All grading equipment must be designed and maintained to prevent injury or stress to fish.
- b. Grading nets must be knotless, have a design optimal for the cage, and have a mesh size appropriate for the fish.
- c. Grading nets must be used to gather a portion of the population rather than all the fish in the cage.
- d. Cage nets must be kept clean to avoid water quality problems during grading.

- e. All equipment must be thoroughly cleaned and disinfected before use and between sites.

HH 21: Grading process

- a. Only healthy fish must undergo the grading process.
- b. It is preferable to grade all populations into new tanks/cages to promote optimal welfare.
- c. Before grading, fish must be fasted for the minimum period required so as not to compromise their welfare (see F 8).
- d. If fish are returned to their original tank/cage, it must be large enough to ensure the welfare of both the original and the returning population.
- e. Grading must be completed in one continuous operation.
- f. No tank/cage must be crowded for grading more than twice a week or three times in a month, unless required by the designated veterinarian for reasons of fish welfare.
- g. Grading operations must not be carried out if adverse weather conditions are likely to compromise fish welfare.

HH 22: Passive grading

- a. When a passive grading system is used, the size and design of the grading panel must be appropriate for the size of the fish being graded and the cage in which they are located. Passive grading must be carried out whenever possible and practical.
- b. Grading panels must be checked beforehand for signs of wear before starting the operation.

HH 23: Manual grading

- a. Pumps must be able to pump to the required distance.
- b. The operator must be able to control pump speed.
- c. All pipes must be:
 - 1. smooth with rounded bends;
 - 2. of a diameter appropriate to the size of the fish, including where they pass through couplings.
- d. Water must always flow through the pipes to minimize descaling.
- e. The grading table must be smooth and free of sharp edges.
- f. Where counters are used, they must be in good working order and fit for purpose.
- g. The grading net must:
 - 1. be of an appropriate size;
 - 2. have sufficient buoyancy;
 - 3. be knotless mesh.
- h. No fish must remain out of water for more than 15 seconds, unless anesthetized.

HH 24: Wellboat grading

- a. All wellboat crew involved in the fish grading process must have received adequate welfare training in addition to being aware of their maritime responsibilities.
- b. There must be a designated person responsible for the care of the fish for as long as they are on board.
- c. All equipment must be checked to ensure it is working and fit for purpose before fish pumping begins.
- d. Great care must be taken when pumping fish.
- e. The grading machine must be positioned so that the crew member operating the pumps has a clear view of the fish.

- f. Grading equipment must provide safe access for staff around it to facilitate routine inspection.
- g. Return pipes must:
 - 1. be well supported;
 - 2. have the minimum number of joints;
 - 3. be long enough that the graded population can be returned safely away from the edge of the cage.
- h. Before leaving the site, careful inspection and disinfection of the equipment must be carried out as appropriate.

Using a vacuum pump on fish twice in 24 hours is not optimal practice for animal welfare. Where possible, preference should be given to using wellboats with "overpressure" (reverse siphon) discharge capability.

- i. Any fish placed in the hold after grading must be subject to an additional welfare risk assessment.
- j. Any additional fasting period must be authorized by the veterinarian or health officer and recorded in the VHWP (see HH 1).
- k. Discharges that do not involve the use of movable bulkheads must be able to keep the wellboat balanced during the final stages of discharge to avoid compromising the welfare of the last fish.
- l. A grading plan must be kept on site for inspection.

HH 25: Pushing / towing cages

- a. The speed of pushing must be suitable for the size of the fish.
- b. There must be a designated person on the enclosure who is responsible for maintaining the welfare of the fish.
- c. There must be clear communication between the skipper and the designated person on the enclosure.
- d. The speed of pushing must not be faster than the speed of the swimming fish.

F. Protection from Other Animals

HH 26: Precautions and protection from other animals

- a. Humane precautions must be taken to protect salmon from other animals that could cause them harm and/or transmit disease.
- b. The methods used to protect fish must be documented in the Predator Control Plan.
- c. The primary means of protecting fish must be physical exclusion, preventing other animals from entering tanks and cages.
- d. If fish have been attacked, they must be examined promptly, as soon as the attack is known, to check for signs of injury.

HH 27: Wild animals trapped in enclosure nets

- a. The following data must be recorded for all wild animals removed from nets:
 - 1. species;
 - 2. date of removal;
 - 3. whether the animal was alive or dead at the time of removal.

- b. Cages must:
 - 1. be protected with visible top nets that are secured to prevent predators from entering;
 - 2. have a mesh size that does not trap birds.

HH 28: Predator-proof nets

- a. The deployment of predator-proof nets must be considered at sites and during periods of high risk, and at any other time if there is a risk of attack.
- b. When predator-proof nets cannot be deployed for animal welfare reasons, the precise nature of those animal welfare reasons must be documented and recorded.
- c. Shooting sea lions is prohibited.

HH 29: Acoustic devices

- a. Acoustic deterrent devices or acoustic scaring devices may only be used in accordance with required licensing, legislation, codes, and/or guidelines.
- b. If these devices are used, they must:
 - 1. operate without adversely affecting non-target species;
 - 2. be effective in deterring predation by sea lions;
 - 3. be checked regularly and kept in good condition to ensure they are fully operational.
- c. If these devices are implemented:
 - 1. their continued operational status must be recorded as part of daily site checks;
 - 2. the date the devices were installed must be recorded in the VHWP.

PART 7: TRANSPORTATION

Objectives: Transport systems need to be designed and operated to ensure that fish are not caused unnecessary distress or discomfort. The transport and handling of fish must be kept to an absolute minimum. Those involved in fish transport need to be thoroughly trained and competent to carry out the required tasks.

A. General Transport

T 1: Transport suppliers allowed

All suppliers of the different transport methods (road/helicopter/wellboat) used to transport fish from Certified Humane®-approved sites must also be approved by HFAC.

T 2: Training and awareness of welfare

- a. All people involved in fish transport must be familiar with, and transport fish in accordance with all relevant legislation.
- b. Staff must be trained and competent to maintain animal welfare, and to recognize and promptly resolve any problems.
- c. Transport operators must ensure that all people involved in fish transport have a copy of the current version of the Certified Humane® Welfare Standards for Farmed Coho Salmon at each site or vehicle, and that they:
 1. are familiar with its contents;
 2. understand and apply its contents;
- d. All staff working with or handling fish must:
 1. be trained and competent;
 2. be aware of their duties;
 3. be aware of the related welfare risks;
- e. Staff training records must be kept and made available during inspection and upon request.

T 3: Transport planning

There must be adequate planning and orderly communication among all those involved in the transport/harvest/grading of fish to avoid potential or actual delays and welfare problems for the salmon. Planning records must include:

- a. The number of fish to be transported;
- b. The size range of the fish;
- c. The weight of the fish;
- d. The current health status of the fish.

T 4: Handling

Any handling of fish prior to transport must:

- a. Be kept to a minimum;
- b. Be carried out in a way that avoids unnecessary discomfort to fish;
- c. Prevent fish from being out of water for more than 15 seconds (unless anesthetized).

T 5: Water quality and stocking density

- a. Water temperature and pH must be as close as possible to those at the site of origin.

- b. Oxygen and temperature must be monitored frequently enough to allow contingency measures to be taken, and oxygen levels in the water:
 - 1. must not fall below 6 mg/l or 70%, with appropriate action taken should this occur.
 - 2. in cases of high temperatures >18°C, saturation must be maintained at >76%.
- c. The water must not contain contaminants that could be harmful to fish welfare.
- d. Maximum stocking density during transport must follow best animal welfare practices in accordance with logistical realities:
 - 1. smolts on trucks: maximum density of 80 kg/m³ for transports longer than 6 hours, or 95 kg/m³ for transports shorter than 6 hours.
 - 2. smolts on wellboats: maximum density of 60 kg/m³ for transports longer than 8 hours, or 70 kg/m³ for transports shorter than 8 hours.
 - 3. harvest wellboats: maximum density of 125 kg/m³ for transports longer than 8 hours, or 135 kg/m³ for transports shorter than 8 hours.
- e. Water quality, handling, biosecurity measures, and records must conform to the established standards for all types of transport.

B. Site Staff Responsible for Moving Fish

T 6: Transport plan

- a. Every trip must have a transport plan covering the important aspects of the trip, including:
 - 1. the duration of the trip;
 - 2. water quality;
 - 3. the identity of those responsible for fish welfare.
- b. Site managers must ensure that all staff, including transport staff, are aware of this transport plan.
- c. Wellboats arriving in Chile to work in Chilean waters must have a valid disinfection certificate from their country of origin.

T 7: Fish fit for transport

- a. Only healthy fish free of injury must be transported.
- b. Care must be taken to ensure dead fish are not loaded for transport.
- c. Sick or severely injured fish:
 - 1. must not be transported;
 - 2. must be humanely euthanized.

T 8: Monitoring and records

- a. There must be a designated staff member responsible for monitoring fish welfare during loading, transport, and unloading.
- b. Records of procedures related to loading, transport, and unloading must be kept, including details of any incident or risk to fish welfare.
- c. The following records must be kept:
 - 1. time since the last handling;
 - 2. time since vaccination;
 - 3. time since the last treatment (including anesthesia);
 - 4. fasting time;
 - 5. date of transfer from freshwater to estuary and/or sea;

6. any clinical signs of disease;
7. grading records;
8. oxygen levels during grading;
9. number of fish in each tank to be transported;
10. stocking densities of the tanks used for transport.

T 9: Fasting

Fasting prior to transport:

- a. must never exceed 72 hours for fish in freshwater, estuary, or sea, unless otherwise specified by a veterinarian.
- b. must be recorded in the VHWP when the above time limits are exceeded, along with the related causes.

T 10: Bath treatments

Any bath treatment must:

- a. be completed a minimum of 14 days before transport, unless a veterinarian indicates otherwise.
- b. be recorded in the VHWP.

T 11: Nets for transport

- a. Hand nets:
 1. must be the correct size so they can be lifted easily and fish at the bottom of the net are not injured;
 2. must have a mesh size appropriate to the size of the fish to prevent escapes;
 3. must not be overfilled.
- b. Fish must not be placed in nets before everything is ready for loading into transport tanks/the helicopter.
- c. Netting the last fish in any tank must be done with great care to avoid harming any fish.

C. Transport Staff

T 12: Equipment inspection

- a. All equipment on which fish depend for life support must be inspected at least every 4 hours.
- b. If equipment faults are found:
 1. fish in transit must be inspected;
 2. any problem must be corrected immediately.

T 13: Management of oxygen, water temperature and pH

- a. Aeration or supplemental oxygen must be available throughout transport, sufficient to last at least 50% longer than the expected duration of the trip.
- b. Oxygen levels must:
 1. Be monitored throughout the trip (including internal trips);
 2. Be maintained in accordance with T 5.

T 14: Records of dead or injured fish

- a. Any fish that dies during transport must be segregated from live fish immediately upon arrival.
- b. Records must be kept of any death or injury occurring during transport.

T 15: Cleaning and disinfection

Transport containers and equipment must be cleaned and disinfected after each trip to prevent the spread of disease to fish.

D. Fry Transport

T 16: Fry transport

- a. Calculations of stocking densities based on tank floor area must consider the tendency of fry to crowd at the bottom of the tank.
- b. Oxygen supply to the bottom of the tank must consider the crowding behavior of fry.
- c. If a hose is used to rinse the tank at the end of unloading, it must not be aimed at the fish, but at the tank wall, to avoid injuring them.
- d. Oxygen levels must:
 - 1. be monitored continuously;
 - 2. be maintained in accordance with T 5.
- e. Transfer bags must be securely fastened to avoid harming fish.
- f. Vessels must be booked in advance before departure.

E. Road Transport

T 17: Driver's responsibilities

- a. The vehicle driver must:
 - 1. be fully aware of the transport standards relating to salmon;
 - 2. understand the needs of the fish being transported;
 - 3. transport fish in a manner that does not compromise their welfare;
 - 4. be adequately trained to carry out their duties.
- b. Before leaving the site of origin, the vehicle driver must:
 - 1. carry out a visual check of oxygen levels and aeration rates in the tanks;
 - 2. record oxygen levels on the log sheet.
- c. During the trip, if oxygen levels become unstable, the driver must:
 - 1. be able to visually check fish for signs of stress;
 - 2. be able to identify the cause of oxygen instability;
 - 3. take appropriate action to ensure fish welfare.
- d. Vehicle drivers must be able to access below deck during the trip to monitor fish welfare.
- e. On arrival at the unloading site, the driver must:
 - 1. be aware of environmental and biosecurity requirements before arriving at the site;
 - 2. ensure compliance with any environmental and biosecurity requirements.

T 18: Transport tanks and openings

- a. Tank insulation must be such that it allows the water to be maintained at a constant temperature of +/- 1.5°C from the start of the trip.
- b. All transport tanks and life support systems:
 - 3. must be fit for purpose;
 - 4. must be fully inspected before loading;
 - 5. must have no leaks, splinters, or cracks.
- c. All covers, outlets, and any other openings must be fully secured before departure.

T 19: Stocking density and water quality

- a. Tanks must contain water of adequate quality, with temperature and oxygen levels monitored and regulated in accordance with the PS 4 standard.
- b. Maximum stocking density must be set so that water quality can remain the same for the entire duration of the trip.
- c. Diffused oxygen must be distributed throughout the water column using an oil-free compressor.
- d. There must be sufficient aeration to prevent dead spots in the tank.

T 20: Ferries

- a. If a trip requires the use of a ro-ro ferry, procedures must be in place to ensure fish welfare during the crossing.
- b. All vessels used must be booked in advance before departure.

T 21: Unloading

- a. After arriving at the site, unloading must be carried out without undue delay.
- b. The truck must be positioned so that all tanks can be fully emptied, considering any unevenness in the ground.
- c. Valves must be adequate to allow more than one fish through at a time.
- d. All pipes must be securely fastened to prevent fish from escaping during unloading.
- e. All unloading must be carried out through valves, rather than removing fish from tanks with nets.
- f. Any pipe must be adjustable to account for any rise and fall of the tide.
- g. There must always be water in the tanks during unloading to prevent the last fish from drying out and running out of oxygen.
- h. There must be a system for flushing the tanks at the end of unloading to ensure the last salmon are removed without compromising their welfare.
- i. Tank design must include sloped floors to facilitate unloading of the last fish and guide them toward the outlet.

F. Helicopter Transfer

T 22: Crew involved

- a. Pilots and ground staff must be trained and competent in how they handle fish and aware of the welfare consequences.
- b. Staff must be available at each fish receiving site who are aware of the procedures necessary to safeguard fish welfare.

- c. Site staff must be able to communicate with the loading site and the helicopter crew.

T 23: Preparations

- a. All receiving cages must be clearly identified, for example with marker buoys.
- b. Helicopter tanks and other auxiliary equipment must:
 - 1. be in optimal maintenance condition;
 - 2. be clean;
 - 3. be fit for purpose.
- c. There must be enough tanks to ensure that the time fish wait to be transported does not compromise their welfare.
- d. The maximum expected travel time to the unloading site with fish aboard must not exceed 15 minutes.
- e. A sample fish weight must be known before loading begins.
- f. A contingency plan must be in place in case of:
 - 1. bad weather;
 - 2. failure of a tank to open.

T 24: Loading

- a. Fish must be transferred from the rearing tanks/cages without causing them harm.
- b. Loading fish into the tanks must be timed to coincide with the arrival of the helicopter.
- c. The helicopter tank must contain approximately two-thirds of water before fish are loaded into it.
- d. The tank's life support system must be switched on and working before fish are introduced.
- e. Helicopter buckets must have their own independent oxygen supply.
- f. The oxygen level in the bucket must:
 - 1. be the same as that of the tanks the fish came from;
 - 2. be maintained at a minimum of 6 mg/l.
- g. The maximum stocking density in the tank must not exceed 400 kg/m³.

T 25: Unloading

- a. When unloading fish, the helicopter tank must be lowered gently into the water to avoid injury.
- b. Before departing, the helicopter tank must be allowed to empty completely.

G. Wellboat Transport (Pre-smolts or Smolts) and Receiving

T 26: Requirements for wellboats and planning

- a. Only wellboats capable of operating with closed valves are permitted.
- b. The trip must be planned to ensure that arrivals at loading and unloading sites are timed to avoid delays in moving the fish.
- c. There must be sufficient light in the well to allow easy inspection of the fish.
- d. If necessary, during smolt transport in the wellboat, the water may be cooled gradually by a maximum of 1.5°C every 4 hours to match the temperature of the destination seawater site.

T 27: Stocking density and fish counting equipment

- a. Maximum stocking densities must follow those established in T 5, and must also be set so that water quality can be maintained throughout the trip.
- b. Where fish counting equipment is used, it must:
 - 1. be positioned over a drain;
 - 2. be kept up to date on maintenance;
 - 3. be calibrated periodically to maintain accuracy;
 - 4. be of a design that does not cause harm or injury to fish.
- c. The number of fish to be loaded must be known so that compliance with stocking density can be verified.
- d. There must be a system to ensure that the number of fish unloaded into each cage is planned in advance and communicated to wellboat staff before unloading begins.

T 28: Pumps, pipes and discharge

- a. Fish must not be unloaded if adverse weather conditions are likely to compromise fish welfare.
- b. Adjustments must be made to the wellboat's trim/balance to ensure that fish are aligned with the discharge point.
- c. Pumps and pipes used for discharge must be positioned to minimize the height and distance over which fish must be pumped.
- d. The angle and drop arrangement of the pipe must:
 - 1. distribute fish adequately in the cage;
 - 2. minimize the risk of fish collisions.
- e. Pumps and pipes must not have rough edges that could injure fish.
- f. There must be a method to ensure that no fish remain in the pipes after pumping or during a breakdown.
- g. Water flow through the wells during discharge must:
 - 1. be sufficient to facilitate fish movement;
 - 2. not be so strong as to cause injury to fish.
- h. A humane procedure must be implemented to safeguard the welfare of fish when removing the last individuals from the well.
- i. Nets in receiving cages:
 - 1. must be set at a depth sufficient to allow inspection;
 - 2. must not be positioned so shallow that fish become stressed by intense sunlight.

T 29: Mortality records

- a. Producers must be able to demonstrate that they have done everything possible to ensure maximum survival when smolts are transferred to sea.
- b. Dead and moribund fish must be euthanized humanely and hygienically.
- c. Records of all dead and moribund fish must include the cause of death whenever possible and any other information related to fish health and welfare.

H. Harvest Wellboats

T 30: Requirements for wellboats and planning

- a. Wellboat cleaning procedures must comply with the local disinfection guidelines.

- b. Harvesting fish from multiple sites is prohibited (harvesting fish from different sites with different disease control areas is not permitted).
- c. Harvesting fish from within the same site and between harvests from neighboring sites is permitted provided the fish are of the same class and year. This must be recorded.
- d. The wellboat must be able to monitor and record the number of fish loaded into each well.
- e. All grading, loading, and unloading of fish must be recorded by closed-circuit television (CCTV), with recordings kept for a minimum of 14 days.

T 31: Wellboat equipment and systems

- a. The wellboat must be equipped with movable bulkheads or other systems used for unloading fish that are operated so as not to compromise fish welfare.
- b. There must be sufficient natural or artificial lighting to allow continuous inspection/monitoring of fish throughout the well.
- c. All wellboats registered to operate in Chilean waters must be equipped with an automatic recording system capable of:
 - 1. recording its position;
 - 2. determining whether all inlet, outlet, and bottom valves are open or closed at the same time;
 - 3. making the information available in real time and retrospectively;
 - 4. being retained for a period of at least 14 days.
- d. Where systems rely on automatic monitoring equipment, this equipment must have alarms and be backed up with fully operational manual support systems (e.g., water quality control methods such as oxygenators/aerators and carbon dioxide strippers).
- e. Weekly checks must be carried out and the accuracy of calibration recorded for automatic equipment.
- f. Where calibration is not possible, there must be a demonstrable way to ensure that the equipment is functioning correctly.
- g. All automatic recording systems must have been certified as accurate and fit for purpose by an independent and competent expert.
- h. Wellboats must be equipped with water quality monitoring and maintenance systems, which must be calibrated so they always function and remain fit for purpose.
- i. All onboard/onshore water filtration/treatment methods must be recorded, and these records must be made available to the Certified Humane® inspector.

T 32: Wellboat water parameters

- a. Water must be cooled by a maximum of 1.5°C per hour to a minimum of 50% of ambient water temperature, ideally between 5-18°C.
- b. The pH of well water must always be between 6.8 and 8.0.
- c. Oxygen levels must:
 - 1. be monitored continuously;
 - 2. be maintained in accordance with T 5.
- d. Carbon dioxide must be kept below a level that can be demonstrated not to be harmful to fish welfare (as a guideline, it must not exceed 20 mg/l).
- e. The ammonia (NH₃) level must not exceed 0.012 mg/l (un-ionized); this applies only to transports longer than 8 hours, measured under the worst-case water quality scenario.

T 33: Harvest activities and records

- a. There must be no unnecessary delays in unloading fish once the vessel has docked.
- b. Pumping fish from the well or holding area to the slaughter plant must be carried out so that it:
 - 1. does not demonstrably compromise fish welfare;
 - 2. ensures that slaughterhouse staff can maintain an efficient stunning and bleeding procedure.
- c. There must be a procedure in place to ensure that the last fish are humanely removed from the pipe at the end of unloading without causing them harm.
- d. Extraneous species must be handled in accordance with relevant legislation (see E 9 for more information).
- e. The following records must be kept for inspection and made available upon request:
 - 1. wellboat movements;
 - 2. fish movements;
 - 3. timing of fish movements;
 - 4. disinfection records;
 - 5. number of fish loaded;
 - 6. fish size distribution;
 - 7. route taken during transport;
 - 8. water quality records;
 - 9. timing of valve open and closed operations.

I. Harvest at Cage Side

T 34: Cleaning and disinfection of the wellboat

- a. Movement of vessels between sites must be kept to a minimum.
- b. Wellboat cleaning and disinfection procedures set out in the current version of the local disinfection guidelines under SERNAPESCA must be followed, and a checklist must be signed by the boat's captain upon completion of the task.

T 35: Equipment

- a. All equipment must be checked periodically and kept in good condition in accordance with internal or manufacturer maintenance schedules.
- b. All equipment must be kept clean and hygienic and must be thoroughly disinfected and rinsed after use.
- c. All storage facilities must:
 - 1. be enclosed;
 - 2. be wind- and watertight;
 - 3. be protected from other animals.

T 36: Waste

- a. Any fish visibly dead or moribund on the surface must be removed/euthanized before new operations begin.
- b. All solid and liquid waste materials must be stored and disposed of appropriately in accordance with relevant legislation.

- c. Wellboats harvesting at cage side must not discharge blood water within a 5 km radius of any site.
- d. If blood water is discharged into the sea:
 - 1. it must be inertized and disinfected;
 - 2. treatment methods must be recorded and the records made available to the Certified Humane® inspector.

T 37: Competent staff

Vessel crews must be trained and competent to maintain animal welfare, and to recognize and promptly resolve any problems.

PART 8: STUNNING AND SLAUGHTER

OBJECTIVES: The slaughter system must ensure that sufficient current passes through the fish's body for the time necessary to render it immediately insensible until the moment of death. Fish must be slaughtered humanely, without unnecessary distress or discomfort. Crowding and handling prior to slaughter must be kept to an absolute minimum. Personnel involved in slaughter must be appropriately trained and competent to carry out the required tasks.

A. Pre-Slaughter Management

S 1: Holding cages

When holding cage is used prior to slaughter:

- a. The total time from the start of fasting to slaughter must not exceed 168 hours or 70-degree days, whichever occurs first.
- b. The maximum stocking density in the cages must not exceed 25 kg/m³.
- c. Water quality parameters must be in accordance with T 32.
- d. On arrival and before being pumped to the plant, moribund fish must be humanely euthanized without delay.
- e. Mortality records must be kept from the arrival of the fish until the cage is emptied and all fish are transferred to the processing plant.
- f. Weekly mortality above 1% must be recorded and investigated, and adoption of a prevention strategy in the VHWP must be considered.
- g. Two handling events involving fish handling within an interval of less than 24 hours are not permitted.
- h. Salmon may remain in the holding cages for a maximum of 144 hours (6 days), and management must demonstrate that this time is kept to the minimum possible.
- i. Crowding and handling prior to slaughter must be kept to an absolute minimum.
- j. Continuous monitoring must be carried out for any fish that may have become trapped in the pipes. These checks must be recorded.
- k. There must be no unnecessary delays in unloading fish once the wellboat has docked.
- l. Maximum time in the pipe must not exceed 20 minutes. However, when this time exceeds 10 minutes, water quality must be ensured with a minimum oxygen level of 6 mg/l or 70%; at high temperatures >18°C saturation must be >76% measured at the pipe outlet.
- m. If water quality in the pipe falls below the 20% threshold relative to the cage water, immediate corrective measures must be taken to make the necessary improvements.
- n. Pumping fish from the cage to the slaughter plant must be carried out so that it:
 1. does not compromise fish welfare.
 2. ensures that plant staff carry out the stunning and bleeding procedure efficiently.
- o. There must be a procedure to ensure that the last fish are removed from the pipe at the end of unloading humanely and without harming them.

B. Stunning Followed by Bleeding

S 2: Competent staff

- a. All relevant staff involved in the operation must be trained and competent to:

1. identify signs of effective stunning;
2. safely operate the stunning/slaughter system.
- b. There must be a designated person responsible for fish welfare throughout the slaughter process, who has received training in humane fish slaughter.

S 3: Humane slaughter methods

Farmed Coho salmon must be humanely killed using a method that renders them immediately insensible and is effective until death occurs. Mechanical humane devices must be used instead of a manual concussive blow to the head (except for casualty slaughter).

- a. The use of mechanical devices must be monitored to ensure they function correctly and apply the stun at the correct location.
- b. A blow must be delivered to the top of the head, just behind the eyes, with sufficient force to cause immediate loss of consciousness, which must be maintained until death.
- c. The use of manual devices is limited to a maximum of 70 fish per operator per day.
- d. A priest or backup stunner must be available throughout the slaughter process to allow an immediate percussive blow to be administered should a fish not have been effectively stunned.
- e. All blood, scales, and mucus from slaughter operations must be contained and disposed of appropriately.
- f. Processors must always:
 1. Humanely euthanize any unwanted/non-target fish present in the tanks;
 2. Be aware of and comply with all applicable legislation on protected species.
- g. The following methods for slaughtering fish are prohibited:
 1. Live chilling;
 2. Carbon dioxide (CO₂);
 3. Salt or ammonia baths;
 4. Asphyxiation by removal from water;
 5. Electro-immobilization.

Certified Humane® is following all new developments associated with the humane killing of farmed fish. If any of these methods are shown not to compromise the welfare of the fish involved, then consideration will be given to incorporating them in the HFAC standards in the future.

S 4: Stunning equipment

- a. Stunning equipment must be operated according to the manufacturer's recommendations or relevant internal protocols.
- b. Electrical stunning equipment must have a visible means of verifying that the appropriate current is being delivered throughout the process.
- c. All equipment used must:
 1. be clean and checked periodically according to the manufacturer's instructions;
 2. be fit for its specific use at all times.
- d. The flow of fish into the stunning system must have an appropriate speed to:
 1. allow operators to handle each fish individually and with care; and
 2. ensure that only one fish at a time passes through the stunner.

- e. Contingency plans must be in place to ensure that fish welfare is not compromised in the event of equipment or material failure, including an interruption in the power supply, loss of water, or water pump breakdown.

S 5: Electrical stunning

- a. Animal welfare validation of the electrical parameters used must be available to the auditor.
- b. Whatever electrical process is used (continuous flow, batch, etc.), it must be ensured that:
 - 1. the fish is rendered unconscious in less than 1 second;
 - 2. there are no electric shocks prior to stunning;
 - 3. the stun is maintained until the fish dies or remains insensible through percussive stunning.
- c. Fish must be positioned in the stunner in a way that avoids failure to stun them:
- d. There must be a humane procedure to ensure that no fish remain in the stunning system at the end of the procedure.

S 6: Stunning effectiveness

- a. The stun efficiency must be checked for all fish at the exit of the stunner, during bleeding and before processing for absence of any eye rolling, breathing, response to tail pinch, or voluntary movements.
- b. Sufficient time after stunning must be allowed to:
 - 1. Assess stunning effectiveness in all fish;
 - 2. Immediately re-stun any fish that have not been effectively stunned, and records of stunning effectiveness must be kept in an auditable format.
- c. If stunning effectiveness falls below 90%, the operation must be stopped immediately and system parameters readjusted. This incident and the corrective actions implemented must be recorded in an auditable format. Every effort must be made to keep stunning effectiveness as close to 100% as possible.
- d. There must be a Standard Operating Procedure (SOP) detailing the protocol for handling fish that has not been effectively stunned.
- e. A closed-circuit television (CCTV) system must be installed to capture clear footage of the backup stunning process, which must be stored for a minimum of 14 days.

S 7: Bleeding

- a. All fish must be bled (exsanguinated) by cutting the gills or the aorta.
- b. Bleeding must be carried out within 15 seconds of electrical stunning, and within 60 seconds of mechanical stunning.
- c. All fish must be unconscious during bleeding and dead before any further processing.
- d. All personnel responsible for stunning and bleeding must be trained and competent to identify signs of effective stunning and to correctly operate the stunning system.

PART 9: PROCESSING SALMON PRODUCTS

P 1: Selling Coho Salmon with the Certified Humane® Logo

- a. All processing systems must be audited for traceability and to ensure that:
 1. there is no mixing with non-certified meat or by-products;
 2. the Certified Humane® logo is used only on Coho salmon meat and by-products originating from Certified Humane®-certified farms.
- b. The program will also audit the slaughter plant to verify traceability under the Policy Manual, ensuring that all products labeled with the Certified Humane® logo come exclusively from Certified Humane®-certified farms. All standards and guidelines are available at <https://certifiedhumanelatino.org/>
- c. Annual mass balance information for products labeled with the Certified Humane® logo must be recorded in an auditable format.

PART 10: APPENDIX

Appendix 1: Additional guidance on fish feeding

- The species from which fishmeal and fish oil are derived must be listed by the feed supplier, whether as whole fish or by-products.
- Feed must not contain protein derived from the same family of species (Salmonidae) being produced.
- The percentage of plant-based ingredients included in the feed formulation must be clearly stated on the ingredient list of each feed and/or the feed supplier's specification sheet and must be made available to the auditor upon request.
- The inclusion of plant-based protein source ingredients in the feed formulation is limited to a maximum total of 47%.
- The inclusion of plant-based oils in the feed formulation is limited to a maximum total of 28%.
- The inclusion of plant-based carbohydrate source ingredients in the feed formulation is limited to a maximum total of 15%.
- The Forage Fish Dependency Ratio (FFDR) measures the amount of forage fish in the fishmeal (FFDR_m) and fish oil (FFDR_o) used to produce one kg of farmed animal. The FFDR_m, the FFDR_o, or the percentage inclusion of EPA (eicosapentaenoic acid) + DHA (docosahexaenoic acid) from marine sources must not exceed the values described below:

Stage	Maximum Values	EPA + DHA
Freshwater / brackish water	FFDR _m : ≤1.5 FFDR _o : ≤2.95	≤9%
Seawater	FFDR _m : ≤1.2 FFDR _o : ≤2.52	< 30 g/kg of feed

The rate takes into account the differences in the content and yield among the types of feed ingredients used. The calculations for FFDR_m, FFDR_o, and EPA + DHA are presented below:

$$FFDR_m = \frac{\left(\frac{fm\ content_{type1}}{fm\ yield_{type1}}\right) + \left(\frac{fm\ content_{type2}}{fm\ yield_{type2}}\right) + \left(\frac{fm\ content_{type3}}{fm\ yield_{type3}}\right) + etc}{total\ feed\ use\ (tonnes)} * eFCR$$

$$FFDR_o = \frac{\left(\frac{fo\ content_{type1}}{fo\ yield_{type1}}\right) + \left(\frac{fo\ content_{type2}}{fo\ yield_{type2}}\right) + \left(\frac{fo\ content_{type3}}{fo\ yield_{type3}}\right) + etc}{total\ feed\ use\ (tonnes)} * eFCR$$

Where,

fm content: is the % of fishmeal in each type of feed;

fo content: is the % of fish oil in each type of feed;

fm and fo yield: the yield of fm (%) and the yield of fo (%) are the efficiencies with which fish oil or fishmeal are obtained for each type of feed (note that yield equals fishmeal production (tonnes)/fish landings (tonnes) * 100). Request these values from your feed supplier.

Only fishmeal and fish oil derived directly from forage fisheries (e.g., anchovy or krill) must be included in the FFDR calculation. Fishmeal and fish oil derived from fishery by-products, such as trimmings and offal, must not be included in the FFDR calculation. Trimmings are defined as by-products when fish are processed for human consumption, or when whole fish are rejected for human consumption.

The rate (eFCR - economic Feed Conversion Ratio) is the relationship between the amount of feed used and the weight of the animals produced, taking into account uneaten feed and animal losses during production, such as mortality or escapes. The eFCR is calculated using the following formula:

$$eFCR = \frac{\text{total feed used (tonnes)}}{\text{net production (tonnes)}}$$

Where:

Total feed used is the total quantity of all types of feed, in metric tonnes (tonnes), used during production.

Net production for phase-based (toll processing) production is calculated as:

$$\text{Net production (tonnes)} = \text{harvested production (tonnes)} - \text{stocked production (tonnes)}$$

Harvested production is the wet weight of the animals harvested, in metric tonnes. Stocked production is the wet weight of the animals stocked, in metric tonnes.

The EPA and DHA content in feed for Atlantic salmon in **freshwater** phase is calculated per site as follows:

$$\text{weighted EPA and DHA in fish oil (\%)} = \frac{(\text{EPA and DHA content (\%)}_{\text{type1}} * \text{feed use}_{\text{type1}} (\text{tonnes})) + (\text{EPA and DHA content (\%)}_{\text{type1}} * \text{feed use}_{\text{type1}} (\text{tonnes})) + \text{etc}}{\text{total feed use (tonnes)}}$$

Where:

EPA and DHA content (%) refers to the feed-specific percentage of EPA and DHA contained in the fish oil.

Only fish oil derived directly from forage fisheries, such as anchoveta, must be included in the calculation of EPA and DHA.

Fish oil derived from fishery by-products, such as trimmings and offal, shall not be included in the calculation of EPA and DHA. Trimmings are defined as by-products generated when fish are processed for human consumption, or when whole fish are rejected for human consumption.

The EPA and DHA content in feed for Atlantic salmon in **seawater** phase is calculated per site as follows:

$$\text{EPA and DHA in feed } \left(\frac{\text{g}}{\text{kg}}\right) = \frac{\text{fo content (\%)} * \text{EPA and DHA (\%)} \text{ content}}{10}$$

If the fish oil content (*fo content*(%)) varies in different feeds used during production, a weighted average is calculated as follows:

$$\text{weighted EPA and DHA in feed } \left(\frac{g}{kg}\right) = \frac{\text{total EPA and DHA in feed (g)}}{\text{total feed use (tonnes)} * 1000}$$

Total EPA and DHA in feed are calculated as follows:

$$\begin{aligned} \text{Total EPA and DHA in feed (g)} = & \\ & (\text{EPA and DHA content (\%)}_{\text{type1}} * \text{fo content (\%)}_{\text{type1}} * \text{feed used (tonnes)}_{\text{type1}} * 100) \\ & + (\text{EPA and DHA content (\%)}_{\text{type2}} * \text{fo content (\%)}_{\text{type2}} * \text{feed used (tonnes)}_{\text{type2}} * 100) \end{aligned}$$

Only fish oil derived directly from a forage fishery (e.g. anchoveta) is to be included in the calculation of EPA and DHA.

Fish oil derived from fisheries' by-products, such as trimmings and offal, shall not be included in the calculation of EPA and DHA. Trimmings are defined as by-products when fish are processed for human consumption or if whole fish is rejected for use in human consumption.

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FARMED COHO SALMON

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