Humane Farm Animal Care's
Certified Humane® Welfare Standards

FARMED TILAPIA

Edition 2025

PO Box 82, Middleburg, VA – 20118.

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 fish, 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 livestock managers adhere to the following:

- 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 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 Care Standards

- The broad objectives of the standard are described at the beginning of each section.
- The numbered requirements are the standards. Compliance with all of 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 egg 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 is:
   1. Appropriate for their species, age, and stage of production;
   2. Fed in sufficient quantity to maintain good health; and
   3. Formulated or assessed to satisfy their nutritional needs.

b. All feed must be manufactured from constituents that are free from active parasites, known as fish pathogens and contamination.

F 2: Free access to feed

a. Fish must have free access to nutritious feed each day, except when directed otherwise by an attending veterinarian or as per F 8.

b. Feed must be provided to fish at a minimum of two feedings per day.

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. Feed records must be available to the Humane Farm Animal Care Inspector during the inspection and upon request.

F 4: Substances prohibited in feed

a. No feedstuff containing antibiotics, growth regulators, hormones or other substances is permitted to feed fish of any age for deliberately boost growth or feed efficiency.

b. Antibiotics can be used only for essential therapeutic use (a disease outbreak or where welfare will otherwise be compromised as advised by a veterinary) and records must be kept.

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. All fish must receive adequate amounts of feed and be observed at least once a day during feeding time.

c. Stale or moldy feed must not be provided to fish.

F 6: Avoiding changes in feed

a. Efforts must be made to avoid sudden changes in the type and quantity of feed, except under the direction of a veterinarian.
b. Accidental or involuntary changes in feed and the action taken must be recorded.

F 7: Clean feeding equipment

a. Manual or automatic systems must be kept clean.
b. Feeding equipment must be designed, constructed, placed, and maintained so that contamination of the feed is minimized.
c. Automatic feed delivery systems must be maintained in good working order.

F 8: Fasting

a. Prior to handling and/or sanitary procedures or transport between farms or for slaughter, fasting period must not exceed 24 hours, unless directed by the designated veterinary for fish welfare reasons.
b. Fasting protocol must be written in the Veterinary Health and Welfare Plan (VHWP; see H 1).
c. After any period of fasting, feed must be reintroduced to:
    1. Encourage the fish to resume feeding;
    2. Minimize waste;
    3. Allow easy access to feed and prevent undo competition.
d. Records of the period fish were fasted must be kept, and where applicable, the time that the feed was reintroduced.
e. Fasting for the purpose of off-flavoring is accepted only under adverse climate conditions (e.g. excessive algal bloom) and prescribed by a professional.

It is unacceptable to deprive tilapia from feeding for meat quality purposes. Fasting is a very critical point in tropical freshwater fish. The time for emptying the gastrointestinal tract is around 17 hours in Nile tilapia kept at 28°C (https://doi.org/10.1016/j.aquaculture.2021.737338).

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: Records of facility features that promote animal welfare
For all enclosures (pond/hapas/tank), the following key points must be documented and available at the inspection:

a. Total enclosure housing capacity available to the fish (m^2 or yd^2 for ponds or ft^3 or m^3 for other enclosures).
b. The initial number of fish housed or the updated number of fish at the time of transferring per enclosure.
c. Target water quality parameters (i.e., pH, temperature, dissolved oxygen, oxygen saturation, NH_3, alkalinity, hardness; see PS 8).

E 2: Facility design and maintenance

a. Ponds, hapas or 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 as entrance to wild animals.
c. In indoor facilities, the lids, covers or nettings must be placed over the tanks to prevent fish escaping.
d. If nets are used, they must be of a suitable size to prevent escaping and entangling fish in the tank.
e. In indoor facilities, tanks over 5 meters in diameter must be fitted with oxygen and water level alarms.
f. The hapa must allow an adequate flow of clean water, checked regularly for holes and maintained accordingly.
g. The water current must not be too strong that prevents fish from holding their position in the water column.
h. During the grow-out phase, the lowest depth in the water column should be 80 cm.
i. The cleaning process must not compromise the welfare of the fish from the dirt/detritus that is released from the process.
j. Frequency of cleaning should be increased to mitigate the size and quality of potential detritus.

B. Environmental Quality

E 3: Water quality

a. Water quality composition must be monitored frequently, if necessary daily, depending on the system, climate condition, time of year and lifecycle stage of stock.
b. Water quality assessment procedure must be detailed in the VHWP (see H 1).
c. If water quality departs from the acceptable range, immediate action must be taken to identify the problems and rectify the situation promptly. Records of the action taken must be kept in an auditable format.
d. Deterioration of water quality due to fouled nets or overfeed must be avoided.

E 4: Contingency plan in recirculation systems

A contingency plan must be established for recirculation systems detailing the course of the actions to be undertaken should unexpected issues arise.

E 5: Lighting in indoor systems

a. Lighting of enclosures must be maintained at a level suitable for each stage of fish development.
b. Fish must be protected from high levels of UV light or sudden changes in lighting levels other than natural daylight.
c. Adequate lighting must be available at any time for use when inspecting fish and equipment.

C. Environmental Impact

E 6: Environmental Impact Plan

a. 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 the local regulations.
b. All local, regional and federal legislation, official guidelines and Codes of Practice must be followed and understood for the use of water and land.

E 7: Escapees

Fish farms must have a farm-specific containment plan in place for preventing fish escaping and for recapture them.

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

E 8: Extraneous species

a. Extraneous species (terrestrial, aquatic and aerial) present in any of the production stages must be treated in accordance with the relevant legislation and local regulations.
b. Nets over larvae and alevins enclosures may be used to reduce the attack from predators.
c. The use of other fish species to population control is not allowed.

E 9: Aesthetic
Sites must be kept organized and tidy, and all waste must be disposed of by an approved method; burning plastics is prohibited.

PART 4: PRODUCTION STAGES

OBJECTIVES: Tilapia may be raised in fresh or brackish water. These standards were designed to address the critical point of fish welfare during all the production cycle, from the ova to the slaughter.

The standards apply to both re-circulation (RAS) and flow through systems (ponds and hapas) concerning indoor or outdoor facilities. The following definitions apply:

Nursery *– From eggs up to 5 g*
Incubation *– Eggs collected from the mouths of the females.*
Mouthbrooding *– Eggs are incubated in the buccal cavity of females and the larva is collected from the hapa, or the broodstock is removed from the hapa.*
Fry or Larviculture *– Hatched eggs up to 5 g*
Post-larva *– from 0,1 up to 0,5 g*
Alevins or fingerlings *– from 0,5 g up to 55 g*
Grow-out *– larger than 55 g up to slaughter weight*

There are areas of ongoing research on the welfare of eggs and fish at this stage of their lifecycle. Some of this research may challenge what is at present deemed as the established practice. If any new scientific evidence outcomes promote positive effects on these or any other stage of production, HFAC will seek to incorporate information into the standards.

A. Fry production (Larviculture)

PS 1: Broodstock to produce fertilized eggs

a. The broodstock must be stocked at a maximal density of 2 kg/m^3 during the spawning period.
b. The broodstock groups should be identified and tracked to avoid endogamy.
c. Genetic selection of broodstock and offspring must not result in welfare issues due to physical malformations.
d. For natural reproduction, stock males and females in hapas must follow the sex ratio of 1:2 or 1:3.

Farmers are encouraged to use resources that promote nesting behavior during the reproduction phase, such as natural or artificial substrate.

e. During the broodstock resting period, fish must be handled at a minimum and fed at a rate of a minimum of 2% of their biomass.
f. The maximum spawning duration allowed is 100 days, followed by a minimum 15-day resting period when males and females remain separated. After natural reproduction, the broodstock must have a minimum 15-day resting period.

PS 2: Collecting fertilized eggs/fry/larvae

a. The collection of fertilized eggs or larvae directly from the mouths of females should be carried out in the water.

b. All equipment used for collection must be smooth and designed to avoid injuries in both the females and eggs.
c. Eggs must not be transported on a dry surface; transport of eggs must occur with at least twice the volume of water.

PS 3: Incubation
a. All eggs must be disinfected prior to entry any new facility.
b. Eggs must be flushed with clean water before exposure to disinfectants.
c. Water flow and incubator design must prevent 'dead spots' in the enclosure.
d. After placement, eggs must remain undisturbed (other than for picking) for 3 days.
e. The incubation environment must allow for removal of non-viable and dead eggs.
f. Records of survival rates during incubation must be available in an auditable format.
g. Regular inspections must be carried out to monitor and detect any fungal infections.

PS 4: Hatchery
a. The maximum stocking density of larvae must be 2.5 kg/m^3.
b. All equipment used in this phase must be designed, constructed, sited and maintained in good repair. Records must be kept of equipment services.
c. There must be a screen to prevent the blocking of inlet valves being inspected at least three times a day.
d. Hatching environment must be hygienic and free from any rough edges that could cause damage to the eggs.
e. There must be no cross contamination of water from one container to another.
f. The removing of dead eggs must not cause further mortality.
g. Cleaning the larvae trays must be done at least once daily to keep good water flow.
h. Alevins or fingerlings must receive feed at least 4 times a day, according to their body weight.

PS 5: Mouthbrooding
a. For transferring larvae to another pond or tank, the water quality parameters in the new site must be similar to that of the hapa.
b. The transferring pond/tank must be protected against predators.
c. The transfer from the hatchery to tanks/ponds must be done in water, keeping handling at minimum.

PS 6: Sexual reversion
a. The maximum concentration of 17-alfa-metil-testosterone used must be 60 mg/kg.
b. Feeding the larvae with 17-alfa-metil-testosterone is allowed for a maximum of 35 days.
c. The protocol to add the hormone to the feed must be available during the audit.
d. The effectiveness of sexual reversion must be assessed in a representative sample of the batch and records must be available in an auditable format.
e. The sexual reversion rate must be 98% or above and reported in the documentation when selling alevins to grow-out farms.

PS 7: Grow-out phase

a. Alevins must be produced either in-house or obtained from another Certified Humane approved supplier.
b. Alevins must be accompanied by health documentation and records from the nursery stage and from the parent stock.

PS 8: Water quality parameters

Water used for fish rearing must:

a. Be frequently tested for quality parameters and filtered or treated with ultraviolet radiation in RAS systems.
b. The following water quality parameters must be complied with:

Parameter	Breeding	Nursery	Grow-out
Min Oxygen (O_2) mg/l	5.0	5.0	5.0
Range of Oxygen Saturation (O_2) %	40-110	40-110	40-110
Temp °C	24-31	24-31	21-31*
Water pH	6.5 to 8.5	6.5 to 8.5	6.5 to 8.5
Free Ammonia (NH_3) mg/l	< 0.05	< 0.05	< 0.1
Nitrite (NO_2) mg/l	< 0.50	< 0.30	< 0.50
Transparency cm	25-45	-	25-45
Salinity (g/L or ‰)	<25	<25	<25
Alkalinity mg/L of $CaCO_3$	30-100	30-100	30-100
Photoperiod (Light:Dark)	Natural or 12L: 12D 16L:8D	Natural or 12L: 12D 16L:8D	-

c. Water levels of O_2, temperature and pH must be measured daily.
d. Water levels of free ammonia, nitrite, transparency and alkalinity must be measured at least once per week.
e. Records for water quality parameters and treatments, when applicable, must be in an auditable format.
f. Water management must prevent abrupt alterations to water quality and corrective action must be promptly taken if parameters fall outside acceptable ranges; record of the action must be kept in an auditable format.
g. Actions must be taken to prevent the accumulation of feces on the water's surface.
h. For grow-out phase only, a wider temperature range is acceptable (min. of 12°C and max. of 35 °C) when mortality rates (including euthanasia) are in conformance with H 9.

PS 9: Stocking density

a. The following maximum stocking densities must not be exceeded:
    1. Hatchery – the maximum stocking density must be set so that water quality is maintained for the duration incubation to keep rates of survival above 95%;
    2. If the mortality rate during the incubation period was above 5% the next batch will use 10% less eggs per volume.
b. The farm stocking plan must demonstrate that the facilities can the following:
    1. At nursery, mean liveweight up to 5 g: 2.5 kg/m² or m³;
    2. At grow-out, liveweight > 500 g: 6 kg/m² or m³.

PART 5: MANAGEMENT

OBJECTIVES: A high degree of caring and responsible management is vital to ensure good animal welfare. Managers and caretakers for both freshwater or seawater 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 personnel involved in husbandry practices have access to a copy of the current *Animal Care Standards for Farmed Tilapia.*
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. Be able to demonstrate that staff with responsibility for animal care are trained and competent in aspects of fish husbandry and welfare, relevant to their duties. When deficiencies are noted, managers must provide appropriate training to ensure that all stockkeepers have the required skills;
   2. Make sure that all third-party staff being used for the husbandry, handling, procedures and process on sites (i.e., crowding, harvesting, treating, vaccination, transportation) have proper training to ensure fish welfare.
b. Written records of managers and staff training (including third-party staff) must be maintained.
c. Stock-keepers and all personnel involved in husbandry practices must be able to:
   1. Demonstrate their proficiency in procedures that have the potential to cause pain or distress including netting or other handling, crowding and performing euthanasia;
   2. Recognize indicators of poor welfare in fish including abnormal behavior, physical injury and symptoms of disease;
   3. Understand the needs of the fish and be aware of any risks involved and the procedures to address those risks;
   4. Recognize visual indicators of poor water quality for the fish (e.g. gasping, foam, color alterations);
   5. Recognize fish behavioral indicators of 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
Managers must:
a. Develop and implement plans and precautions with the procedures to be followed in emergencies such as fire, leaks, disease outbreaks, extreme climate conditions, problems

with transportation, and any other catastrophic events that may adversely affect water quality, such as algal blooms.

b. Provide an emergency action note, sited in an easily accessible location, highlighting the appropriate emergency contact numbers and a map grid reference for the location of the unit.
c. Ensure that all relevant staff members are fully conversant with the procedures which must be implemented if there is a fish escape incident, including the plans for the recapture of escaped fish.

M 4: 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, the Operator must record:
    1. Date;
    2. Complaint format (written or verbal);
    3. Complainant;
    4. Description of complaint;
    5. Action taken to resolve the complaint;
    6. Results of action taken;
    7. Supervisor initials.
c. Operators must notify *Humane Farm Animal Care* 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.

B. Inspection and Records

M 5: Operations records*

Operation records must be kept up-to-date and presented in a auditable format to the HFAC inspector. These records include, at a minimum:

a. details of origin of stock, fish movements allowing traceability.
b. control of any extraneous/non-target fish.
c. age and weight of fish in each enclosure.
d. grading records.
e. current stocking densities in each enclosure based on target age and weight at transferring or slaughter.
f. details of fish and equipment inspects.
g. daily and cumulative mortality expressed as a percentage (reasons stated).
h. daily and cumulative culling expressed as a percentage (reasons stated).
i. feed consumption.
j. details of any health treatments, vaccinations and diseases.
k. records of water quality parameters.
l. training records.

*See Appendix 1 for a complete list of required records.

M 6: Monitoring fish

a. Fish must be inspected at regular intervals, at least twice daily, weather permitting.
b. Full records must be maintained of inspections, including the time and date of inspection and identification of the person(s) conducting the inspection of animals.
c. If problems are identified during inspection, the stockkeeper must act promptly to remedy the cause in consultation with a veterinary when necessary. Any actions taken must be recorded must be kept in an auditable format.
d. The number of moribund, injured, euthanized and dead fish must be recorded daily. Record must contain:
    1. Date;
    2. Causes of euthanasia and dead, when known;
    3. Action taken to restore health or culling if necessary;
    4. Segregation of number of culled fish from those found dead during the inspections.

M 7: Compassionate handling and care

a. Work routines and practices must ensure that fish do not suffer from rough handling or physical damage.
b. All crowding and handling processes must be slow and deliberate both to alleviate stress and reduce possible injury.
c. If fish must be handled, adequate support must be given to its body.

M 8: Equipment management

a. When equipment is installed that affects animal welfare, caretakers must be able to:
    1. Demonstrate their ability to operate the equipment and carry out routine maintenance;
    2. Recognize common signs of malfunction; and
    3. Take immediate action in the event of any failure.
b. Where pumps and pipes are used:
    1. These must operate according to the species and size range of the fish being pumped to avoid injury;
    2. Must be kept in good working order, free from sharp protrusions, joints, kinks, bends or rough inner edges;
    3. A humane method must be implemented to ensure that all fish have been removed from the pipe at the end of the operation or if equipment fails during processing;
    4. Fish exiting any pipe must not suffer injuries and dispersing as falling in the tank.
c. When hand nets are used they must be:
    1. Of a suitable net dimensions and mesh size;
    2. Designed to avoid the occurrence of physical damage.

M 9: Automatic systems for fish life support

a. All equipment that fish rely on for life support must be inspected twice a day.
b. Indoor tanks larger than 5 m^3 must be equipped with an alarm system for water and oxygen levels.
c. If any failure or issue is detected with the life support equipment:
    1. The fish must be inspected;
    2. The problem must be corrected immediately.

M 10: Auxiliary power supply

a. Auxiliary power supply must be accessible and capable of providing power to critical electrical equipment that the fish rely on for life support.
b. The power supply, if stored on site, must be checked at the frequency recommended by the manufacturer, and these checks must be documented.

C. Management for handling procedures

Optimizing husbandry practices and farming environments can significantly reduce the creation of size hierarchies within populations, and therefore also reduce the requirement to grade. For example, evidence shows that feed distribution and ration size are extremely important, as knowing the biomass.
Underfeeding quickly results in the development of a hierarchy which, if allowed to prevail, can be the cause of welfare problems for some fish.

M 11: Fish handling plan

a. A written handling plan must be available to farm management and farm staff and/operator prior to handling operations commencing.
b. Handling procedures during temperatures below 15º C are not allowed.
c. In the grow-out phase, grading may occur at most three times during the cycle and with a minimum interval of 30 days.
d. Oxygen levels in the water must be monitored and recorded throughout all crowding procedures and never fall below 4 mg/l and 40% of saturation, with appropriate action taken should this occur.
e. Supplementary oxygen and/or aeration must be available for the duration of the crowding procedure.

M 12: Handling procedures

a. Removal of fish from water and handling must only be carried out absolutely when necessary.
b. If fish must be handled, live fish must never be held by the tail only or thrown over solid objects.
c. Time out of water must:
    1. be kept to the minimum possible;
    2. never exceed 15 seconds for a live fish (unless sedated/anaesthetized).
d. Fish must not be left to die in air.
e. Handling operations must not take place if adverse weather conditions are likely to compromise fish welfare.

M 13: Crowding and grading plan

a. Grading must only be performed with healthy fish and when necessary.
b. A written grading plan must be agreed between farm management and site staff and/or grading operator prior to operations commencing. This plan must become a part of the VHWP (see HH 1).
c. The crowding and grading plan must include:
    1. The reason for the need to grade;

2. A pre-grade risk assessment;
3. The number/biomass of fish to be graded per day;
4. The location of fish populations at both pre- and post-grading;
5. The pre-grade fasting period;
6. The overall health status/assessment of the fish;
7. The equipment to be used, including the type of grader;
8. Expected time for completion of the grade;
9. The required number of staff and respective duties to be performed;
10. The physical characteristics of the site such as water temperature and weather conditions;
11. The training records of the grading team;
12. The requirement for a post-grading health check;
13. Post grading mortality records;
14. Any relevant contingency plans;

M 14: Crowding and grading equipment

a. All equipment must be designed and maintained to prevent damaging or causing stress to the fish.
b. Nets must be of knotless material, of optimal design for the enclosure, and of an appropriate mesh size for the fish.
c. Nets must be used to crowd a portion of the population rather than crowding the whole enclosure.
d. Enclosure nets must be kept clean to avoid water quality problems during crowding.
e. All equipment must be thoroughly cleaned and disinfected before use and, if applicable, between sites.

M 15: Crowding and grading process

a. Only healthy fish must be subjected to the grading process.
b. Grading all populations into new enclosures is preferable to optimize fish welfare.
c. Prior to grading, fish must be fasted for the minimum period required in order not to compromise their welfare (see F8).
d. Fish must not be crowded for more than two hours continuously.
e. No enclosure must be crowded more than twice in any one week or three times in any month, unless required otherwise by the attending veterinarian.
f. The level of crowding should not expose more than 30% of the fish's body out of the water surface.
g. Grading operations must not take place if adverse weather conditions are likely to compromise fish welfare.

M 16: Monitoring fish post-crowding or grading

a. Producers must:
   1. Humanely cull any extraneous/non-target fish that are present in the tanks or ponds;
   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 properly trained and competent to recognize welfare issues and take appropriate action if necessary.
c. Mortality checks must be recorded as soon as possible after grading.

M 17: Passive grading

a. Where passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within. Passive grading must be carried out where possible and practical.
b. The grading panels must be checked for signs of wear before grading commences.

M 18: Manual grading

a. Pumps must be able to push for the required distance.
b. The operator must be able to control the speed of the pump.
c. All pipes must be:
    1. Smooth with swept bends;
    2. Of a diameter which is appropriate for the size of the fish, including fish that pass through the couplings.
d. Water must always flow through the pipework to minimize the incidence of scaling.
e. The grading table must be smooth, with no sharp edges.
f. Where counters are used, they must be in working order and be fit for purpose.
g. The crowding net must:
    1. Be of an appropriate size;
    2. Have sufficient flotation;
    3. Be constructed of knotless mesh.

D. Management During Treatment and Vaccination

M 19: Handling during injections

a. Operators must regularly inspect needles and replace them if necessary, according to manufacturers' instructions.
b. Audit sampled fish must only be culled by trained/competent personnel.
c. The appointed supervisor/injection team leader must check at the beginning of the process, and at regular intervals during the day to ensure that the procedure is being done correctly. Records of these checks must be made.
d. The injection procedure must be subject to a third-party audit.

M 20: Anesthesia procedure

a. Care must be taken when returning the recovering fish to the tank following the anesthetic/injection process.
b. There must be a team member with responsibility for:
    1. regularly monitoring the oxygen levels at a minimum of 4 mg/L and 40% of saturation in the anesthetic bath and at the recovery tank to ensure that they are recovering from the anesthetic procedure;
    2. check the depth and flow of water to ensure that returning fish are not returned to water that is either too shallow, or at an incorrect flow rate, depth or quality;
    3. rectify and record any issues.

M 21: Manual vaccination procedure

a. The vaccination program must be detailed in the VHWP.
b. Vaccination by immersion is the only approved method for 1g liveweight fish.

c. Prior to vaccination, there must be a vaccination plan in place, which must:
    1. be guided by the vaccination team leader and farm appointed supervisor;
    2. include the number and weight of the fish to be vaccinated;
    3. detail the expected timeframe of the process.
d. Vaccination teams must:
    1. ensure that all staff working with stock are trained and competent in the aspects of the vaccination process to which they are assigned;
    2. have a named team leader who has attended a fish welfare course.
e. All fish must be pre-graded before they are vaccinated.
f. Vaccines must be used according to manufacturers' instructions.
g. Vaccines and anesthetics must:
    1. be on farm before vaccination commences;
    2. only be administered to fish by suitably trained staff.
h. Water temperature for vaccination must be according to manufacturers' instructions.
i. All fish must be suitably anesthetized before being vaccinated.
j. Where fish are humanely dispatched, this must be undertaken through an overdose of a suitable anesthetic.
k. At the end of the process there must be a reconciliation between the amount of vaccine used and the number of fish which have been vaccinated. This must be recorded.

M 22: Automated vaccination procedure

a. All fish must be pre-graded before they are vaccinated.
b. An assessment of fish condition must be made before the grading process begins, to ensure that they are robust enough to endure the procedure.
c. The equipment must:
    1. be thoroughly checked after transportation for any damage/broken parts which may halt the vaccination process;
    2. be calibrated according to the size of the fish, taking into account needle size, its, position, angle and dosage of the vaccine;
    3. be checked for the correct calibration at least once per hour during the vaccination process.
d. A sample number of fish must be vaccinated to check the calibration before the main process is started.
e. The sample fish must be humanely culled before any inspections to check for vaccination accuracy.
f. All fish must be anesthetized before being vaccinated.
g. There must be continual monitoring to check for any fish which may have become trapped in the pipes of the machine. These checks must be recorded.
h. Needles must be inspected at least every two hours and replaced according to manufacturer's guidelines.
i. After transportation, the machine must be thoroughly checked to ensure that any working parts have not been damaged during the transportation process.
j. At the end of the process there must be a reconciliation between the amount of vaccination used and the number of fish which have been vaccinated. This must be recorded.

PART 6: HEALTH

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

A. Health Care Practices

Producers must develop and implement a written Veterinary Health and Welfare Plan (VHWP) that covers the following areas and is regularly updated in consultation with a veterinarian:

1. Tolerance limits on fish performance parameters;
2. Health assessment during fish handling;
3. Biosecurity measures;
4. Treatments and other aspects of fish health;
5. Vaccination programs;
6. Cleaning and disinfection policy;
7. Emergency health events;
8. Care of injured and unproductive fish;
9. Mortality recording and reporting;
10. Physical alterations;
11. Selecting fish for good health and performance;
12. Genetic modification and cloning;
13. Injection procedures;
14. Anesthesia of fish;
15. Protection from other Animals.

Health records can be logged in any form (e.g., spiral notebooks, checklists, phone applications) depending on what works for the producer, as long as the required information is recorded and can be provided to HFAC or the inspector upon request.

H 1: Fish performance data

a. Fish must be continually monitored for performance such as, fed consumption, anticipated mortality rate both according to fish´s age, production diseases, infectious diseases, and injuries caused by poor water quality or insufficient husbandry practices, that may cause:
   1. Production benchmarks that fall beneath projected norms;
   2. Outbreak of abnormal behaviors;
   3. Physical alterations;
   4. Reduction in fed consumption.

b. If any fish performance parameters fall below the tolerance limits identified in the VHWP and genetics guidelines, actions must be taken to investigate and remedy the issue.

c. Managers must maintain and make available to the *HFAC* inspector records of annual Certified Humane production data regarding biomass performance data.

H 2: Health assessment during fish handling

a. During the procedures involving handling (weighting, grading, vaccination or others) a sample representative by farm must be used to evaluate Animal-Based Indicators (ABIs) in a three-point-scale.
b. These must be observed but not limited to the condition of the eyes, skin, spine, opercula, fins, gills, body condition, presence of ectoparasites and deformities. The results of these evaluations must be available in an auditable format.

H 3: Biosecurity measures

a. Producers must implement an effective biosecurity plan to prevent disease outbreaks.
b. To ensure the health of their fish, producers must follow effective biosecurity measures, which may include, for instance, personal protective equipment, foot bath stations, hand cleaning stations and controlled visitor access.
c. Animals being brought in to populate the enclosure must be observed for any anormal behavior, physical alteration, or potential disease outbreak.
d. Measures in compliance with all national, regional and local health and disease monitoring regulations.

H 4: Treatments and other aspects of fish health

a. All treatments must be recorded.
b. At the minimum, records for any treatments given therapeutically for disease must specify the:
    1. Treatment used;
    2. Dates of administration;
    3. Identification of batch or group of fish treated;
    4. Reason for treatment; and
    5. Outcome.
c. A treatment prescription authorized by the veterinarian must be present with the batch records.
d. All relevant legislation for notifiable diseases must be understood and followed.
e. The medication for treatment must only be administered to fish:
    1. By suitably trained staff;
    2. Strictly in accordance with the instructions prescribed, which must be on farm before the treatment commences;
    3. When advised by the attending veterinarian and in accordance with current legislation for use in tilapia.
f. In exceptional circumstances, on the advice of the designated veterinary, specific products licensed for use in other food producing species or manipulated drugs can be administered as detailed in the VHWP.
g. Veterinary medicine withdrawal periods must be strictly met.
h. Veterinary products must be properly labelled and stored.
i. Any treatments that have clearly not worked or had an adverse reaction must be:
    1. Recorded in the medicine record book;
    2. Reported to the farm veterinary and health manager.
j. Any treatment must be completed at a minimum of 14 days before transport, unless stated otherwise by veterinary advice and recorded in the VHWP.

H 5: Vaccination program

a. The vaccination program must:
   1. Comply with local, regional and national regulations;
   2. Be in accordance with disease prevalence in the production site and region.
b. Records for vaccinations must be auditable and specify the:
   1. Type of vaccination;
   2. Dates of administration; and
   3. Batch identification.

H 6: Cleaning and disinfection policy

a. Premises and equipment must be thoroughly cleaned and disinfected before starting a new cycle of production, in accordance with an operation´s written procedure.
b. Nets and other fish handling devices must be kept clean, in good repair, and be exclusive or disinfected before use with different fish populations/tanks.
c. Transport equipment and containers must be cleaned and disinfected after each batch of fish to prevent the spread of disease.

H 7: Emergency health events

a. All sudden deaths, disease outbreaks, and euthanasia of unfit fish must be:
   1. Recorded;
   2. Investigated thoroughly;
   3. The corrective actions taken as necessary;
   4. Reported to the veterinarians or local authorities in cases of biosecurity threats or large number of deaths.
b. The VHWP must describe the operation's plans in the case of an emergency health event.
c. Measures in compliance with all national, regional and local health and disease monitoring regulations.

H 8: Care of injured and unproductive fish

Any moribund, injured or unproductive fish, and those suffering from open wounds or lesions must be:

a. Treated without delay; or
b. If necessary, culled according to recognize humane euthanasia guidelines and stated in the VHWP, such as:
   1. Anesthetic overdose;
   2. A priest of appropriate size for the fish > 250 g;
   3. A mechanical percussive device.

c. Under no circumstances must seriously injured or sick fish be left to die in air.

H 9: Mortality recording and reporting

a. Fish mortality, including culled fish, must be recorded daily per pond or tank.
b. Where fish cumulative mortality rate exceeds the threshold figures shown below, immediate action is required:
   - Broodstock: >10% of the batch
   - Nursery: > 10% of the batch
   - Grow-out: > 10% of the batch

c. Where the mortality rate exceeds the above:
    1. An investigation of possible causes must take place;
    2. A plan must be implemented to address the issue and prevent recurrence.

H 10: Physical alterations

a. Any mutilation involving the removal of sensitive tissue is prohibited.
b. Marking methods that cause distress or injury to fish must not be used.

H 11: Selecting fish for good health and disposition

a. Fish must not have been produced by breeding techniques that result in health or welfare problems for any of the animals involved.
b. Breeding procedures that adversely affect the welfare if the fish are prohibited.

H 12: Genetic modification and cloning

The use of gene editing and cloning techniques on fish and their offspring is prohibited.

H 13: Injection procedures

a. Any injection delivery to fish must be described in the VHWP.
b. All injection procedures must be continuously monitored to ensure the welfare of fish is not compromised.
c. Mortality checks must be recorded within 48 hours after injection delivery.
d. Drugs administered via injection must be used according to manufacturers' instructions.

H 14: Anesthesia of fish

a. All fish must be properly anesthetized before being injected and the procedure must be carried out by trained, competent personnel.
b. Anesthetics must be used according to manufacturers' instructions and must:
    1. be on farm before vaccination commences;
    2. only be administered to fish by suitably trained staff.
c. Following injection, the movement of fish over surfaces from the injection table to the recovery tank/pond/enclosure must be such that they are not at risk of hitting the bottom of the tank or other fish.

D. Protection from Other Animals

H 15: Precautions and protection from other animals

a. Humane precautions must be taken to protect tilapia from other animals that could cause them harm, including bringing in diseases.
b. Methods used to protect the fish must be written in the VHWP.
c. The primary means of protecting the fish must be through physical exclusion, by denying other animals access to tanks / ponds or enclosures.
d. If an attack has been identified, fish must be checked promptly for signs of injury.
e. Local, state and federal animal protection laws must be followed.

H 16: Use of predator-proof nets

a. Enclosures for larvae and alevins < 55 g must be:

1. protected using visible top nets that are secured to prevent the ingress of predators into the enclosure;
2. of a mesh size that does not ensnare birds.

b. Predator-proof nets must be considered for deployment at high-risk sites during the high-risk periods, and at all other times if there is a risk of attack.
c. Where predator-proof nets cannot be deployed for animal welfare reasons, the precise nature of the animal welfare reasons must be documented and recorded.

H 17: Recording wild animals in the enclosure nets

a. The use of killing methods against predators is not acceptable.
b. The following details of all wild animals removed from nets must be recorded:
   1. Species;
   2. Date of removal;
   3. Whether the animal was dead or alive on removal.

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 that provide transport services for Certified Humane fish farms must comply and be approved by the program.

T 2: Transport planning and records
All journeys that fish are subjected to must have a transport plan, which is regularly updated.

T 3: Transport staff
a. All people involved in transportation of fish must be familiar with, and transport fish in accordance with applicable legislation.
b. Transport operators must ensure that all people involved in the fish transport of the fish are familiar and understand the requirements of the HFAC standards for Farmed Tilapia.
c. Records of staff training must be kept and made available during the HFAC inspection and upon request.
d. There must be a named member of staff responsible for monitoring the welfare of the fish during loading, transport and unloading.
e. There must be trained and competent staff available at the farm to receive fish.
f. The driver of the fish transport vehicle must:
    1. Be fully aware of the transport regulations relating to fish;
    2. Understand the needs of the fish being transported;
    3. Drive in a manner which will not compromise the welfare of the fish;
    4. Be properly trained for this duty.

T 4: Fish fit for transport and handling
a. Only healthy, undamaged fish must be transported.
b. Care must be taken to ensure dead fish are not loaded for transport.
c. Moribund or seriously injured fish must:
    1. Not be transported;
    2. Be humanely culled.
c. Any handling of fish prior and during transport must be conducted in such a way as to prevent any unnecessary distress to the fish.
d. Follow the general points for handling fish (see Section M).

T 5: Water quality
a. Water must be free from contaminants detrimental to the welfare of the fish.
b. Transport tanks must be filled with good quality water (see PS 8).

c. Supplementary oxygen or aeration must be available during all transportation, which is sufficient to last at least 50% longer than the anticipated journey length.
d. Oxygen levels must be:
    1. Monitored throughout the journey (including for any internal journeys);
    2. Maintained at a minimum 4 mg/liter and 40% saturation.

T 6: Stocking density

a. The maximum stocking density for fingerlings or adults must be set so that water quality is maintained for the duration of the journey.
b. Independent of the stocking density, the cumulative mortality rate 7 days after transport must be:
    1. Below 5% for fingerlings <10 g;
    2. Below 2% for juvenile > 10g or adults.
c. The transport journey of fish must not last longer than 24h.

T 7: Catching for transport

a. Nets and hand nets must:
    1. be of a correct size so that they can be easily lifted and the fish at the bottom of the net are not injured;
    2. have a suitable mesh size for the size of the fish which prevents fish escaping;
    3. not be overfilled.
b. Fish must not be netted before the transport tanks are ready for transferring.
c. The netting of the last fish in any tank must be undertaken with a great deal of caution and care so as not to injure any fish.

T 8: Records of dead or injured fish

a. Any fish which died during transportation must be separated from live fish immediately upon arrival.
b. Records must be kept of any deaths or injuries that occur during transportation.

T 9: On-farm harvesting

a. The harvesting must be performed in the cooler hours of the day.
b. When placing the fish in the truck, they must not be injured by the walls or floor of the transport tanks.
c. Fish may be slaughtered on-farm as long as it is in conformance with S4 to S8.

B. Road Transport

T 10: Transport condition assessment

a. Before leaving the farm, the driver must:
    1. Perform a visual check of the oxygen levels and rates of aeration into the tanks;
    2. Record the oxygen levels on the record sheet.
b. During the journey, if oxygen levels become unstable, the driver must:
    1. Be able to visually check the fish for signs of stress;
    2. Be able to identify the cause of the oxygen instability;
    3. Take appropriate action to ensure the welfare of the fish.

c. Drivers must be able to gain access to tanks during the journey to monitor the welfare of the fish.

T 11: Transport in bags and tanks

a. The use of bags is allowed only for transporting fish weighing less than 60 g.
b. The bags used for transport must be resistant and punctured-free during transport.
c. The bags used for transport must be filled with a minimum of 66% of their capacity with oxygen.
d. Bags must be securely attached to avoid damaging the fish.
e. Transport tanks must serve their purpose without compromising the fish welfare.
f. Tanks must have a top opening and a lateral opening.
g. The interior of the tank must have sensors for temperature and dissolved oxygen (mg/L) or saturation (%).
h. Tank insulation must be such that it allows the water to remain at a constant temperature at approximately ±1.5 °C from the start of the journey.
i. All transport tanks and life support systems must:
    1. Be fit for purpose;
    2. Fully inspected before loading;
    3. Be without leaks, chips or cracks.
j. All lids, outlets and any other openings must be fully secured before departure.
k. Diffused oxygen must be spread around the water column using an oil free compressor.
l. There must be sufficient aeration to avoid dead spots inside the tanks.

C. Transport

T 12: Stocking density at transport

a. Maximum stocking densities must be set so that water quality can be maintained over the length of the journey.
b. If fish counting equipment is in place, it must:
    1. Be over a de-waterer;
    2. Be fully maintained;
    3. Be regularly calibrated to maintain accuracy;
    4. Be of a design not likely to cause damage or injury to the fish.
c. The number of fish to be loaded must be known and comply with water quality conditions (PS 8).

T 13: Pumps and pipes during unloading

a. After arriving at the farm, discharge must take place without undue delay.
b. The unloading of fish must not take place if adverse weather conditions are likely to compromise the welfare of the fish.
c. Adjustments must be made to the trim/balance of the truck to ensure fish are aligned with the discharge point.
d. Pumps, pipes or openings used for unloading must be positioned to minimize the height and distance that the fish is pumped/unloaded.
    1. The pipe or opening layout angle and drop must lead to good distribution into the enclosure and minimize the risk of fish collisions.

e. Pumps, pipes and openings must be free of any rough edges which might damage the fish.
f. There must be a method in place to ensure that no fish are left in the pipes after pumping, or during a breakdown.
g. Water flow through the wells at discharge must:
    1. Be sufficient to facilitate movement of the fish;
    2. Not be so strong as to cause fish injury.
h. A humane process must be in place to safeguard fish welfare by removing the last fish from the tank.
i. If the water quality differs from the origin, the fingerlings must be acclimated inside the bag before released in the new enclosure.
j. The nets at the reception enclosure must:
    1. Be set at sufficient depth to permit inspection;
    2. Not so shallow that fish are stressed by strong sunlight.

T 14: Mitigating mortality during transport

a. Producers must be able to demonstrate that they have done everything possible to ensure maximum survival.
b. Dead and moribund fish must be disposed of humanely and hygienically.
c. Records of all dead and moribund fish must:
    1. Be kept;
    2. Include the cause of death where possible and any other information relating to the health and welfare of the fish.

D. Transport of Fish to the Slaughterhouse

T 15: Transport equipment

a. All equipment must be checked regularly and maintained in accordance with manufacturers' and in-house maintenance schedules.
b. All equipment must be maintained in clean, hygienic conditions and must be thoroughly disinfected and rinsed after use.
c. All storage facilities must:
    1. Be bunded;
    2. Be wind and water tight.

T 16: Waste materials

a. Any visible surface mortalities or obviously moribund fish on the surface must be removed before further operations begin.
b. All solid and liquid waste materials must be stored and disposed of appropriately and in accordance with relevant legislation.

T 17: Competent staff

Truck drivers and transport staff must have completed training and are able to monitor and care for fish welfare.

T 18: Record keeping

a. The following records must be kept for inspection and be available on request:
   1. Crowding times;
   2. Oxygen levels inside the crow;
   3. Truck movements;
   4. Fish movements;
   5. Times of fish movements;
   6. Disinfection logs;
   7. Numbers of fish loaded/fish size distribution;
   8. Stocking density (kg/m_3);
   9. Oxygen levels during the journey must be measured from all compartments at least in the middle and at the end of the journey for transport longer than 4 hours.;
   10. Route covered during transport.

b. Extraneous species must be dealt with according to the legislation (see E 9).

T 19: Unloading fish

a. After arriving at the slaughterhouse, discharge must take place without undue delay.
b. The lorry must be sited to ensure that all tanks can be fully emptied, considering any cambers which may be apparent in the ground.
c. Valves must be suitable for more than one fish to pass through at any one time.
d. Openings must be securely attached to prevent fish from escaping during the unloading process.
e. All unloading must be through lateral openings by gravity rather than netting fish from the tanks.
f. Water must always be in the tanks during unloading to avoid the last fish becoming dry and without oxygen.
g. There must be a system for flushing the tanks at the end of unloading to ensure that the last fish is removed without compromising their welfare.
h. Tank design must facilitate the discharge of the last fish by having sloping floors which guide the fish to the outlet.

PART 8: STUNNING AND SLAUGHTER

OBJECTIVES: The system must ensure sufficient current is passed through the body of the fish for a sufficient duration to render the fish immediately insensible until death supervenes. Fish need to be killed humanely without any unnecessary distress or discomfort. Pre-slaughter crowding and handling must to be kept to an absolute minimum. Personnel involved in slaughter need to be thoroughly trained and competent to carry out the required tasks.

A. Pre-Slaughter Management

S 1: Holding pens

When using holding tanks before slaughter:

a. Maximum stocking density must be set so that water quality is maintained for the duration of the permanence in the tanks.
b. Water quality parameters such as temperature, pH and dissolved oxygen (mg/L) must be recorded and maintained (see PS 8).
c. Pumping fish twice within 24 hours is not allowed.
d. There must be back-up systems and contingency plans in place to deal with system malfunctions and breakdowns in order to safeguard the welfare of the fish.
e. There must be continual monitoring to check for any fish which may have become trapped in the transport tanks. These checks must be recorded.
f. Driving fish from the holding pen to the stunning table must be done in a way that does not compromise fish welfare.

S 2: Moribund fish and mortality records

a. At arrival and until the transference to the stunning table, moribund fish must be humanely killed without delay.
b. Records of mortality must be kept from arrival until the tank is emptied and all the fish have been transferred to the stunning table.
c. Weekly mortality per holding tank above 1% must be recorded and investigated, and a prevention strategy should be considered.

B. Stunning followed by bleeding

S 3: Competent staff

a. All relevant personnel must be trained and competent to:
    1. identify signs of an effective stun;
    2. operate the stunning/killing system safely.
b. There must be a named person responsible for fish welfare throughout the killing process who has been trained in humane killing of fish.

S 4: Methods for humane slaughter

a. Farmed tilapia must be humanely killed with a method that renders the fish unconscious immediately until death supervenes. Humane mechanical devices must be used in preference to a manual percussive blow.
b. The use of mechanical devices must be monitored to ensure that they are working properly and that they are delivering the stun at the correct location.
c. One blow must be delivered to the top of the head just behind the eyes, of sufficient force to cause immediate loss of consciousness that lasts until death.
d. In the case of manual devices its use is limited to 70 fish per operator per day
e. A priest or secondary stunner must be available throughout the killing process to allow a percussive blow to be administered immediately in the event of a fish not being effectively stunned.
f. Processors must always:
    1. Humanely destroy any extraneous/non-target fish present in the tanks;
    2. Be aware of, and adhere to, any legislation relating to protected species.
g. The following methods for slaughtering the fish are prohibited:
    1. Hypothermia state;
    2. Carbon dioxide (CO_2);
    3. Salt or ammonia baths;
    4. Asphyxiation;
    5. Electro-immobilization.

HFAC is following all new developments associated with the 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 into HFAC welfare standards in the future.

S 5: Stunning equipment

a. All equipment must be operated in accordance with the manufacturer's recommendations or relevant internal protocols.
b. Equipment must be fitted with a visible means of checking that the correct current is being administered throughout the process.
c. All equipment must be:
    1. Cleaned and maintained regularly and, in any case, at least in accordance with the manufacturer's instructions;
    2. Fit for its purpose at all times.
d. The flow of fish into the stunning system must be of an appropriate speed as to:
    1. Not cause fish to be out of water for longer than necessary;
    2. Allow operators to handle individual fish with care through the stunning system and ensure that only single fish is entering in the stunner.
e. Contingency plans must be in place to ensure fish welfare is not compromised should there be any equipment or material failure, including an interruption in the electricity supply, loss of water, or breakdown of the water pump.

S 6: Electrical stunning

a. For electrical stunning it must be ensured that:

1. The unconsciousness of the fish is achieved immediately;
2. There are no pre-stun shocks;
3. The unconsciousness is maintained until the fish dies or is insensible to percussive stunning;
4. Fish must be presented to the stunner in a way it does not miss the stun (e.g. skid or falling from the stun table to the floor).

b. There must be a humane process in place to ensure no fish are left in the system at the end of the procedure.
c. If there is no scientific evidence of the electrical parameters used for stunning, a test will be conducted during the audit. This test will observe the behavior of 300 fish stunned with a 1-second exposure time using the regular parameters and 90% of fish must show behavioral indicators of unconsciousness.

As guidelines for testing electrical stunning, review the reference Fish Humane Slaughter Manual in Portuguese (see References for publications from Barcellos, 2022).

S 7: Stunning effectiveness

a. The stun efficiency must be checked for all fish at the exit of the stunner, during bleeding and before processing. Fish must be absent of eye rolling, breathing, response to painful stimuli, or voluntary movements.
b. There must be sufficient time after stunning, and safeguards in place, to:
   1. Assess the effectiveness of the stun in all fish;
   2. Ensure all fish that have not been effectively stunned are re-stunned immediately.
c. The number of fish that have not been effectively stunned must be recorded, and the records must be available during the audit.
d. Out of the first 100 fish stunned each 6 hours, stun efficiency below 90% must result in stopping the process and the stunner's settings must be checked. This incident and action taken must be recorded in an auditable format. Efforts must be made to maintain stunning efficiency as near to 100% as possible.
e. A Standard Operating Procedure must be in place to detail the procedure for dealing with fish that have not been effectively stunned.
f. During the audit day, a sample of stunned fish must be verified to assess stun effectiveness.
g. CCTV must be installed to provide clear footage of the back-up stun process which must be stored for a minimum of 14 days.

S 8: Bleeding

a. All fish must be bled by the cut of the gills, or by decapitation.
b. Bleeding must follow within 15 seconds of electrical stunning, and within 20 seconds of mechanical stunning.
c. All fish must be unconscious during bleeding and dead prior to further processing.
d. All personnel responsible for bleeding must be trained and competent to identify signs of stunning failure and take immediate action.

Part 9: PROCESSING TILAPIA PRODUCTS

P 1: Selling tilapia with the Certified Humane® logo

a. All processing systems must be inspected by *HFAC* for traceability to ensure that:
   1. There is no commingling with non-certified fish meat or meat products;
   2. That the Certified Humane® logo is only being used on fish meat and by-products from Certified Humane® farms.

b. The HFAC will also audit the slaughter plant for traceability according to the Policy Manual to ensure that all the products must be labeled with the Certified Humane® logo originate from Certified Humane® farms. All standards and guidelines can be found at **www.certifiedhumane.org**.

c. Annual mass balance information must be recorded in an auditable format for products labeled with the Certified Humane® logo.

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APPENDIX 1

LIST OF RECORDS

Operations records must be kept up-to-date and made available to the inspector.
These records include, at a minimum:

a. details of origin of stock, allowing traceability
b. control of other animals
c. crowding and grading records
d. calibration records
e. numbers, age and weights/uniformity of fish in each pond/tank/hapas/enclosure
f. estimated current stocking densities (kg/m_3) in each pond/tank/hapas/enclosure
g. where appropriate, target age and weight at which fish will be slaughtered (in order to predict final stocking densities)
h. details of fish and equipment inspects
i. daily and cumulative mortality expressed as a percentage (reasons stated)
j. daily and cumulative culling expressed as a percentage (reasons stated)
k. feed consumption
l. details of any health problems
m. details of any medication/vaccinations applied
n. records of regulatory correspondence (Local official regulations)
o. records of water quality tests as appropriate to the system
p. records of hapas inspections and maintenance
q. training records
r. full details of fish movements.
    1. journey start and end times
    2. water quality parameters
    3. contingency and emergency plans
    4. identity of those responsible for fish welfare.
    5. number of fish to be transported
    6. weight of the fish
    7. current health status of the fish
    8. time since last handling
    9. time since vaccination
    10. time since last treatment (including anesthetic)
    11. feed withdrawal time
    12. any clinical signs of disease
    13. crowding records
    14. oxygen levels during crowding
    15. numbers of fish in each tank or bag to be transported
    16. stocking densities of tanks being used for transport

Humane Farm Animal Care's
Certified Humane® Standards

FARMED TILAPIA

PO Box 82, Middleburg, VA- 20118.