



# MINISTRY OF AGRICULTURE, LIVESTOCK AND FISHERIES

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## STATE DEPARTMENT OF FISHERIES

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# Fish Quality Assurance Guidelines for Fish Business Operators in Kenya



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## **PREFACE**

The fisheries sector plays an important role in the global economy. In Kenya, the sector provides food, employment and incomes to a large population and earns the country KSh. 5 billion annually from foreign exchange. Kenya's annual fish production in 2013 was 181,516 metric tons (MT) valued at approximately KSh. 21.3 billion at ex-vessel price. These earnings are likely to increase if the underexploited areas such as Aquaculture, the Exclusive Economic Zone (EEZ) and other inland lakes are tapped. In the year 2013, fish production from inland capture fisheries stood at 123,861 MT (68%), and marine capture fisheries at 8,865 MT (6%) while aquaculture production was 48,790 MT, contributing 27% of the total fish production.

Fish and fishery products in the country are sold locally and also exported to the regional and international markets. One of the Ministry's functions is to ensure production and marketing of safe and high quality products with a view to safeguarding the health of consumers and ensuring that the industry remains vibrant both locally and internationally. One major requirement of international markets is that a country wishing to export her fish and fishery product has to document and perform official controls along the value chain to ensure the verification of compliance with requirements.

For continued market access, the Government of Kenya has put in place necessary legislation and framework for the production and placing on the market of safe fish and fishery products from both capture fisheries and aquaculture production. To ensure compliance and harmonized implementation of legislation, the Ministry has developed guidelines to be used by producers, processors, traders and input providers.

These guidelines conform to universally accepted standards and comply with relevant national laws and regulations of Kenya. They are, as much as possible, consistent with relevant international agreements, conventions, standards, codes of practice and guidelines. These guidelines lay a foundation geared towards the growth of the fishery industry and will be improved from time to time based on advances in technology and production.

The overall aim of these guidelines is to ensure sustainable production of safe and quality fish and fishery products that will promote food safety, security and trade.



**Mr. Adan Mohamed, CBS,**

**Ag. Cabinet Secretary for Agriculture, Livestock Fisheries Development**

## **PREAMBLE**

The fisheries sector plays a significant role in the social and economic development of the country. In recognition of the sector's positive contribution to food security, job and wealth creation, revenue generation and national development the Ministry of Agriculture, Livestock and Fisheries has initiated major interventions towards the development of national, regional and international markets for fish and fishery products. In line with this, great efforts have been put in place to facilitate sustainable management of fisheries resources for the benefit of the present and future generations. Currently, the sector supports over 2 million people directly and indirectly, working as fishers, fish farmers, traders, processors, suppliers and merchants of fishing accessories and employees and their dependants.

The fish and fish products produced in the country are utilized locally and also exported to the regional and international markets. In the year 2013, the total annual fish production was 181,516 metric tons valued at KSh. 21.3 billion. The bulk of the production came from Lake Victoria. This production can go higher if we invested in the fisheries of the Indian Ocean, Lake Turkana and aquaculture which are currently under-utilized. During the same year, a total of 6,742 metric tonnes of fish and fishery products valued at KSh. 2,568,886,000 were exported. Apart from the above mentioned exports, a total of 1,509 metric tonnes of Tuna loins were processed at a labour charge of KSh. 215,260,000 and trans-shipped through the port of Mombasa.

In the last five (5) years, a total of 69,194 fish ponds have been constructed countrywide. Consequently, the area under aquaculture has risen from 722 hectares in 2008 to 2,015 hectares in 2013. Aquaculture production has risen from 1000 MT valued at KSh. one (1) billion to 48,790 MT valued at KSh. 17.6 billion within the same period.

As all are aware, guidelines are best practices in the industry that are strongly recommended. In addition, they are an important tool used towards attaining compliance with existing regulations. The principal objective of these guidelines is, therefore, to provide advisories to Fish Business Operators (FBO) on the production, handling, transportation, processing and placing in the market, adequate, safe and quality fish and fishery products. The adoption of these guidelines will contribute towards attaining food security, wealth creation and employment in our country.



Prof. Micheni J. Ntiba, CBS  
Principal Secretary, State Department of Fisheries

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## **ABBREVIATIONS AND ACRONYMNS**

CA	Competent Authority
CAN	Calcium Ammonium Nitrate
DAP	Di-Ammonium Phosphate
EIA	Environmental Impact Assessment
GAqPs	Good Aquaculture Practices
GHP	Good Hygiene Practices
GMP	Good Manufacturing Practices
HACCP	Hazard Analysis and Critical Control Point
IUU	Illegal Unreported and Unregulated fishing
PPT	Parts Per Thousand
PPM	Parts Per Million
SSOP	Sanitation Standard Operating Procedures



## **DEFINITION OF TERMS**

**Aquaculture:** the cultivation, propagation or farming of aquatic organisms including fish, mollusks, crustacean and aquatic plants whether from eggs, spawn, spat, seed or by other means or by rearing fish lawfully taken from the wild or lawfully imported to Kenya or other similar process

**Aquaculture facility:** Refers to a fishery enterprise involved in operations related to culture of fish and fishery products

**Aquaculture systems:** Refers to all culture devices used as aqua farms. The devices include racks, rafts, ponds, pens and cages.

**Biologicals:** are vaccines, cultures and other preparations made from living organisms and their products intended for use in diagnosing, immunizing or treating animals.

**Brood-stock:** means parent stock of cultured fish used to multiply a particular strain or variety in captivity.

**Cage:** Is a suspended container enclosed on all sides by netting or other material that hold the cultured organism inside while permitting relative free water exchange with the surrounding.

**Candling:** Means passing fish over translucent table illuminated from below to detect parasites and other defects.

**Carrying capacity:** Is the maximum number of animals or biomass that can be supported by a given ecosystem for a given time

**Competent Authority:** The Ministry with the mandate to carry out official checks for fish and fishery products to ensure safety to the consumer in compliance with the Fisheries Act CAP 378 (Revised 2012).

For compliance with aquatic health and welfare measures, international health certification and other standards or recommendations in the Aquatic Health Code of the World Animal Health Organization (OIE), the Veterinary Services shall be the Competent Authority.

**Contingency plan:** Documented work plan designed to ensure that all needed action, requirements and resources are provided in order to eradicate or bring under control outbreak of specified diseases of aquatic organisms

**Critical limit:** A criterion which separates acceptability from unacceptability. Unacceptable refers to unsafe products.

**Fallowing:** for disease management purposes, an operation where an aquaculture facility is emptied of aquatic animals susceptible for a disease of concern or known to be capable of transferring the disease agent and where feasible of the carrying water

**Fish feed:** means any substance or product, including additive, whether processed, partially processed or unprocessed, intended to be used for oral feeding in fish culture system producing fish for human consumption.

**Fish processing establishment:** means any premises where fish and fishery products are prepared, processed, chilled, frozen, packaged or stored but does not include landing stations, auction or wholesale markets or catering premises.

**Fishery Enterprise:** means any premises, public or private and whether for profit or not, where operations related to production, culture, handling, manufacture, processing, storage, packaging, transport or distribution and marketing of fish, fishery products and fish feed for human and animal consumption are undertaken.

**Fish outlet:** Any premises public or private where operations related to processing, distribution and marketing of fish feed/ fish farm inputs/ fish and fishery products.

**Hatchery:** means a place of breeding, hatching and rearing through the early life stages of cultured organisms.

**Hazard:** means biological, chemical or physical agent in, or condition of, fishery products or fish feed with the potential to cause an adverse effect on human health.

**Holding:** means all the production units operated under a single management for the purpose of producing agricultural products.

**Infectious agent:** An organism (virus, bacteria, fungus, protozoan or helminth) that is capable of producing infection or infectious disease.

**Labelling:** means any terms, words, particulars, trademarks, brand name, pictorial matter or symbol relating to and placed on any packaging, document, notice, label, board, ring or collar accompanying or referring to a product.

**Live feed:** Are live microorganism that inhabit the water column and are fed to fish larvae at the start of feeding immediately after yolk sac absorption.

**Nursery:** means a place where an intermediate farming system, between the hatchery and grow-out stages is applied.

**Pens:** Are culture facilities used to raise aquatic organisms. It may be solid wall, netted structure fixed to the bottom substrate and allowing free water exchange in the inter-tidal zone.

**Production cycle:** means the lifespan of cultured organisms from the earliest life stage to harvesting.

**Quarantine:** means maintaining a group of aquatic animals in isolation with no direct or indirect contact with other aquatic animals, in order to undergo observation for a specified length of time, and if appropriate, testing and treatment, including proper treatment of effluent waters.

**Raft:** A floating structure equipped with floats and sinkers if necessary and safely anchored in a protected coastal area. Used for the suspended culture of aquatic organisms

**Risk:** Means a function of the probability of an adverse health effect and the severity of that effect, consequential to a hazard

**Stocking density:** in the framework of aquaculture, means the live weight of animals per cubic metre of water at any time during the grow-out phase and in the case of flatfish and shrimp the weight per square metre of surface.

**Veterinary Authority:** means the Governmental Authority of an OIE Member, comprising veterinarians, other professionals and para-professionals, having the responsibility and competence for ensuring or supervising the implementation of the aquatic animal health and welfare measures, international aquatic animal health certification and other standards and recommendations in the Aquatic Code in Kenya.

**Veterinary Services:** means the governmental and non-governmental organizations that implement animal health and welfare measures and other standards and recommendations in the OIE Aquatic Animal Health Code in Kenya. The Veterinary Services are under the overall control and direction of the Veterinary Authority. Private sector organizations, veterinarians, veterinary paraprofessionals or aquatic animal health professionals are normally accredited or approved by the Veterinary Authority to deliver the delegated functions.

**Veterinary medicine:** means any curative or preventive substance, formulated medicament, or mixture of substances, whether proprietary or in the form of a preparation effective in animals, which is used, or is manufactured, sold or represented as suitable for use, in— (a) the diagnosis, treatment, mitigation or prevention of disease or abnormal physical or mental state or the symptoms thereof in an animal; (b) restoring, correcting or modifying any physical, mental or organic function in an animal; or (c) controlling internal or external pests and parasites and includes insecticides, vaccines, hormones, alternative medicines, antiseptics, disinfectants, surgical, nutrients and biological products;

**Veterinary Surgeon:** means a person registered as a Veterinary Surgeon registered under the Veterinary surgeons and Veterinary para-professionals Act Number 29 of 2011.

**Veterinary Para-Professional:** means a person registered as a Veterinary para-professional under the Veterinary surgeons and Veterinary para-professional Act Number 29 of 2011.

## **INTRODUCTION**

The management commitment is the production of safe and quality products and provision of the necessary logistic support which has a direct bearing on the expected outcome. The guidelines cover both aquaculture and capture fisheries.

The objective of the document is to provide guidance to fish business operators to produce, handle and place safe and quality fish and fishery products in the market. These guidelines are to assist in implementation of the legal requirements.

The management of fishery enterprises shall ensure that their personnel are given continuous appropriate training to enable them enforce the Sanitary and Phyto-sanitary Measures with changing technology and legal requirements.

### **1.0. MANAGEMENT**

#### **1.1 Management commitment (Fishery Enterprises)**

The Management shall demonstrate high level of commitment and compliance with aspects to include:

- Good Manufacturing Practices (GMP) and Good Hygiene Practices (GHP)
- Food safety and hygiene policy
- Financial commitment
- Capacity building
- Administrative structure, job description and reporting procedures
- Monitoring, Control and Surveillance regimes to ensure food safety
- Designation quality and production departments as different entities
- Proper document control and Record keeping
- Welfare of the employees
- Internal audits

The management of fishery enterprise will put in place mechanisms for self assessment to ensure production of safe and quality products.

These guidelines will be reviewed as need arises to reflect changes in technology and developments in the industry.

## **2.0. REQUIREMENTS FOR FISH FARMS AND HATCHERIES**

The objective of this section is to provide guidance on sanitary measures that are required to produce, process and place in the market safe aquaculture inputs and products.

### **2.1. Good aquaculture practices**

Good aquaculture practices (GAQPs) are a series of considerations, procedures, and protocols designed to foster efficient and responsible aquaculture production. GAQPs also help to ensure final product quality, safety, and environmental sustainability. Considerations are made for;

- Site selection
- Production system design
- Incoming seed stock
- Facility bio-security
- Feeding management
- Procurement and storage
- Production techniques to maximize fish health and harvest
- Cleaning and sanitation basics to ensure final product quality and safety

### **2.2. Requirements for an internal system to control safety hazards in farmed fish**

Every aquaculture facility shall have an effective bio-security program incorporating;

- Disease prevention
- Disease monitoring,
- Management of disease outbreaks,
- Cleaning and disinfection between production cycles, and
- General security precautions.

The bio-security plan must be adaptable, address local disease threats, and prevent environmental degradation.

The primary goal of the bio-security program will be to prevent the introduction of any infectious organism by eliminating or controlling infectious diseases within the facility. The potential sources of entry for an infectious agent into an aquaculture facility include;

- Additions of new stock (fry, post larvae, juvenile and brood-stock);
- Contaminated water or feed, humans, animals or equipment, and subclinical (asymptomatic) carriers within the existing stock.

### **2.3. Site Selection**

The site should be suitable for aquaculture production. A survey and analyses of relevant physical, chemical and biological parameters will be conducted to determine suitability for aquaculture and the species to be cultured. An environmental impact assessment shall be undertaken. The area should be free from sources of contamination and the risk of contamination should be minimal and any sources of pollution shall be controllable.

For a land based aquaculture establishment, a survey and analysis of soils shall be conducted in order to determine the concentration of micro-contaminants (heavy metals, pesticides residues, trace elements and dioxins) and micro-organisms of concern for the safety of the live fish and end products. For earthen ponds, soils shall be impervious to water to avoid the ingress of possible pollutants

Cages, pens or any other form of fish culture enclosures and water intakes should be sited away from routes of water-borne traffic, and preferably located upstream of any water-borne traffic and any natural or man-made discharges.

### **2.4. Production system design**

- The design of the production systems should not have any adverse effect on the environment.
- The design should prevent cross contamination.
- The design should ensure that there is adequate space for production operations and equipment.
- The system design and construction should ensure easy, fast and hygienic operations.
- The design should have adequate depth to maintain thermal stability.
- The design should allow for adequate internal water circulation to facilitate fish swimming behaviour.
- There should be water control structures to regulate water entry and exit from the system.
- The inlets and the outlets should be separated to avoid contamination and should be screened to prevent entry of undesired species and fish escapes.
- The design should allow for complete drainage of the culture facility.

- The design should allow for waste collection at the discharge.
- Discharge waters should be treated to improve water quality parameters prior to leaving the farm site.
- Where appropriate, the design should allow for sufficient sizing of support-system components which include:-solids separation, infiltration, re-aeration/degassing, water sterilization (ultraviolet light, ozone), to maintain adequate water-quality parameters for the species under production.

## **2.5. Requirements for fish seed producers**

Fish seed producers shall ensure that:-

- The facility should be accessible for routine inspection and management.
- Access to the hatchery shall be restricted to authorized personnel.
- Fish seed producers will have adequate technology.
- The management of a seed production facility shall designate holding units for fry and fingerlings.
- The following water quality parameters shall be monitored and records maintained;
  - » Temperature
  - » Dissolved oxygen
  - » Salinity
  - » pH
  - » Ammonia
  - » Nitrates
  - » Hardness
- Breeding shall be conducted in a manner that precludes contamination.
- Fish seed shall be graded according to size and age.
- Sorting and grading of fish seed shall not compromise fish health and quality.
- The personnel involved in fish seed production shall be skilled in fish breeding and seed handling to prevent injuries and disease to brood-stock and fry/ fingerlings.
- There shall be a documented personnel hygiene procedure.
- The personnel shall be provided with appropriate protective gear.
- Records of origin of inputs, stocking, growth performance, feeding, health, harvests and movements by dates shall be maintained for traceability purposes.

### **2.5.1. Facilities and equipment**

- Fish seed production facility shall be clean and will have clear designated areas for holding brood-stock, propagation, nursing and holding young fish.



- The gears and equipment for handling eggs, fry, fingerlings or brood-stock shall not cause any injuries or contamination.
- The facility shall have adequate supply of safe and good quality water including adequate water storage facilities.
- Adequate and suitable equipment will be provided for breeding, nursery and for holding brood-stock and fingerlings.
- There shall be designated areas for storage of packing material and for packing fish.
- The seed production facility shall be equipped with aeration equipment, graders, digital balance, fish handling nets, water quality meters, incubators, seine nets and hapa nets.
- The drainage system will be well designed and equipped to screen water into and out of the hatchery.

### **2.5.2. Brood-stock**

- Brood-stock producers will have adequate technology and reliable production facilities.
- Brood-stock shall be obtained from a source approved by the CA and will be of recommended sizes (Nile tilapia (*Oreochromis niloticus*); females:  $\geq 120\text{g}$  and males:  $\geq 180\text{g}$ . African catfish (*Clarias gariepinus*); females: 300-500g and males 200-500g. Carps (*Cyprinus* spp); both males and females 2.5-10Kg; Rainbow Trout (*Oncorhynchus mykiss*) both males and females 0.7-3 Kg.
- Production and distribution of genetically improved brood-stock shall only be done with approval from the CA. Records of production and distribution shall be kept and shall be made accessible for inspection.
- The brood-stock shall be free from parasites, diseases and malformations.
- The brood-stock shall be well managed to prevent disease outbreaks.
- Procedures for brood-stock management shall be documented and shall include fish health monitoring.
- Brood-stock management and breeding program records shall be maintained.

### **2.5.3. Artificial propagation**

Artificial propagation is practiced for fish which do not reproduce naturally in captivity. A basic pre-condition of fish propagation is to have sexually mature male and female fish producing milt and eggs. Only approved hormones and chemicals shall be used in artificial propagation.

### **2.5.3.1. Procedure for artificial propagation**

There are two approaches in artificial propagation depending on species: Induced propagation without hormones and induced propagation with organic or synthetic gonadotropin hormone treatment. The latter is commonly used due to the high rate of success.

Species which are currently artificially propagated in the country are African catfish, trout and carps. Propagation shall be undertaken as follows:-

#### **A. African catfish**

The process of induced spawning includes the following steps:

- i. Injection of gonadotropin into female spawner
- ii. Collection of milt from male brooder
- iii. Stripping of female spawner
- iv. Fertilization of eggs
- v. Incubation of eggs

#### **i. Procedure for Injection of female spawner with gonadotropin**

- Use a syringe with a volume of 2 cm<sup>3</sup> and a needle 2-3 cm long with a diameter of 0.6-0.7 mm.
- Fit a sterilized needle into a syringe
- Draw the gonadotropin into the syringe and eliminate any air bubbles.
- Cover the head of the female fish with a clean wet towel and inject the suspension intramuscularly at an angle of 30 – 45° into the dorsal muscle in the direction of the tail (Injection is preferably done in the evening).
- After injection gently finger-rub the injected area to facilitate even distribution throughout the muscle.
- Place the injected female in a tank with flowing or circulating water.
- Ovulation will take place within 12 – 18 hrs depending on water temperature and the gonadotropin used.

#### **ii. Procedure for collection of milt**

- Milt will be collected from the male prior to stripping the female.
- Milt is obtained by operating on or sacrificing a male fish.
- In case the volume of the milt is not sufficient, dilute with 0.9% saline solution.
- Excess milt should be stored in a refrigerator at 4°C for a maximum of 2 days.

### **iii. Procedure for stripping of female spawners**

- The females should be starved for 3 days before stripping to allow evacuation of the gut contents which may contaminate the eggs during stripping.
- Use a net to remove the female carefully from a holding receptacle.
- Gently hold the spawner with a dry towel, strip by applying gentle pressure on the abdomen and collect the eggs into a clean dry bowl / tray.
- After stripping, place the females in recovery tanks under favorable conditions while being fed a high protein level diet (>30% CP) to begin another cycle of egg development.

### **iv. Procedure for fertilization of eggs**

- Fertilization of the eggs will be done either by the dry or wet method. The wet method is preferable when there is insufficient quantity of milt.
- For the dry method, squeeze the freshly dissected testes and distribute the droplets evenly on top of the egg mass, the eggs and milt are mixed together and water is added to rinse off the excess milt.
- For the wet method, mix the milt with the fertilizing solution before pouring on the eggs. The fertilizing solution is prepared beforehand by mixing 3 g of Sodium chloride (common salt) and 4 g of Urea in 1 litre of water. Immediately add clean water into the tray/bowl and mix the eggs and the sperm gently for 1-5 minutes.
- Fertilization occurs in 2-5 minutes.
- The fertilized eggs are ready for incubation.

### **v. Procedure for incubation of Eggs**

- Within a few minutes after fertilization the eggs will absorb water and become sticky.
- To prevent the eggs from sticking together, spread them on a substrate in a single layer to facilitate aeration and prevent fungal infections. The substrate can be a kakaban, clean roots of Nile cabbage or a floating net placed inside the incubation tank.
- Incubate the eggs in water with flow rate of 1-3lt per minute/ aeration using air stone diffusers
- The incubation period will vary depending on the water temperature
- The optimum incubation temperature and period is 27°C and 23hrs respectively.

## **B. Trout**

- i. Select a ready female and anesthetize by dipping in a recommended tranquilizer to keep the fish calm.
- ii. Wash off the anaesthetic by dipping the fish in clean water.
- iii. Hold the fish in a horizontal position with the belly facing down and strip the female's eggs into a dry, shallow container. Gently press the abdomen from the base of the pelvic fin towards the tail to start the flow of eggs until all the eggs are stripped.
- iv. Strip the male milt onto the eggs and mix gently. Water should not come into contact with the mixture for it will inhibit fertilization by the sperm.
- v. In case the milt is not for immediate use, store in a refrigerator for 2 days at 2 to 3°C.
- vi. Fertilization will occur within 30 seconds. Add enough water to cover the eggs.
- vii. Mix thoroughly but gently and rinse off the excess milt with clean water.
- viii. Place the eggs into an incubation tray, and put the trays into an incubator.
- ix. Maintain temperatures between 9-14 °C during incubation.

## **C. Common Carp**

- i. Select mature male and female brood-stock from holding facility. Sexually mature fish measure 35 to 70 cm and weighing 2.5kg to 10kg.
- ii. Transfer the brooders to the hatchery one day prior to propagation and hold the female and males in separate tanks.
- iii. Prior to handling, the fish may be anaesthetized. The recommended anaesthetic is MS 222 (Sandoz), in a 1:10 000 dilution or 1ml phenoxy-ethanol /10 liters of water, for a period of 5 to 10 minutes, then move into fresh water of high oxygen content for recovery.
- iv. Conduct hypophysation as follows:
  - Induce ovulation in the female and milt production in the male, by injecting the male and female with the gonadotropin.
  - The hypophysation of the female should be done in two stages;
    - » Ten percent of the dosage is given 24 hours before the removal of eggs;
    - » 90 percent of the dosage is given 12 to 14 hours prior to the removal of eggs.
  - Inject the fish intra-muscularly at the base of the dorsal fin using a fine needle. Lightly massage to avoid leakage of the solution injected;
  - The male is injected 24 hours prior to milt collection.
  - Place them in separate conditioning tanks at 24°C.
  - It is imperative that the fish in the hatchery have absolutely quiet surroundings.

- v. The removal of eggs and milt, fertilization
- After 24hrs check the bottom of the conditioning tank for released eggs.
  - Remove the ready females, anaesthetize and dry them using a towel
  - Strip the eggs by gently pressing the abdomen of the fish into a dry bowl.
  - Obtain milt from the male by gently pressing the abdomen and collect the milt into another bowl.
  - Fertilize the eggs by mixing them with the milt; add a little water to activate the sperm while stirring for one minute.
  - Each batch of eggs should be fertilized with milt from no less than three males, since the sperm of any male may occasionally be inactive;
  - Add 3% fresh milk to remove the stickiness of eggs.
  - The eggs should then be rinsed 3 or 4 times with ample quantities of water;
  - After rinsing the eggs are placed in incubators at water temperatures of 24°C for 18hrs to hatch.

#### **2.5.3.2. Production of all male tilapia**

- Only approved hatcheries shall produce and distribute all male tilapia fingerlings.
- Fish seed producers will have adequate technology and reliable production facilities and equipment for monosex tilapia production.

#### **2.5.4. Packaging**

- Appropriate fish packaging materials should be provided. If polythene is used for packaging live fish, the gauge will be  $\geq 0.3\text{mm}$ .
- Packaging materials will be labelled and shall contain at least the following information:
  - » Fish species
  - » Size and Quantity
  - » Batch Number
  - » Name and Physical address of the hatchery
  - » Date of Spawning
  - » Instructions for handling

### **2.6. Fish feed**

The management of an aquaculture facility shall use safe and quality feeds. Samples of fish feed shall be analysed to determine the quality and safety.

### **2.6.1. Feed formulation and production**

- Fish feed will contain nutrients in proportions required for optimum growth by the target fish. Ingredients that contain toxins or known contaminants shall not be used.
- Slaughter house waste and offal from mammalian food animals may only be used as fish feed after proper treatment.
- Compounded fish feeds shall be packaged in airtight and suitable weather resistant material with adequate tamper proof labels detailing composition including additives, granular and pellet size, manufacture and expiry date, origin, contact address and batch numbers.
- Fish feed treated with veterinary medical supplements (including hormones and antibiotics) shall be considered to be veterinary medicines and shall be approved for use under the terms of Pharmacy and Poisons Act (Cap. 244).
- Fish feeds shall be used before the expiry date and any remaining feed disposed off under the supervision of the CA.

### **2.6.2. Medicated feeds**

- Medicated feeds shall be stored separately from other feeds and in accordance to the manufacturers' specifications.
- Medicated feed bags, including bulk bags shall be handled carefully on transit from storage to either hand feeding or automated feeding equipment.
- All unintentional spillage shall be cleaned up immediately, and feed shall be protected from pests and predators.
- Medicated feed shall be fed in accordance with an authorised Veterinary Surgeon/ Veterinary Para-professional's instructions. The appropriate fish shall receive the prescribed amount of medicated feed for the duration of treatment.
- Records on utilization of medicated feed shall be maintained.
- Disposal of medicated feed shall be done under the supervision of the CA.

### **2.6.3. Feed storage**

Fish feed shall be stored in a properly constructed, well-ventilated facility. The feed shall be protected from exposure to pests, vandals, extremes of heat, light and humidity.

Feeds shall be stored according to manufacturers' instructions and stock records maintained.

#### **2.6.4. Live feed for hatcheries**

- Live feed producers shall have appropriate facilities, written documented procedures and maintain records for production of live feeds.
- Live feed producers shall be approved by the CA.
- Record on sale and distribution of live feed shall be maintained.

#### **Artemia**

- Hatcheries should use Artemia nauplii or shell free Artemia as starter feed for fish which require live feeds.
- An acceptable cyst should have minimal quantities of impurities (sand, cracked shells, feathers and salt crystals)
- In cases where Artemia nauplii is to be used, the cysts should be hatched once the fry are into their day 2 to avoid starvation as soon as they exhaust their yolk sac.
- Feeding should be done to satiation in preferably dark conditions but caution should be taken to ensure water quality does not deteriorate.
- Weaning with dry feed will be done from day 4 gradually by reducing the live feed to 50% of the ration and adding the dry feed at 50%. After seven days of such feeding, only dry feed will be administered to the fish.

#### **Hatching Artemia**

- Artemia cysts can be purchased locally from leading hatcheries and hatched in the farm.
- Soak the Artemia cysts in a container with hypochlorite for one hour to disinfect the cysts then pour out hypochlorite and wash the cysts with fresh water till they are clean.
- Prepare hatching solution by dissolving non-iodized salt into fresh water or diluted seawater to 30-33 ppt (parts per thousand). 1 kg of salt per 30 liter of water = 30ppt.
- pH should be 8.0-8.5; if necessary add dissolved sodium bicarbonate (up to 2 g/L technical grade NaHCO<sub>3</sub>) or sodium carbonate solution drop by drop to increase the pH
- Incubate and aerate cysts in a conical shaped container with cyst to solution density of 1.5-2 grams of cysts per liter of hatching solution. Aeration may be done by air-stone diffusers and air blowers.
- Provide hatching tank with natural or artificial light (minimum 2000 lux with fluorescent lamps close to water surface) and maintain constant temperature of 28° C by use aquarium heater.

- Aeration should be strong and continuous.
- Stop aeration and remove fresh nauplii after 12-24 hours of incubation.
- After hatching the hatched nauplii appears red and will settle at the bottom of the tank and the unhatched cysts will appear at the surface.
- Suck out the hatched Artemia nauplii from the bottom of the container using a tube. Rinse the nauplii with cold water and put in a container with water to feed the fish.

## **Culturing zooplankton**

- Select a pond, such as the brood-stock pond. Remove any small fish. The pond must have green water (phytoplankton).
- To prepare zooplankton for a 600-800m<sup>2</sup> pond add 20 kg of chicken manure, 5 kg of lime, 5kg N:P:K: fertilizer (16:16:16) and 2 kg of fine fish meal, cotton seed cake or wheat bran.
- After 3 days, zooplankton will be growing or “bloomed” and can be seen as whitish swarms of tiny zooplankton around the pond in the green water. The green water is due to phytoplankton, which is eaten by zooplankton.
- Plankton net of 50µm-55 should be used to harvest the zooplanktons and sieved through 180 µm net to remove large debris before feeding

## **2.7. Pond management**

### **2.7.1. Pond fertilization**

The following fertilizers may be used where applicable:-

#### **Organic fertilizers**

Organic fertilizers include poultry, rabbit, sheep, goat and cattle manure. Pig manure can only be used if:

- It is added with an equal weight of lime during pond conditioning.
- Has been adequately composited to eliminate trematode eggs.
- Is derived from enclosed animals adjacent to the pond as part of an integrated culture system and those animals are treated regularly with anti-helminthic drug and free from zoonotic diseases.

Manuring rates depend on the size of the pond which is expressed as surface area. Organic manure will be applied at a rate of 50g of dry matter per m<sup>2</sup> depending on the primary productivity of the water



## Inorganic fertilizers

Inorganic fertilizers include DAP, CAN, Urea. Agricultural lime will be applied depending on the surface area and the productivity of the water as described below:

- DAP and CAN will at the rate of 2 g/m<sup>2</sup>
- Urea at a rate of 3 g/m<sup>2</sup>
- Agricultural lime will be applied at the rate of 20kg/100m<sup>2</sup>.

## 2.8. Water quality management

Performance of fish in any given water body is highly dependent on the water quality. The management of an aquaculture facility should therefore design a water quality-monitoring program that puts into consideration natural, spatial and temporal variation in water quality. The following physical and chemical parameters will be monitored:

- pH,
- Ammonia,
- Alkalinity,
- Total hardness,
- Dissolved oxygen,
- Temperature,
- Turbidity,
- Conductivity,
- Nitrites,
- Toxic algae.

In intensive culture systems, the facility will be cleaned regularly and water exchange should be sufficient to remove metabolic wastes and maintain oxygen levels. Control measures will be in place to remedy adverse water quality or quantity situations. Records on water quality shall be maintained.

The ideal water quality parameters for optimum growth and survival of the target fish species are elaborated in Table 1 and Table 2 (for hatcheries) below:-

**Table 1:** Recommended water quality ranges for fresh water cultured fish

Parameters	Cold water fish	Warm water fish
Temperature (°C)	14 – 17	22 – 32
Salinity (ppt)	0 – 25	0 – 25
Alkalinity/hardness (as CaCO <sub>3</sub> ) (mg/l)	40 – 70	40 – 70
pH	6.5 – 8.5	6.5 – 8.5
Dissolved oxygen (mg/l)	≥ 5	≥ 3

Parameters	Cold water fish	Warm water fish
Phosphate (mg/l)	10 – 100	10 – 100
Unionized ammonia (NH <sub>3</sub> ) (mg/l)	< 0.5	< 0.5
Ionized ammonia (NH <sub>4</sub> <sup>+</sup> ) (mg/l)	< 1.5	< 1.5
Plankton turbidity (cm)	30 – 45	30 – 45
Suspended solid size > 1 µm (mg/l)	2 – 10	2 – 10
Suspended solid size < 1 µm (mg/l)	2 – 3	2 – 3
Nitrite (NO <sub>2</sub> ) (mg/l)	< 1	< 1
Nitrate (NO <sub>3</sub> ) (mg/l)	< 10	< 10
Chlorine (Cl <sub>2</sub> ) (mg/l)	< 0.8	< 0.8
Salinity (ppt)	< 5	< 5

**Table 2:** Recommended water quality parameters for hatcheries

Type of Hatchery	Parameters					
	pH	Temperature (°C)	Dissolved oxygen (ppm)	Nitrites (ppm)	Nitrates (ppm)	Salinity (ppt)
Fresh water prawns	7.0-8.5	28-30	>5	< 0.1	<2.0	-
Marine shrimps	7.0	28	>5.0	-	<0.1	35
Finfish	6.5-8.5	28-30	>4.0	-	< 0.1	-

## 2.9. Handling live fish

The following applies to live fish handling:

- Materials used in the construction of holding units and equipment will be of smooth surface to prevent injuries.
- Fish will be handled in a manner that prevents injury.
- Fish shall be examined for signs of injury. Injured fish shall be separated from the rest of the stock.
- If fish are to be marked (fin clipping, coded wire tags, other external tags, etc), this will be done in a manner that causes minimum damage. The procedure shall be done under anaesthesia.

### 2.9.1. Anaesthetizing fish

Anaesthetic protocols shall address the following key components:

- Only approved anaesthetic products shall be used for particular species.
- Operators shall ensure that prescribed quantities of anaesthetic products are used.
- Waterproof gloves and protective clothing (including splash glasses) shall be worn.

- Adequate oxygen shall be maintained during anaesthesia to ensure appropriate water quality, waste disposal and minimal stress to fish during the procedure and recovery.
- Anaesthetic baths shall be renewed based on fish biomass, time and water quality parameters.
- Fish shall be continuously observed during anaesthesia and recovery periods.
- Fluids containing an anaesthetic product shall be disposed off in a manner that meets manufacturer's recommendations and existing regulations.

## **2.10. Monitoring of fish health**

The management of an aquaculture facility shall:-

- Observe fish and fish behaviour daily to examine signs of illness.
- Put in place a facility to quarantine and examine fish on site.
- Develop a sampling protocol in consultation with the CA.
- Put in place a procedure for routine monitoring of fish health.

Monitoring shall be done by:

- Reviewing recent records and patterns of death and morbidity.
- Observing fish behaviour.
- Reviewing general hygiene, management and other possible fish health risks.
- Informing the CA in the event of disease outbreak or increased mortality rates.
- Collection and submission of fish, water and feed samples to the CA for diagnosis and analysis

### **2.10.1. Fish health monitoring records**

The management of aquaculture facility shall keep a chronological record of observations or other information that may indicate illness in a fish population including:

- Morbidity levels.
- Daily feed consumption, growth rate, and feeding behaviour.
- Disease findings or reports of carcass quality made at slaughter.
- External lesions on live fish including signs of ecto-parasites

### **2.10.2. Controlling fish diseases**

Fish may become infected with disease via vertical or horizontal transmission. Vertical transmission is via gametes i.e. eggs and/or milt, while horizontal transmission is from other infected fishes or through contamination from infected water, personnel, clothing and equipment. In order to control fish diseases an aquaculture facility shall:-

- Ensure production that does not compromise the health, safety and quality of fish.
- Put in place precautionary measures to prevent disease outbreaks.
- Develop contingency measures to control disease outbreak.
- Report to the Veterinary Surgeon/ Veterinary Para-professional outbreaks of notifiable diseases on the farm or in the neighbouring aquaculture facilities.
- Quarantine fish from other sources by holding them in separate units using different equipment and designated personnel. The isolation period will cover the incubation period of the disease of particular concern.
- Observe the quarantined fish for mortality, feed consumption and abnormal behaviour on daily basis during the isolation period.
- Ensure that diseased isolated fish are protected against predation and vandalism to avoid further spreading of the disease of particular concern.
- Have facilities for safe handling or disposal of infected and dead fish.
- Ensure that sterile equipment are used in the facility for blood sampling, vaccination and artificial propagation.
- Ensure that used disposable equipment are safely disposed.
- Keep records of treatment that specify the date and nature of treatment, drugs administered, treated fish, duration of treatment and withdrawal period of the drug used.

### **2.10.3. Handling and administration of veterinary drugs**

- Only approved and valid veterinary therapeutic products and medicinal premixes shall be administered to fish. Control of fish diseases using drugs in an aquaculture enterprise shall be carried out only on the basis of a diagnosis, treatment and supervision by an authorized Veterinary Surgeon/ Veterinary Para-professional.
- Records of treatment will be signed, kept and will specify date and nature of treatment, drugs administered and dosage, treated fish, duration of treatment and withdrawal period.
- Fish under treatment shall be isolated for easy identification.

### **2.10.4. Requirements for vaccinating fish**

Vaccines shall be used under the conditions recommended by the manufacturer or the Veterinary Surgeon/ Para-professional's advice. The operator shall ensure that:

- Water temperature and salinity, fish size, and fish health history is considered when designing a vaccination program.
- Vaccination process is designed in a manner that minimizes fish stress.
- Anaesthesia is used when injectable vaccines are administered.

- Water quality is maintained when bath vaccines are used.
- Careful cleaning and disinfection of vaccination equipment is done.

#### **2.10.5. Storage of biologicals**

Biologicals including vaccines shall be refrigerated or frozen and handled as per manufacturer's instructions. Instruction for use for each vaccine on site shall be kept in an accessible safe place. Trained staff shall handle all biologicals safely by wearing appropriate protective gear and taking suitable precautions.

#### **2.10.6. Treatment records**

Treatment records shall include:

- Location of aquaculture facility.
- Species of fish.
- Name of the authorized persons.
- Details of the drugs and prescription which should include:
  - » Name of the drug
  - » Specifications on how they were administered.
  - » Treatment schedule including the date treatment commenced, date of last treatment and withdrawal period.
  - » Name and signature of the person responsible for administering each treatment

Detailed records of medicated feed administration shall be kept during the entire treatment period and the time the fish are on site.

The management of the facility shall ensure that stocks that were treated at the same time are readily identifiable throughout the treatment and withdrawal period.

If treated fish have to be moved to a different site, they shall be accompanied by treatment records.

#### **2.10.7. Withdrawal period and harvesting**

- Drugs used for treatment as well as prophylaxis shall not be given to fish for a period of time (withdrawal period) before slaughtering
- Withdrawal periods under different conditions shall be established by the supplier of the drug for the fish species and the drug administered, and recorded in the drug register kept by the farmer.

- Treated fish shall not be sold or consumed before the end of the drug withdrawal period.
- If fish which are treated with a veterinary medicine are sold live for on-growing before the end of the withdrawal period, the buyer must be informed in writing by the seller.
- The concentration of any veterinary drug residue in the harvested fish shall not exceed the maximum residue limit specified under the Food Drugs and Chemical substances Act Cap 254 or any other applicable laws.

### **2.10.8. Management of fish disease outbreaks**

#### **2.10.8.1. Infectious disease emergencies**

Infectious disease emergencies may be due to significant increase of pathogens which may lead to rapid spread of disease.

The management of an aquaculture facility where an outbreak has occurred shall inform the CA. During this period, visitors shall be restricted. Visitors who have been to another facility within the last 24 hours shall not be allowed into the fishery enterprise.

#### **2.10.8.2. Reporting of diseases**

Reporting of diseases will be done according to the Animal diseases Act CAP 364. "Suspicion" of the occurrence of a disease means observation of clinical signs or preliminary tests indicative of the presence of a pathogen that causes disease. Suspicion or identification of the occurrence of notifiable diseases shall be reported to the authorized Veterinary Surgeon/ Veterinary Para-professional.

Upon confirmation of the disease the CA will notify the concerned aquaculture facility and provide necessary advice.

#### **2.10.8.3. Following**

As part of management of fish disease and prevention of a re-occurrence, an aquaculture facility shall undertake following immediately after:

- Removal of all susceptible species of aquatic animals of concern,
- Removal of all species capable of acting as carriers of the disease of concern,
- If appropriate, removal of other species,
- Removal of water in which infected stocks have been held, where feasible,
- Equipment and other material contaminated or otherwise capable of harbouring

infection have either been removed or subjected to disinfection.

#### **2.10.8.4. Isolation/quarantine**

- When zones are established for fish health reasons, efforts should be made to reduce fish movement between zones. Where fish has to be moved between zones, transporters shall consult with the CA. Fish holding containers including the transport units shall be cleaned to remove waste between use within the same watershed or zone.
- An aquaculture facility may be isolated or quarantined or zoned in case of a disease outbreak. Isolation or quarantine shall remain in force until such a time when the problem has been diagnosed and/or managed and approval granted.
- When an aquaculture facility or locality/zone has been put under quarantine, movement and handling of all fish on/off and within the locality/ zone shall cease. Equipment and personnel shall not move on or off site unless special arrangements are made, e.g., for staff going on or off shift from the site. No visitors or non-essential staff shall be allowed on site without permission from the CA.
- Release of fish out of the facility shall be halted and assessment of the risks conducted by the CA.

#### **2.10.8.5. Determining the cause of an outbreak**

Once an outbreak is recognized, an intensive monitoring and sampling program will be developed targeting all fish on site and any potential fish off site that are epidemiologically linked to affected fish. The following shall be considered

- Investigation and management of mortality.
- All facilities shall have a list of the staff with relevant contact information so that they can easily be contacted.
- Fish health records shall be reviewed and other sources of information such as the management history of the affected and unaffected fish on site in order to help identify possible causes/sources of the outbreak. The following shall be specifically reviewed;
  - » Management history including species, age, year-class, source, vaccination, movements, and treatments.
  - » Past diagnostic results from screening, routine disease monitoring or previous disease history.
  - » Results of any in-house diagnostic work done on the affected groups of fish.
  - » Water quality and feed history.
  - » Mortality rates prior to the outbreak.

- Examination of a representative proportion of sick and dead fish from holding units affected during the outbreak as well as fish in adjacent units and, if possible, epidemiologically linked holding units on and off site.
- The management of an aquaculture facility shall have plans in place that anticipate an increased need for disinfection, disposal or other issues associated with large scale losses, whether these are due to infectious disease, environmental or management problems.
- Management shall be required to notify other facilities or companies (including transport companies) epidemiologically linked to the affected fish and/or in neighbouring culture facilities if a disease of significance is detected and there is a risk of exposure from disease causing agents affecting fish involved in the outbreak.
- Water from a disease outbreak area shall not be released or disposed off without the authority of the CA.

#### **2.10.8.6. Release**

Fish shall not be released from an aquaculture facility to the wild or other farms if:

- They are known to be infected/infested/contaminated with disease causing agents for which there is a reasonable likelihood that a negative population health effect could result in other aquatic organisms because of exposure to the agent(s).
- They had been treated with a drug or chemical and are still within the drug withdrawal period and are likely to enter the human food chain before the end of the withdrawal period.
- The fish are involved in a disease outbreak, and/or the cause of death or illness is unknown.

#### **2.10.8.7. Fish escapes**

Aquaculture facilities shall have an escape management plan approved by the CA.

#### **2.10.8.8. Euthanasia**

Fish that have to be killed as part of disease surveys or other management plans or due to illness shall be euthanized in a humane manner such as; severance of the spinal cord behind the head or, for larger fish, a sharp blow to the head when the fish is restrained out of water, or overdoses of anaesthetics considered humane. Stunning of fish shall result in immediate loss of consciousness that lasts until death. Fish shall not be stunned unless they can be killed without delay. If fish are killed without stunning, the method used shall result in a rapid and irreversible loss of consciousness.



### **2.10.8.9. Disposal of dead fish**

Dead fish shall be handled in a manner that minimizes the spread of infectious disease causing agents. The following shall be observed:-

- Disposal of dead fish shall be in accordance with Animal diseases Act CAP 364 and shall be done under supervision of the CA.
- During a disease outbreak or increased mortality rates, the schedule of removal of dead fish from holding units shall be reviewed.
- The containers used to dispose off dead fish shall be designed in a manner that prevents the spread of potentially infected or contaminated material and be secure from scavengers.
- Dead fish shall be removed from a holding unit on a regular basis and disposed off appropriately.

### **2.11. Control of pests and predators**

The design of aquaculture facilities including the management methods shall prevent the attraction/ infiltration/ proliferation of pests and predators.

Attention shall be paid to the following:

- Fish feed shall be properly stored.
- Dead fish shall be properly disposed off.
- Vegetation or structures that provide cover for predators shall be removed from around holding units where possible.
- Pests and Predator exclusion methods should be used.
- Inspections shall include checks for signs of pests and predators.

### **2.12. Requirements for moving live fish between sites**

Movement of live fish shall be conducted according to the following procedures:-

- Obtain a valid permit for moving live fish between sites.
- Ensure that the fish is kept under ideal survival conditions.
- Starve the fish prior to transportation to reduce faecal and other contamination of transport water.
- Review diagnostic and treatment history of any fish being transported. This shall include mortality, diagnostic and treatment records and examination of a representative sample of dead and nearly dying fish within 14 days of transportation. Consideration shall be given to any differences in the pattern of disease recipient area and the location which fish are being transferred to.
- Ensure that fish are free from any notifiable diseases.

- Keep records on the condition of fish, quantities, type of fish.
- Ensure that transport vehicles/vessels are adequately insulated and tanks/packages are adequately aerated and sealed to prevent oxygen depletion during live fish transportation.
- Ensure that fish are handled in a manner that minimizes skin damage or other trauma.
- Have in place contingency plans in case of delayed transportation.
- Ensure that transport vehicles and vessels, equipment and gears are cleaned and disinfected to prevent contamination.
- Wastes from cleaning operations shall not facilitate spread of infectious agents.
- Ensure that equipment is not moved between catchments or areas established for fish disease management. If equipment must be shared, they shall be properly cleaned and disinfected before being moved.
- Ensure that water used during transportation of live fish is safe and of good quality.
- The applicant for transfer of live fish must provide the following information along with the application:
  - » Species and strains of fish to be transferred;
  - » Source and destination of fish to be transferred;
  - » Intended use and purpose of fish to be transferred;
  - » State of the health of the fish and the environment it has been sourced from;
  - » If new species, its biology and any other relevant information on the ecology of the fish;
  - » Quarantine measures and guarantees in case the species does not occur in the watershed where the fish is destined;
  - » Description of the conditions under which the fish is to be transferred: packaging, oxygen, temperature, conditioning before transfer, and the transportation methods to ensure that the relevant provisions of the Rules are complied with.
- A fresh application for each and every transfer is required with all the information mentioned above. All applicants who meet the conditions above and conform to the requirements are issued with a permit

When zones are established for fish health reasons efforts should be made to reduce fish movement between zones. Where fish has to be moved between zones, transporters shall consult with CA.

### **2.13. Procedure for stocking and restocking of water bodies**

- Any stocking or restocking activity of a water body shall be conducted with approval of the CA.
- A survey of the water body to be stocked and analyses of relevant biotic and a biotic factors will be conducted to determine suitability for the species to be stocked.
- Genetically improved fish or selectively bred fish of any generation must not be released to any water body.
- Record on stocking of water bodies shall be maintained properly and shall be availed for routine inspection.
- Monitoring, evaluation and assessment of the stocked/restocked water bodies shall be conducted annually.

### **2.14. Seaweed production and processing**

#### **2.14.1. Site selection**

- Sea weed farming shall be practiced in a clear, clean, sandy or rocky area in a stable substratum in the inter-tidal zone and shall not block navigation.
- The depth of water at lowest tide mark shall be 1.5 to 3 feet deep, (45 to 90 cm) and at least 7 feet (210cm) at the highest tide mark.
- The temperature of sea water shall be between 27°C and 30°C and the salinity maintained at 30 to 34 ppt.
- The sea weed farm shall be located in areas with adequate nutrients, rich water in flow and moderate velocity of 20 to 40 m per minute.
- The site for sea weed farming should be far from sources of Fresh water and where indigenous Seaweed already grows.

#### **2.14.2. Sea weed production**

- Culture of seaweed shall be done in mid water away from critical habitats such as soft corals and sea grass beds. The area should be protected from tidal waves and strong winds.
- Select and cut seedlings (pieces/ units from a young part of thalli) of about 150 to 200g cut from fresh branches.
- Tie the seedlings on a nylon rope of 4 millimetres (mm) in diameter using a nylon rope of 1mm in diameter.
- The length of 4mm rope ranges from 5-10 meters long.
- The distance from one seedling to another shall be 30cm.
- The sea weeds will be cultivated through peg and line method or raft method.

- In peg and line method, the stakes are fixed firmly in the ground 0.5 - 1 meter apart and ends are tied to these stakes. The seeds are tied on the long lines with tie-ties at intervals (12 – 18 cm).
- In raft method, rafts are used for floating the seaweed near the surface. The raft is made from bamboo that has been tied and anchored. The lines are tied 20 cm apart and seedlings are tied on these lines at intervals of 12– 18 cm.
- Insert floats at intervals to keep the 4mm ropes afloat and fasten to stakes.
- Fix the stakes on the seabed and position them parallel to the direction of the prevailing current to avoid cutting off the sea weed due to currents
- Stretch the rope to avoid sagging.
- Ensure the sea weed farm is well maintained by cleaning the sea weed plants, replacing sea weed that has cut off from the lines and replacing missing or rotten sticks and protect the farm from threats such as pests, flood waters and strong waves.
- The product is ready for the first harvest depending on the growth of the seaweed from 6-8 weeks. Ensure the product does not exceed 1 kg as beyond this they easily break. Harvesting is done 2 to 3 times per week using a stainless steel knife.
- Spread the harvested seaweed over racks/drying beds to dry.
- Protect the harvested sea weed from rain and fresh water leakage during storage. Pack the dried products in dry containers/sacks and store in a dry well ventilated room.

### **2.14.3. Sea weed processing**

The following conditions will be met in processing and storage of sea weed:

- Moisture content of the seaweed shall range between 30%-35%
- Salt and sand will be thoroughly shaken off
- The sea weed shall be dried under hygienic conditions
- The sea weed will not be exposed to water/rain during the drying process
- Storage time prior to sale shall be limited to not more than 4 weeks to prevent spoilage and moisture uptake.

### **2.15. Personnel hygiene and behaviour**

Personnel in an aquaculture facility will:

- Have the necessary skills and qualifications for the task performed.
- Wear appropriate protective clothing.
- Observe all documented hygiene requirements.

The management of the facility will also develop and implement a training programme for the personnel and maintain records.

### 2.16. Visitors

The management of the aquaculture facility will develop a procedure for the management of visitors and keep records.

Visitors to the aquaculture facility shall be guided around the facility. The visitors will:

- Register and sign a declaration form indicating the most recent visits to another aquaculture facility.
- Change into appropriate protective wear before touring the facility.
- Observe all hygiene and disinfection procedures.

### 2.17. Sanitary facilities

- All aquaculture facilities shall provide sanitary facilities reasonably accessible for use by people working in the enterprise.
- The minimum number of facilities shall depend on the number of personnel at the site as indicated in Table 3.
- Sanitary facilities shall be located away from the place where fish are held to ensure there is no risk of contamination of the fish ponds with human waste.

**Table 3:** Guidelines on number of sanitary facilities in a fishery enterprise

Number of employees (Counted according to gender)	Minimum number of sanitary facilities
01 – 09	01
10 – 24	02
25 – 49	03
50 – 100	05
More than 100	For every 30 persons add 1 more toilet

### 2.18. Requirements for facilities and equipment

- The area for handling fish should be adequate.
- The area and the equipment should be designed and constructed in a manner that ensures easy, fast and hygienic operations.
- Equipment used for the harvesting, and fish handling shall be designed to minimize injury.
- The management of an aquaculture facility will develop and document a cleaning and disinfection programme.

- All facilities and equipment shall be cleaned with approved detergents and disinfectants.
- Fish handling equipment shall not be re-used before cleaning and disinfection.
- A system for visual checks shall be developed
- Records shall be kept.

### **2.19. Disinfectants and chemicals**

- Only approved cleaning detergents and disinfectants shall be used in an aquaculture facility and in accordance with manufacturer's instructions.
- Disinfectants and chemicals will be stored in clearly marked containers in designated stores. The expiry dates shall be checked regularly.
- Chemicals shall be handled safely by wearing appropriate protective gear and taking suitable precautions.

### **2.20. Aquaculture facility waste management**

Aquaculture facilities shall document and implement a waste management plan that complies with statutory requirements as set by relevant regulatory authorities and records maintained. The CA shall carry out inspections to ensure compliance with the set requirements.

### **2.21. Marketing of cultured fish**

When cultured fish are delivered to a fishery enterprise the supplier shall provide the following information:

- Species of fish.
- Date of harvest.
- Name of the aquaculture facility/facilities from where the fish originated.
- Name of the fishery enterprise to which fish are delivered.
- Quantity of fish harvested.
- Batch number to identify the consignment of fish.
- Where applicable, treatment record.

The fishery enterprise shall keep the records for two years.

Fish destined for processing shall be accompanied by the permit for movement of cultured fish to processing establishments.

## **3.0. SANITARY REQUIREMENTS FOR CAPTURE FISHERIES**

The objective of this section is to provide guidance on sanitary requirements for production, processing and placement in the market of safe capture fish and fishery products.

### **3.1. Fishing vessels**

The requirements for vessels are dependent on the type of vessel and the operations that are carried out on it. These range from simple fishing activities, to the processing and freezing of final fishery products. In order to gain approval for fishing activities a vessel shall be inspected for seaworthiness and other maritime regulations and a certificate of seaworthiness issued. The vessels must also fulfill all the requirements as set out in the existing fisheries legislation including having all regulatory licenses and maintaining catch data on board. In addition the following requirements shall be fulfilled;

- Fishing vessels shall be designed and constructed in a manner, which protects fish against damage and contamination, facilitates rapid and efficient handling, eases cleaning and disinfection.
- Vessels shall be designed and constructed to prevent contamination of fish with bilge water, sewage, smoke, fuel, oil residue or other objectionable substances.
- Fish shall be protected from physical damage, exposure to high temperatures and drying effects of the sun and wind.
- Fish contact surfaces shall be smooth and corrosion - resistant.
- Fishing vessels shall have appropriately designed and constructed fish holds. Wooden fish holds and dividing boards shall be lined with suitable impervious corrosion resistant materials, which are easy to clean and disinfect. If painted, the paint shall be durable and non-toxic.
- Sharp corners or projections shall not be allowed in the fish hold.
- Fish holds shall be used exclusively for holding fish and shall be clean and sanitary.
- Storage of fuel, cleaning and sanitizing agents shall be organized in such a manner as to prevent contamination of fish contact surfaces.
- Where bait is carried it shall be held in a special container to prevent contamination of the catch.
- All fish handling and storage equipment used on board fishing vessels shall be designed to facilitate efficient handling of fish, suitable for easy cleaning and shall prevent contamination of the catch.
- Parts of fishing gear, which come in contact with fish, shall be free of dead fish and

organic material after each haul. All gear shall be thoroughly cleaned after each fishing trip.

- When cleaning and hosing operations are carried out while the vessel is moored, potable and or clean water shall be used to prevent objectionable contamination. The hold and all equipment shall be cleaned with a suitable cleaning agent immediately after the catch is landed.
- Precautions shall be taken to ensure that human waste and other wastes from the fishing vessel are disposed of in such a manner as not to constitute a public health or environmental hazard.
- Effective measures shall be taken to protect the fishing vessel against pests, rodents, birds and other vermin.
- Live animals other than fish shall be excluded from fishing vessels.
- The duration of a fishing trip shall be determined by the facilities available on the vessel for handling and keeping the catch well chilled.
- Handling the catch shall begin as soon as it comes on board. Any fish unsuitable for human consumption on account of low sensory quality shall be removed from the catch and kept separate.
- Line caught fish shall whenever practicable, be stunned as soon as they are taken on board the vessel to avoid possible bruising and exhaustion.
- Fish shall be placed rapidly in ice and shall be stored in such a manner that the temperature does not rise. The ratio of ice to fish shall be 1:1.
- Fish shall be surrounded by adequate quantities of finely divided ice to give close contact with fish. The ice used shall be made from potable water.
- Unloading the catch shall be carried out in a careful manner and without delay.
- At the conclusion of each fishing trip, all unused ice shall be discarded before cleaning begins.
- Fish shall not be damaged and/or contaminated during unloading through use of hooks, shovels, and forks.
- Care shall be taken to ensure that fish is not damaged or contaminated during sorting, weighing and transfer to containers.
- Artisanal fishing vessels shall be registered by BMUs and the CA/County Director of Fisheries.

Every vessel must have a fishing log as stipulated in Table 4.



**Table 4. Fishing log**

Vessel Name	Vessel Type	Vessel Master	Sailing Date	Starting Fishing Date	Starting Fishing Time	Mid-Day Fishing Date	Mid-Day Fishing Time	Ending Fishing Date	Ending Fishing Time	Starting Fishing Position
Mid-Day Fishing Position	Ending Fishing Position	Number of Hooks/ Number of nets	Depth of Shallowest Hook (m)/ Nets	Depth of Deepest Hook (m)/Nets	Length of Set Line (m)	Species Caught	Pieces	Weight (Kg)		

### 3.2. Freezer and factory vessels

The vessels shall fulfil the requirements of fishing vessels and fish processing establishments where applicable.

### 3.3. Landing sites

Fish intended for commercial processing shall be landed at the landing sites approved by the CA

The control of activities at landing sites shall primarily be the role of the designated persons within the respective BMUs and fish inspectors. The activities shall involve the following:

- Checking of approval documents (Fishermen vessels & transport vehicles),
- Checking on compliance with hygiene and sanitary requirements at beaches.

The following shall be requirements and activities to be undertaken at the landing sites:

- The landing site shall have adequate space and facilities for fish handling
- It shall be easily accessible by road or water or power supply.
- The entire landing site shall be fenced off to prevent unauthorised entry and keep off animals.
- The landing site shall be properly maintained to prevent harbourage and proliferation of pests and vermin.
- The landing site shall be free from pollution risk from adjacent areas and activities.

- There shall be a Beach Management Unit (BMU) responsible for the supervision of compliance with basic hygienic and sanitary requirements including maintenance of records.
- All fish landing site (s) shall be provided with sanitary facilities.
- The environment shall be kept and maintained in a clean state.
- All physical structures such as jetties, floating barge, racks, fish reception center shall be thoroughly washed by use of clean water, disinfected and rinsed before and after use.
- All physical facilities shall be maintained in good state of repair and in an orderly and hygienic condition.
- All fish containers and fish boxes/crates/bins shall be thoroughly washed by use of clean water, disinfected and rinsed before and after use.
- BMUs shall develop and maintain a cleaning and sanitation program and keep records
- The general cleanliness of all structures within the landing site shall be inspected by a fish inspector.
- Fish shall be stored in flake ice at the ratio of 1:1 within the fishing vessels, fish transport vessels and landing sites.
- Fish destined for processing establishment shall be accompanied by a local health certificate.
- All fish handlers shall maintain a high degree of personal health and hygiene and shall take all necessary precautions to prevent contamination of fish.
- Quantity and traceability data shall be kept as appropriate
- Any fish declared unfit for human consumption and which cannot be used for animal feed should be incinerated or buried.

### **3.3.1. Organoleptic Assessment for fish freshness**

Fish landed at the landing site will be assessed organoleptically on the freshness criteria as stated in Table 5

**Table 5: Organoleptic characteristics for fish freshness**

CHARACTERISTICS	FRESH FISH	SPOILED FISH
Odour	Light, desirable, characteristic of the water weeds,	Undesirable, acrid, acid, putrid, ammonia-like,
General aspect	Bright, iridescent pigmentation, no blood spots around the head, along the vertebral column	Dull pigmentation with no shine or reflections
Rigidity of the body	Rigid body. Firm and elastic	Flaccid body. Soft consistency. A slight pressure by the finger leaves a mark
Secretions	Humid fish, transparent mucus, no visible secretions	Presence of sticky secretions
Scales	Bright and firmly attached	Come out easily
Skin	Tight and adhering well	wrinkled, discolored, easy to detach and cut
Eyes	Clear and bright pupil, convex (bulging), occupy all the orbital cavity, transparent cornea	Tern, opaque pupils, concave, glassy, completely sunken
Gill-cover	Adheres firmly with no blood spots	Slightly detached with dark-red spots
Flesh	Humid, shiny, pink or red	Dry, grayish or opaque
Viscera	Neither swollen, saggy, tight or cut	Flaccid, deformed, often swollen, with dark blue, green or black spots
Vertebrate Column	Tightly closed	Open, often prominent

### 3.4. Local health certificates

No person shall transport a batch or consignment of fish or fish products from gazetted fish landing station without a local health certificate issued by the respective Fish Safety and Quality Assurance office in the County.

### 3.5. Identification of suspected poisoned fish

If fish poisoning is suspected, the following symptoms /characteristics will be assessed;

- Firm, flaky and easily removable scales.
- Poisoned fish spoils faster than non- poisoned fish under the same storage conditions.
- The eyes will appear opaque.
- The tail fin will be unusually flexible.
- The gills will either be bloody or at a stage of decomposition emitting rotten odour and brown in colour.
- The belly will appear swollen.

- The natural colour of the fish will have changed.
- The texture loses springiness, is soft and easily depressed.

In case any suspected poisoned fish is found, the BMU shall inform the CA

### **3.6. Handling poisonous fish**

- Identification of poisonous fish shall be conducted immediately upon the landing of catches.
- Any poisonous fish identified will be returned to the sea immediately.
- Any poisonous fish identified at the landing site will be disposed off by burying or incineration.
- The CA shall be informed of all cases of poisonous fish identified.
- All fishery enterprises shall develop procedures for handling poisonous fish.

## **4.0. REQUIREMENTS FOR FISH PROCESSING ESTABLISHMENTS, STORAGE FACILITIES AND ICE PLANTS**

### **4.1. Fish processing establishments**

The management of a fishery enterprise shall, before constructing, reconstructing, or adopting a new one, submit to the respective Fish Safety and Quality Assurance office in the County for approval, a plan of the enterprise and a list of the activities to be carried out by the enterprise. The application shall include:

- Full name and address of the establishment
- Description and composition of finished products
- Number of employees
- Production and storage capacities
- Plant layout, at a minimum scale of 1:200, indicating:
  - » the facilities and their respective utilisation;
  - » the flow of products, by products and wastes;
  - » the disposition of equipment and their respective utilisation;
  - » the sanitary facilities (shower rooms, changing rooms and toilets),
  - » the hand wash basins;
  - » the water reticulation map (water outlets or taps serially numbered on the map);
  - » the waste water disposal system;
  - » the air and moisture exhaust systems;
  - » the system for handling, storage and disposal of by-products;
  - » the bait stations;
- An Environmental Impact Assessment (EIA) report where applicable.

A fish processing establishment that complies with the above requirements may be approved for construction. Upon completion of the construction, the County Ministry responsible for Fisheries will conduct an on-site inspection of the facilities and equipment and will consider issuing a fish processing licence.

#### **4.1.1. Licences and Permits**

Application for approval documents shall be considered upon submission of a relevant and duly filled application form.

For land based fishery enterprises, the following documents shall be attached to the application form:

- An inspection report.
- Copy of certificate of incorporation or registration of business.
- Copy of PIN certificate.

For freezer and factory vessels the following documents shall be attached to the application form:

- An inspection report.
- Copy of certificate of incorporation or registration of business.
- Copy of PIN certificate.
- Certificate of seaworthiness (applicable to fishing vessels).
- Certificate of Kenya registry (applicable to fishing vessels).
- Crew list (applicable to fishing vessels).

#### **4.1.2. Certificate of Compliance**

A Certificate of Compliance (CoC) with national requirements shall be required for export oriented fish processing establishments as outlined in The Fisheries (Safety of fish, Fishery products and Fish feed) Regulations, 2007 anchored in the Fisheries Act CAP 378 (Revised 2012).

- An approval number will be assigned and the establishment will be added to the list of approved establishments authorised to process and distribute fish and fishery products.
- The CoC shall be given per product line, and shall be renewed annually after national inspection and approval by the competent authority, when there is;
  - » a resumption of processing after a lapse for any reason in the operations of the fish processing establishments to which it relates;
  - » a change in the method of fish processing used;
  - » a change in the kind of raw material used in the fish processing establishment.

Application for Certificate of Compliance (CoC) shall be considered upon submission of a relevant and duly filled application form to the CA.

The following documents shall be attached to the application form:

- An inspection report
- Copy of certificate of incorporation or registration of business

The CA may suspend, withdraw or cancel a CoC if:

- A fish processing establishment contravenes any of the conditions attached to the CoC
- Such action is deemed necessary to protect human and animal health.

The CA will communicate in writing to the fish processing establishment the withdrawal of the CoC.

Upon application, a fish processing establishment that meets the requirements of the Kenya standards for fish handling and processing shall be considered for a Certificate of Compliance.

An approval number will be assigned and the establishment added to the list of approved fish processing establishments authorised to process and distribute fish and fishery products

## **4.2. Cold storage facilities**

The management of an independent cold store that intends to handle fish and fishery product shall apply for approval by the Fish Safety and Quality Assurance office in the County.

The application shall include:

- Full names and addresses of the enterprise
- Description of products
- Number of employees
- Storage capacities
- Facility layout, at a minimum scale of 1:200, indicating:
  - » the facilities and their respective utilisation;
  - » the disposition of equipment and their respective utilisation;
  - » the sanitary facilities (shower rooms, changing rooms and toilets),
  - » the hand wash basins;
  - » the waste water disposal system;
  - » the bait stations
- An Environmental Impact Assessment (EIA) report where applicable.

The Fish Safety and Quality Assurance office in the County shall examine the application and its accompanying documents followed by an on- site inspection and will be considered for approval.

### **4.3. Ice Plants**

The management of an independent ice plant that intends to supply ice for use in fisheries activities shall apply for approval by the Fish Safety and Quality Assurance office in the County.

The application shall include:

- The full names and address of the applicant;
- The number of employees;
- The ice production and storage capacities and equipment;
- Source of water and treatment;
- Type of ice;
- The ice distribution vehicles where applicable;
- The ice plant layout plan, at a minimum scale of 1:200, indicating:
  - » the ice plant facilities and their respective utilization,
  - » the refrigeration equipment,
  - » the sanitary facilities (shower rooms, changing rooms and toilets),
  - » the wash basins,
  - » the water reticulation map (water outlets or taps serially numbered on the map and in the ice plant ),
  - » the air and moisture exhaust systems,
  - » the waste water disposal system,
  - » the pest and vermin control system.

The Fish Safety and Quality Assurance office in the County shall examine the application and its accompanying documents followed by an on- site inspection and if the ice plant complies with the relevant requirements it will be considered for approval.



## **5.0. GENERAL REQUIREMENTS FOR CULTURE AND CAPTURE FISHERIES**

### **5.1. Approval for fish transportation**

Parties engaged in transport of fish and fishery products shall seek approval from the respective Fish Safety and Quality Assurance office in the County. The application shall include:

- Full names and addresses of the applicant
- Description of the mode of transport and other relevant documents
- Carrying capacity of fish container / refrigeration and/or insulation capacity
- Cleaning and sanitation program
- Full names and addresses of the suppliers of ice where applicable.
- Where own vessel/vehicle is used to transport fresh fish only, the transport hold shall be marked FISH ONLY in bold.
- Where public/hired transport is used to transport fish and fishery products, the fish shall be adequately protected to prevent contamination and physical damage.

The respective Fish Safety and Quality Assurance office in the County shall examine the application and its accompanying documents followed by an on-site inspection. Vehicles/vessels that comply with the relevant requirements will be considered for approval.

### **5.2. Development and implementation of HACCP-based quality management programs**

The management of a fishery enterprise shall:

- Develop and submit to the respective Fish Safety and Quality Assurance office in the County, a Good Manufacturing Practice (GMP) manual.
- Submit to the respective Fish Safety and Quality Assurance office in the County a copy of the HACCP manual for approval.
- Implement a quality assurance system based on the HACCP approach.

The respective Fish Safety and Quality Assurance office in the County shall regularly verify implementation of the plans by fishery enterprises.

### **5.3. Labelling and traceability**

Labelling of fish and fishery products containers/packages shall include the following information;

- Nature of the fishery product;
- Species name;
- Name of the fishery enterprise and approval number.
- Physical, postal and email address of the fishery enterprise;
- Batch code
- Dates of production and expiry;
- The words “Product of Kenya” shall be embossed on the package.

For the purpose of recall of products, a traceability system shall be developed by the fishery enterprise.

#### **5.4. Record-keeping**

The management of a fishery enterprise shall maintain proper documentation of their activities and keep appropriate records.

Such documents may include;

- Approval documents
- Fishery enterprise inspection and follow-up reports
- HACCP audit and verification reports
- Results of analysis and sanitary control reports.

Traceability records such as material receiving records, batch numbers and dispatch records.

#### **5.5. Requirements for location, facilities and equipment**

##### **5.5.1. Establishment location**

- An establishment must be located on a plot of adequate size (for present needs and future developments), with easy access by road, rail or water.
- An adequate supply of potable water and energy must be available throughout the year.
- A waste management program should be in place
- Should be located at a low pollution risk area
- Establishment shall be located at areas that are free from contaminants.
- The surrounding areas should minimize the invasion, harborage, proliferation and of pests and vermins.

### **5.5.2. Buildings, construction and layout**

- Adequate space for equipment, installations and storage of materials.
- Separation of high risk and low risk areas
- Adequate lighting and ventilation.
- Protection against pests and vermins.
- External walls including roofs, doors and windows should be water-resistant, insect- and rodent proof.
- Internal walls should be smooth, flat, resistant to wear and corrosion, impervious, easily cleanable and light coloured.
- Floors should be impervious to spillage of product, water and disinfectants, durable to impact, resistant to disinfectants and chemicals used, slip resistant, non-toxic, non-tainting and of good appearance and easy to repair.
- Floors should be provided with a slope for self-drainage.
- The general layout and arrangements of areas within the processing establishment should preclude contamination of the final product.

### **5.5.3. Requirements for Chilled storage**

- Fish should be moved to the chilled storage facility without undue delay.
- The facility should be capable of maintaining the temperature of the fish between 0 °C and +4 °C.
- The chill room should be fitted with a calibrated temperature recording device.
- The arrangement of fish in the chilled storage should be based on “first in first out” principle
- The fish should be stored in shallow layers and surrounded by flake ice
- Fish should be stored such that damage from over-stacking or overfilling of boxes will be prevented.
- Where appropriate, replenish ice supply on the fish or alter temperature of the room.
- Fish should not be placed directly on the floor.
- The arrangement of the fish should allow for uniform air circulation

### **5.5.4. Requirements for freezing**

- The fish product should be subjected to a freezing process as quickly as possible.
- A time and temperature regime for freezing should be established and should take into consideration the freezing equipment and capacity.
- The thickness, shape and temperature of fish product entering the freezing process should be as uniform as possible.

- The core temperature of the frozen fish should be monitored regularly for completeness of the freezing process.
- The cold store should be fitted with a calibrated temperature recording device.
- Frequent checks should be made to ensure correct operation of freezing.
- Accurate records of all freezing operations should be kept.

#### **5.5.5. Requirements for cold storage**

- The facility should be capable of maintaining the temperature of the fish at or colder than  $-18^{\circ}\text{C}$ , and with minimal temperature fluctuations.
- The cold store should be fitted with a calibrated temperature recording device  
The arrangement of fish in the Cold storage should be based on “first in first out” principle
- Product should be glazed and/or wrapped to protect it from dehydration.
- Fish should not be placed directly on the floor
- The arrangement of the fish should allow for uniform air circulation
- Frozen product should be moved to the cold storage facility as quickly as possible.

#### **5.5.6. Requirements for controlled thawing**

- The thawing method should be clearly defined and should address the following:
  - » Time and temperature of thawing,
  - » Temperature measuring instrument used
  - » Placement of temperature recording device.
- The thawing schedule (time and temperature parameters) should be carefully monitored and records maintained.
- Selection of the thawing method should particularly into account the thickness and uniformity of size of the products to be thawed.
- Thawing time and temperature and fish temperature critical limits should be selected so as to control the development of micro-organisms and histamine (where high-risk species are concerned) or persistent and distinctive objectionable odours or flavours indicative of decomposition or rancidity.
- Where water is used as the thawing medium, it should be of potable quality.
- Where water is used, circulation should be sufficient to produce even thawing.
- During thawing, products should not be exposed to excessively high temperatures.
- Particular attention should be paid to control condensation and drip from the fish. Effective drainage should be ensured.
- After thawing, fish should be immediately processed or refrigerated and kept at the adequate temperature (temperature of melting ice).

#### **5.5.7. Requirements for Ice plants**

- The ice plant should be located in an area that precludes contamination
- The design of the ice plant should facilitate hygienic harvesting and collection of ice
- Ice contact surfaces shall be made of material that is corrosion resistant and easy to clean and sanitize.
- Potable water or clean sea water should be used for ice production.

#### **5.5.8. Requirements for water treatment facilities**

- The water treatment facility should be located in an area that precludes contamination.
- The facility should be provided with adequate covered water storage tanks which are easy to clean and corrosion resistant.
- The design of the facility should facilitate hygienic treatment, storage and distribution of water.
- The recommended water treatment methods should be documented and records kept.

#### **5.5.9. Requirement for cooking**

- A cooking schedule for boiling or steaming should be designed taking into consideration the time, temperature and size of the fish.
- The cooking vats (equipment) should be equipped with calibrated temperature recording devices.
- Fish should be cooked according to size, and depending on the product, temperature should be monitored and maintained.

#### **5.5.10. Requirements for cooling**

- Cooling should be done in cold circulated air, running potable water, refrigerated brine, or clean sea water.
- Cooling should be completed as quickly as possible.
- The process of cooling should be done in a place without direct contact with the raw product.
- Cooling containers should not be placed on the floor.
- The same water should not be used for cooling more than one batch.

#### **5.5.11. Other facilities and equipment**

- All fish contact surfaces should be smooth, easy to clean and disinfect.

- All Equipment must be designed in a way that precludes contamination of the products
- Machinery must be designed and constructed to prevent liquids or living creatures - primarily insects - from entering and accumulating in areas that cannot be cleaned

### **5.6. Handling live crabs and lobsters**

The following applies to handling of live crabs and lobsters:

- Materials used in the construction of holding units and equipment will be of smooth surface to prevent injuries.
- The surroundings of the holding premises should be clean and protected from vermin and vectors and light penetration should be adequate.
- Fish will be handled in a manner that prevents injury.
- Fish shall be examined for signs of injury. Injured fish shall be separated from the rest of the stock.
- There should be a provision for quarantine of all fresh fish arrivals to check for any signs of disease. Any fish presenting any signs of disease shall immediately be isolated and disposed off appropriately. No medication should be used to treat any diseased fish.
- The fish should not stay in the holding tanks for more than 3 days. In the event that the fish have to stay for more than 3 days, then they shall be placed in cages and put in the sea until the appropriate time for packaging and dispatch.
- The fish must not be given any supplementary feed in the holding tanks.
- The fishery enterprise shall have an adequate supply of sea water which shall be free from pollutants.
- The enterprise shall be equipped with a water purification system that is complemented with a good water aeration system.
- The water shall be monitored regularly for the following parameters:
  - » Salinity
  - » Temperature
  - » pH
  - » Ammonia
  - » Nitrates
  - » Nitrites
- Chemicals must not be used to treat the water under any circumstances. The water shall be changed regularly and spent water shall either be treated and drained back to sea or be disposed off in septic tanks. The holding tanks shall be easily drained.

- The following records shall be kept:
  - » Water quality;
  - » Daily catches/deliveries;
  - » Fish health condition;
  - » Unusual occurrences and their corrective actions.
- During packaging of the fish, care shall be made to keep them cool and moist at all times.

### **5.7. Handling Ornamental fish**

The fishery enterprise shall have valid approval documents. The following applies to handling of ornamental fish:

- Materials used in the construction of holding units and equipment will be of smooth surface to prevent injuries.
- The surroundings of the holding premises should be clean and protected from vermin and vectors and the light penetration should be adequate.
- Fish will be handled in a manner that prevents injury.
- Fish shall be examined for signs of injury. Injured fish shall be separated from the rest of the stock.
- There should be a provision for quarantine of all fresh fish arrivals to check for any signs of disease. Any fish showing any signs of disease shall immediately be isolated and disposed off appropriately. No medication should be used to treat any diseased fish.
- Approved chemicals, may be used to treat the water to get rid of any pathogens. Formaldehyde and malachite green shall not be used to treat the water.
- The water shall be changed regularly and spent water shall either be treated and drained back to the source or be disposed off in septic tanks. The holding tanks shall be easily drained.
- The water shall be monitored regularly for the following parameters:
  - » Salinity (where applicable)
  - » Temperature
  - » pH
  - » Ammonia
  - » Nitrates
  - » Nitrites
- The fishery enterprise shall keep the following records:
  - » Water quality;
  - » Daily catches/deliveries;

- » Fish health condition;
- » Fish treatment records;
- » Unusual occurrences and their corrective actions.

During packaging of the fish, care shall be made to keep them cool and moist at all times.

#### **5.7.1. Disposal of ornamental fish**

- Ornamental fish shall not be released into any water bodies
- FBO's dealing with ornamental fish shall maintain a fish disposal management plan
- The fish shall only be disposed off under the supervision of the CA/The respective Fish Safety and Quality Assurance office in the County.
- Records of fish disposal shall be maintained.

#### **5.8. Checking for parasites in fish**

Checking for parasites in fish will be through visual inspection involving the following:

- Visual inspection of whole fish will target surfaces including the gills, mouth, skin, and fins.
- Visual inspection of eviscerated fish will be carried out on the abdominal cavity, liver and roe intended for human consumption. Candling may be used for visual inspection of flat fish and fillets.
- Before they are released for human consumption fish and fishery products shall be subjected to visual inspection, by way of sample, for the purpose of detecting any parasite that are visible.
- Fish or parts of fish which are obviously infested with parasites which cannot be readily removed shall not be placed on the market.
- In case of significant infestation the CA shall be informed.

#### **5.9. Fish outlets**

The operators should have the necessary approval documents from regulatory authorities. In addition they should have facilities for hygienic handling, processing and storage of fish and fisheries products that meet the following conditions;

- Fresh fish shall be sold from designated areas located away from sources of contamination
- Equipment and working surfaces used for preparing fish in the market stall shall be non-corrosive, easy to clean and disinfect.
- Potable water shall be used to wash fish, contact surfaces and equipment.



- Working surfaces, display counters and equipment shall be cleaned, sanitized and stored appropriately at the end of each operation.
- Waste from fish handling shall be contained in sealed refuse containers.
- Where ice is used, the resultant melt water shall be ducted into appropriate drains.
- Display surfaces shall be made of non-porous, corrosion resistant material that is easy to clean and disinfect.
- Display counters shall be constructed with a slope to facilitate drainage.
- Fresh fish shall be displayed on raised platforms and where possible ice shall be used.
- Transparent display counters shall be made from non-breakable materials.
- If a temperature controlled display counter is used, the temperature of the fish shall be maintained at less than or equal to five degrees Celsius ( $\leq +5^{\circ}\text{C}$ ).
- Hand washing facilities shall be provided at all fish market stalls.
- Cured fish shall not be washed with water to remove contaminants. Appropriate equipment shall be used to remove adhering contaminants.
- Cured fish shall not be adulterated with chemicals harmful to human life
- Cured fish infested with insects and/or contaminated with moulds or any other contaminant shall not be placed on the market.
- Cured fish shall not be thrown, tossed, dragged or displayed for sale on the ground.

#### **5.9.1. Conditions for storage of fish**

- Where possible chill/cold storage facilities will be provided to cater for surplus fish and be maintained in accordance with Good Cold Storage Practices.
- Suitable handling facilities shall be provided to ensure proper storage and labelling of stored fish
- The storage facility shall be maintained in good state of repair and cleanliness and be vermin proof
- Cured fish packages shall be placed on pallets
- Stacks of stored fish shall be arranged in a manner that facilitates free movement of fish handlers, allows air circulation and prevents damage
- Cured fish shall be stored in a clean well ventilated, non-corrosive easy to clean and vermin proof storage
- Heavy objects shall not be placed on top of cured fish to prevent damage and fragmentation

#### **5.9.2. Hygiene conditions for fish handlers**

- Fish handlers shall undergo medical check-up twice a year.

- Fish handlers suffering from communicable diseases shall not handle fish.
- Fish handlers shall wear clean light coloured protective wear.
- Fish handlers shall strictly adhere to Good Hygiene Practices (GHP) which include avoiding; spitting, sneezing, unguarded coughs, smoking, chewing and eating.
- Adequate number of sanitary facilities shall be provided and maintained in good condition.
- Fish handlers shall wash their hands immediately after visiting the sanitary facilities and whenever they resume work after break.

## **6.0. REQUIREMENTS FOR RECALL**

The traceability of fish and fishery products, and fish feed used in fish culture systems, and any other substance intended to be incorporated during fish or fish feed processing shall be established at all stages of production and distribution.

Operators of fishery enterprises shall have systems in place to identify their suppliers of fish or fishery products, fish feed, or any substance intended to be incorporated into a fishery product or feed. These systems shall be made available to the Competent Authority (CA) on demand.

Operators of fishery establishments shall have in place systems and procedures to identify products destination. This information shall be made available to the CA on demand.

Fish and fishery products or fish feed which are likely to be placed on the market shall be labeled or otherwise identified through relevant documentation or other information to ensure their traceability.

Each operator of a fishery establishment shall prepare a written recall plan detailing the procedures to be followed in case a batch of fish or fishery products does not meet market requirements.

## **7.0. REQUIREMENTS FOR EXPORT AND IMPORT OF FISH AND FISHERY PRODUCT**

The objective of this section is to provide guidance on export/import procedures for fish and fishery products.

### **7.1. Export of processed fish**

Fishery enterprises intending to process and export fish shall be in possession of the following fisheries approval documents where applicable:

- Fish processing license.
- Certificate of registration of local fishing vessel (in case of fishing vessels).
- Certificate of Compliance with Kenya Standards for fish handling and processing.

Any fishery enterprise intending to export fish and fishery products shall be required to apply for a Certificate of Compliance (CoC) with Kenya Standards for fish handling and processing.

The following documents shall be attached to the application form:

- An inspection report
- Copy of certificate of incorporation or registration of business

#### **7.1.1. Certification of fish and fishery products**

No person shall export a batch or consignment of fish or fish products without a health certificate issued by a fish inspector. The Fisheries (Safety of fish, Fishery products and Fish feed) Regulations, 2007 anchored in the Fisheries Act CAP 378 (Revised 2012) and the Animal Diseases Act Cap 364 prescribes conditions for issuance of a health certificate.

A health certificate will be issued for batches or consignments that comply with the relevant sanitary requirements. A fish inspector may refuse to issue the health certificate if:

- The fishery enterprise has not complied with legal requirements.
- The fish batch or consignment in respect of which the certificate is sought is contaminated.

To curb Illegal Unregulated Unreported (IUU) fishing activities, a health certificate for marine fish and fishery products will be issued on condition that relevant catch certification documents are presented.

### **7.1.2. Export of samples of fish and fishery products**

Samples of fish and fishery products may be exported for market promotion purposes.

The exporter shall make an application in writing to the CA indicating the following:

- Name and address of the applicant
- Purpose of request
- Scientific and common names of the fish species
- Source of sample and method of production
- Nature of sample
- Size of sample
- Destination including the name of the recipient
- The value of the sample

N/B: the sample size shall not be more than 20Kg.

### **7.1.3. Export permit**

For each consignment the exporter will apply will apply for an export health certificate.

The validity period for the export permit shall be 7 days for chilled fish and 14 days for other fish products.

### **7.1.4. Health certificate**

For each consignment the exporter will apply to the CA for an export health certificate.

Once the information is verified, and upon payment of the applicable fee a health certificate will be issued.

## **7.2. Export of live fish**

For each consignment of live fish to be exported the exporter will apply to the CA for an export permit. The following information will be included in the application:

- The identity and physical address of the exporter.
- The number of aquarium fish dealers' licence (where applicable).
- The species name.
- Number of pieces and FOB value of the consignment
- The country of destination.

The inspector will verify the information contained in the application form and once satisfied authorise fee payment for export permit.

The validity period for an export permit shall be 7 days. Export health certificate for the consignment shall be obtained from the Veterinary Authority.

### **7.3. Import of fish and fishery products**

For each consignment an importer will apply to the CA for an import permit. A health certificate issued by the CA from the country of origin and an invoice from the supplier will be attached.

For imports by a foreign fishing vessel or a reefer carrier, the inspector at the entry point will inspect the vessel/carrier to confirm the consignment and vessel details which are recorded on the Catch Declaration Form.

While considering application for import permit reference will be made to CITES listing.

#### **7.3.1. Importation of fish as raw material for processing for export**

- Applicants intending to import marine fish as raw material for processing and export shall be required to make a declaration for each consignment in both electronic and hard copy.
- The electronic application form shall be submitted at least three (3) days prior to the arrival of the consignment at port.
- A signed and stamped hard copy of the application form together with copies of supporting documents shall be presented to the CA upon arrival of the consignment at port. The supporting document shall include the catch certificates, health certificates and any other relevant documents.



