**A Code of Good Practice for Hainan Tilapia Farming**

The 2nd Edition (2016)

To promote healthy, responsible and environment-friendly tilapia farming models in Hainan, the Hainan Tilapia Sustainability Alliance (hereafter 'the Alliance') organized national and local aquaculture experts along with representatives of farms, hatcheries and processing plants to jointly develop a Code of Good Practice (CoGP). As a result of the first industry-led initiative to set up a benchmark for tilapia farming community in Hainan, the Code aims to provide technical guidance on how to raise tilapia in an efficient and responsible way, featured by disease control and pollution mitigation. The execution of the Code will help reduce the use of chemical fertilizers and medicines that potentially threaten consumer's health and natural environment, while improving farmer's livelihood with better quality of fish.

This is the second public version of the Code issued by the Alliance in April 2016, which has been applied to 35 pilot farms in Hainan. Through a trial-and-error process, the Alliance will keep revising and updating the Code and monitoring the implementation of the Code. Eventually, this Code will be disseminated to all tilapia farms in Hainan as a voluntary standard.

## 1 Scope

The Code of Good Practice recommends most suitable measures to manage pond, fish and environment that include technical requirements and recommendations for pond preparation, fingerling rearing, feeding management of grow out fish, water quality management and disease prevention and treatment.

The Code applies to pond farming of tilapia in Hainan.

## 2 Normative References

The following national standards are indispensable references for the application of the Code. For cited standards with date, its revision (excluding correction) or amendment are not applicable for this Code. Nevertheless, it is encouraged that parties using this Code to research whether the latest version of the following references would be potentially applicable to this Code. For those standards without date, this Code will always refer to their latest versions as reference.

GB 11607 Aquaculture water quality standards
NY 5051 Pollution-free food freshwater aquaculture water quality
NY 5071 Pollution-free food fishery drug using guidelines
NY 5072 Pollution-free food fishery feeding safety limits
SC / T 1008 Specification for aquaculture breeding in pond

SC / T1025 Nile tilapia feeding nutrition standards
NY5071-2002 Pollution-free food Standard for fish medicine usage
SC / T 7015-2011 Harmless treatment procedure for infected aquatic animals

# 3 Environmental Basics

## 3.1 Siting

3.1.1 Farm shall be located in a place with plenty of water, easy for water intake and drainage;
3.1.2 There shall be no pollution source (e.g. industrial, agricultural, medical and municipal wastewater or solid wastes) threatening water quality around farm;
3.1.3 Ponds shall be well-ventilated and sun-facing;
3.1.4 No farm shall be constructed over wetlands or mangrove reserves;
3.1.5 Farm shall maintain a valid Aquaculture Permit (or Land Use Permit), and a map showing the size, inlets/outlets of the farm, the location of feed storage and other facilities, as well as surrounding environment shall be available.

## 3.2 Water Quality

3.2.1 Water quality shall meet the standards of aquaculture water quality standard GB 11607 and NY 505. During farming period, key water quality parameters shall refer to Table 1;
3.2.2 It is recommended to use the website (*http://waterph.jooylife.com/*) to obtain specific guidance when adjusting water quality in pond (for details please contact the Alliance);
3.2.3 Transparency of farming water shall reach at least 30cm.

## 3.3 Requirement for pond

3.3.1 The size of pond is recommended to be around 5 to 25 mu (15 mu = 1ha). Depth of water shall be 2 to 3m;
3.3.2 Pond bottom shall be flat. It is recommended to choose loam and sandy loam bottom, so that pond will not have leaking problem;
3.3.3 Pond sediment is recommended to be around 10 to 30 cm; no more than 50 cm
3.3.4 Before filled up with water, pond shall be drained out and exposed under blazing sun for long enough (1-2 weeks) for disinfection.
3.3.5 Pond cleaning, bottom levelling and dam repairing shall be done between crops; screens and meshes shall be installed in the inlets and outlets to prevent from tilapia escaping or other fish entering
3.3.6 *Advanced requirement – install recirculating aquaculture system (RAS) or effluent treatment equipment

**Table 1** Reference index for water quality variables in tilapia pond

| **Key water quality index** | **Reference values** |
|---|---|
| Dissolved oxygen at the bottom | >3mg/L |
| Transparency | 30-40cm |

| | |
|---|---|
| Ammonia concentration | 0.1-0.3mg/L |
| pH | 7.0-8.5 |
| Nitrite | <0.05mg/L |
| Phosphate | 0.1-0.5mg/L |
| Alkalinity $CaCO_3$ | 100-200mg /L |
| Hardness $CaCO_3$ | 50-150mg/L |

# 4 Rearing Fingerling

## 4.1 Water Requirement

4.1.1 Water temperature in pond to hold fingerling shall be kept above 22℃; if temperature is under 25℃， spread bleaching powder (dissolved in water) in pond (10 m away from shoreline, with dosage of 1kg per mu per 1.5 m of water depth. When water temperature is above 25℃, no disinfection treatment is required as tilapia will recover quickly from stress response.

4.1.2 Define the pH tested after one hour of aeration as $pH_0$ (the baseline) and check pH twice a day (morning and evening, respectively). The range of the variation in pH values shall not exceed 0.5 unit, i.e. $|pH-pH_0|<0.5$;

4.1.3 Ammonia nitrogen < 0.5mg/L, Nitrite nitrogen < 0.05mg/L.

4.1.4 If pH is too low, use lime to adjust it; if pH is too high, use lactic acid bacteria, soluble carbon source and organic acid to adjust it, and use aerator more frequently.

## 4.2 Stocking

4.2.1 Trial stocking depends on fingerling's stress response: if it shows minor stress response, add 1~2 times of volume of pond water into fingerling bag, set still for 30 minutes before stocking; if stress response is significant (e.g. pH is too high), add water and other anti-stress medicines prescribed by a licensed veterinarian (or technician with equivalent qualification). Abnormal movements (e.g. abrupt acceleration/deceleration or swirling) in 2-3 minutes after fingerlings entering pond but recovery soon is the manifestation of minor stress response, while significant stress response represents abnormal movements occurring right after fingerlings entering pond.

4.2.2 Stocking density of fry is dependent on the size of the baby tilapia (transferred to growout pond): if the size is expected to be 100 pieces per 500g, stocking density shall be 50,000 pieces per mu; if the size is expected to be 50 pieces per 500g, stocking density shall be 30,000 pieces per mu; if the size is 20 pieces per 500g, stocking density shall be 16,000 pieces per mu. Based on pond condition, recommended stocking density can be + or - 20% of the above.

### 4.3 Daily Management

4.3.1 After stocking, the first 2 days are adaptive period for fingerlings, thus no feeding. From the 3rd day to the 5th day, limited amounts of feed shall be provided; after 5 days, normal feeding starts. Powdered feed shall be used to feed fingerlings younger than 10 days (about 3~3.5 cm of length), shredded feed or Grade One (No.1) Extruded feed shall be used to feed fingerling older than 10 days;

4.3.2 Feed 2 to 3 times per day; feed less in rainy days or when dissolved oxygen stays at low level;

4.3.3 *Advanced requirement - Feed 4 to 6 times per day, daily feeding rate shall be around 6~12%.

4.3.4 During the rearing phase, add clean water into pond over time to gradually increase water level and maintain a good water quality;

4.3.5 Install an aerator of 1.5 kilowatt every 3 mu, ensuring dissolved oxygen at the pond bottom no lower than 3 mg/L at all hours and no lower than 5 mg/L at 16 hours in total within a lasting 24 hours;

4.3.6 Turn on aerator for 24 hours in advance of stocking and 2 hours at noon on the day of stocking; extend aerator running duration as fry grows and biomass increases. During the growing period, turn on aerator for 2 hours at noon in sunny days and on the early morning of the next day when in the morning dissolved oxygen is lower than 4 mg/L. When the value of dissolved oxygen within 24 hours varies largely, farmers shall scrape bottom (sediment) every 7 to 10 days in sunny days to reduce the accumulation of oxygen deficit. This is necessary to prevent loss of fingerling during abrupt change of weather and live transfer of fingerling.

4.3.7 Daily management of Water Quality

- Water quality monitoring: check pH twice a day (during morning and evening), keep pH in $|pH - pH0| < 0.5$ (see 4.1.2)
- Water temperature: check temperature at a depth of 50 cm underwater everyday at 7:00-9:00, 12:00-14:00 and 17:00-19:00
- Dissolved Oxygen (DO): check DO twice a day at a depth of 50 cm underwater at any two time slots of the following: 7:00-9:00, 12:00-14:00 and 17:00-19:00. DO shall not be lower than 3 mg/L; once DO goes lower than 4 mg/L, precautious analysis shall be conducted and aeration shall be increased.
- Ammonia nitrogen & nitrite: check ammonia nitrogen and nitrite once a week; when abnormality detected, increase the frequency of measurement to once a day; un-ionized ammonia shall be lower than 0.1 mg/L and nitrite shall be lower than 0.05 mg/L.
- Phosphate, alkalinity & hardness: check once a month; when abnormality detected, increase the frequency of measurement to once a week; phosphate shall stay 0.1-0.5 mg/L; alkalinity shall stay 100-200 mg/L; hardness shall stay 50-150 mg/L.
- Pond inspection: inspect once respectively each morning and evening to detect problem and respond to problem timely
- Fish monitoring: monitor the growing states and uniformity once a week
- Record keeping: daily feeding amount, growing status, FCR, mortality, water quality status and management measures, and use of medicines, etc.

### 4.4 Fingerling moved from rearing pond to growout pond

4.4.1 Assess fish status before transfer (e.g. average weight, average length, sign of disease, and incidence of parasite infection)

4.4.2 If for some reason fingerlings have not been fed well for a long time, a 10 days of normal feeding is required before fingerlings transfer to ensure healthy fingerlings and strengthen adaptability

4.4.3 Scrape bottom 3 days before moving fingerling to growout pond and stop feeding for 1 day before transfer; during the 3 days, turn on aerator to reduce stress at harvest and transportation.

4.4.4 Test water quality of growout pond and turn on aerator for 48 hours before receiving fingerlings to stabilize pond environment

4.4.5 Preparation and inspection before harvest

Harvest tool: fingerling trawl, fingerling basket and bar

Transportation facility: truck with water tank, oxygen and aeration device

Measuring instrument: electronic scale

Water quality adjustment: sea salt and ice

4.4.6 Harvest and transportation

- Hauling in constant speed to reduce the risk of injury caused by stress reaction
- After collecting fish into net, turn on aerator immediately; water flow near net shall be moderate to prevent fish from fleeing in net against the current
- Water used in transportation shall be well water or water from growout pond; aerate the water 10 minutes before placing fish in and add sea salt to adjust water salinity to 3~4‰; adjust water temperature with ice to 28℃
- Keep fingerling density in the basket appropriate to avoid injury caused by crowding and deprived oxygen; handle the basket gently, weigh and load fingerling quickly
- Sampling at least 3 times to count the number of fingerling; sampling at least 500 pieces to calculate the average weight of fingerling
- During the transportation, the density baseline of fingerling is for fish size of 100 pieces/jin (1 jin = 0.5 kg), placing up to 40000 pieces of fingerling in every cubic meter of water. The density for varying fish sizes can be calculated according to “5/7” principle, e.g. for fish size of 50 pieces/jin, placing up to 28000 pieces of fingerling in every cubic meter of water
- During the transportation, dissolved oxygen shall be above 8 mg/L.

## 5 Growout Pond Management

### 5.1 Environmental Restoration

Dredging

5.1.1 Pond needs dredging before stocking if sediment exceeds 50 cm of thickness;

5.1.2 Dredging method: Use scraper, slit gun or a bulldozer. Warnings: NEVER remove all sediment. At least 10 to 30cm of sediment shall be retained.

Ditch and Drainage

5.1.3 Immediately after previous harvest, pond shall be drained completely.

5.1.4 Advanced requirement – Drainage ditch shall be dig into shapes like: “田” or “丰”, with at 30cm in length, 40cm in depth. It is preferred that ditch bottom touches underneath soil; To achieve the best drainage and sunning, pump is recommended to remove all water from pond.

Sunning pond

5.1.5 To ensure an effective sunning

- Large number of cracks with 2 to 3 cm of width shall be found in the sediment surface;
- Sediments surface shall be sunned to yellow, not white;
- Step on the sediment, shoeprints shall be visible that indicates a good elasticity, but no water shall come out of sediment;
- Sunning shall continue till deepest layer of sediment is sampled to see if there are no any dark sludge, which indicates organic matter has been fully oxidized.

5.1.6 Time for sunning

- If weather and drainage situation are favorable, 15 to 20 days are long enough for effective sunning. Otherwise extend sunning time to ensure effectiveness.
- When weather is not favorable, tilling bottom is recommended.

5.1.7 Alkalization

Subsoil in old pond or in mangrove area may be acid or acidified, thus lime shall be added to adjust pH and to help organic matter decomposed.

5.1.8 Tillage

Tilling when adding lime to pond sediment is highly recommended to improve soil aeration and promote organic matter decomposition.

5.1.9 Using Probiotics

To enhance decomposition of organic matter in sediment, it is recommended to use probiotics and soil remediation agents based on soil test results. For example, spray soil oxidant to old pond at 1 to 2 kg per mu, which reduces the reduction potential of pond sediment, so help complete decomposition of organic matter.

Pond Cleaning

5.1.10 Dry cleaning

- Using 60 to 75 kg lime per mu, dig several small pits all around the pond , add the lime into pit, then add 10 ~ 20 cm water. After lime dissolved completely, spray it to pond bottom.
- Next day, stir up bottom to make lime and sediment mixed completely.
- *Advanced requirement – choose lime dosage properly according to soil quality measurements (e.g. pH and alkalinity)

5.1.11 Wet cleaning

After a complete sunning of pond bottom, add water to a depth of 40 to 60 cm all at once, spread lime to pond (100 to 150 kg per mu, per meter);

5.1.12 Adding water and fertilizing water

- Water shall be filtered by 40-60 mesh screen. Apply 1.5 to 5kg of urea per mu, 4-5kg of phosphate fertilizer per mu to cultivate zooplankton.
- Transparency of pond water shall be maintained at 15-30 cm.
- No water shall be introduced from ponds where disease has occurred
- *Advanced requirement – during production phase, test pathogens (e.g. streptococcus) and key water quality indicators (e.g. pH, ammonia nitrogen concentration and dissolved oxygen, see Table 1) of source water

5.1.13 Aerators

- See 4.3.5 for requirement for aeration
- Aerators shall be placed to form a triangle layout in pond, avoiding all sets in one straight line.
- *Advanced requirement – 3 to 4 sets of impeller aerators shall be installed for every 10 mu along with 1 set of wave aerator per 10 mu. For large size fish and high yield pond, micropore aerator shall be installed.

5.1.14 Feeding machine

- Feeding machine shall be placed downwind with sufficient aeration and facing water in rich dissolved oxygen.
- Feeding machine shall be placed at least 3 m away from shoreline, at least 50 cm above water surface, which prevents feed pellets from being blown outside pond as wasted.
- Feeding machine shall mostly feed to pond area with deepest water depth where more space within water body can allow more fish to be fed, thus enhance feeding efficiency.
- *Advanced requirement – install 360° feeding machine to achieve an even feeding across the entire pond

## 5.2 Stocking Management

5.2.1 Stocking density

- Depending on the size of fingerlings to be stocked and water fertility, most favorable stocking density is recommended as 2,000 to 4,000 pieces per mu if pond has >2 m of water depth with sufficient aerators;
- Same-sized fingerlings that swim actively and strong are preferred to stock.

5.2.2 Other species to balance water quality

- It is highly recommended that 30 to 50 bighead carps (each weighed at >250g) (Aristichthys nobilis) and 20 silver carps (Hypophthalmichthys molitrix) shall be stocked together for every mu of water, which help in the early stage balance water nutrients through algae consumption.
- *Advanced requirement – bighead carps stocked shall have a sampling test of

pathogen (e.g. streptococcus) undertaken by a qualified institute

### 5.3 Growout Management

5.3.1 Monitoring and recording

- Inspect pond every day to check on water quality, change of temperature and fish activity to avoid hypoxia; remove sick and dead fish immediately when being discovered.
- Farming records shall be kept for every pond. Records shall include stocking status, feed source and feeding scheme, medicine source and usage, water temperature, water quality, releasing and harvesting information, predator invasion record and pond inspection record (Farming record template see appendix); all records shall be kept for at least two years.

5.3.2 Stirring sediment

- Stirring sediment is a common measure to maintain water quality in aquaculture. Each time only about 20% of sediment shall be stirred up and accompanied by a close check on dissolved oxygen and fish activity;
- If pond has been constantly stirred up every 10 days from the very beginning, it can be entirely stirred up all at once.

5.3.3 Changing water

- Use dense net to filter fish while adding water, prevent other fishes or harmful organisms from entering pond
- Pond depth shall be >2 m, the deeper the better.
- During hot season, frequency of changing water shall be increased accordingly.
- *Advanced requirement
  a) Effluent shall be collected into receiving pool and discharged after sediment, filtration and disinfection;
  b) Every 15 days, depending on water quality and availability, 20% to 30% of water in pond shall be replaced; temperature difference between water introduced and replaced shall not exceed 2℃ and aeration might be required in rainy days.

5.3.4 Aeration

- When fish swim up to the surface, aerator must be turned all day and night; if not, no aerator needed at night;
- During day time, aerator shall be turned on to avoid water stratification, at least once in early morning, once at afternoon with 2to 3 hours each time;
- Increase time of using aerator when high temperature, cloudy day with low pressure, muggy weather.
- Use wave aerator to enhance nutrient exchange between water and sediment.

5.3.5 Water Quality Monitoring

- Physical and chemistry variables of water quality shall be regularly monitored, including: total alkalinity, calcium hardness, salinity, temperature, pH, ammonia, nitrite, and dissolved oxygen, etc. (see Table 1);

- Balance of total alkalinity and calcium hardness shall be maintained well through adding shell powder and quick lime into pond water. Specific adjustment plan is recommended on the website (waterph.jooylife.com). (for details please contact the Alliance);
- *Advanced requirement
  a) Given the characteristics of low alkalinity and low hardness in Hainan's soil, adjusting bottom sediment shall take priority if possibleTry to avoid chemical approach to kill algae
  b) In case if farm is equipped with microscopes, composition and quantity of plankton in water shall be checked frequently

## 5.4 Feeding management

5.4.1 Feeding requirements

- Only use compound feed that is in compliance with the national feed standard (NY5072);
- Raw material and auxiliary material shall follow the requirements of GB 13078;
- Nutritional requirements shall follow the requirements of SC / T 1025;
- Choose high quality, balanced nutrition, and low protein feed; feed stored must be within its expiration date;
- Feed shall be stored in a separate room that is moisture-proof, shaded and well-ventilated;
- Feed bag shall be stored away from ground and walls
- *Advanced requirement – Feed room shall have anti-pest and anti-rat facilities and keep the room tidy and dry.

5.4.2 Regular feeding

Feed 2-3 times per day depending on the level of dissolved oxygen, roughly at 8:00 - 9: 00 and 13: 00 - 14: 00.

5.4.3 Feeding rate

- In general, the amount of daily feeding shall be about 1.6% of fish weight.
- Make feeding rate and schedule based on temperature, dissolved oxygen, ammonia nitrogen and other water quality variables (see Table 1), with reference of recommended usage from the feed mill;
- Avoid neither temporal nor spatial over-feeding to prevent from local hypoxia;
- When the water quality variables failed to realize the level of reference value (see Table 1), immediately slow down or even temporarily stop feeding.

## 5.5 Harvesting

- Harvest when most of tilapia reach market size (>=500g /tail);
- To avoid hypoxia, harvest day shall be at low temperature, less windy but sunny.
- Two options for harvest, one is purse seine fishing, the other is dry pond fishing.
- Try to avoid damage on other fish. Harvesting all at once is recommended.
- Disinfect fishing gear immediately. Harvesting net shall be exposure to sun.

### 5.6 Medicine Usage

- Administration of any veterinary medicine requires withdrawal time of 40 days before harvesting.
- Administration of drugs in aquaculture shall comply with the National Veterinary Regulations, and "Pollution-free food guidelines for the use of fishery drugs" (NY5071-2002, the Ministry of Agriculture).
- Only use drugs under licensed veterinarian (or practicing technicians with equivalent qualification and experience)'s guidance and only use drugs form legal drug manufacturer and supplier (i.e. with valid production license, approval number, and production standard);
- Administration of drugs shall strictly follow instructions of usage and dosage;
- National banned drugs and medicated additives are prohibited;
- Harvest can only happen after passing withdrawal period.

## 6 Disease Prevention

### 6.1 Prevention methods

Ecological prevention is the main approach to lower disease occurrence. The key principle of ecological prevention approach is the stability of ecosystem that has been strengthened through water environmental management. It is mainly reflected in the following aspects:

- Increase natural productivity of pond ecosystem
- Lower the chance of animal disease outbreak

6.1.1 Alkalinity and calcium concentration of the pond water shall be adjusted and maintained at its critical point to achieve the highest efficiency of photosynthesis in pond water.

6.1.2 Manage pond bottom to allow sediment to release micro elements, thus maintaining mass exchange supporting a healthy ecosystem within pond.

6.1.3 Appropriate polyculture: every 2,000 to 4,000 pieces of tilapia per mu shall be accompanied by 30 to 50 pieces of silver carp. Through different types of fish that feed on different categories of food, secondary productivity as well as biodiversity within pond ecosystem will be enhanced.

6.1.4 Immunization

- Fingerlings with vaccine (mainly include vaccine of streptococcus and aeromonas aeromonas hydrophila) to enhance disease resistance are recommended.

### 6.2 Common fish disease and prevention method (see Table 2)

**Table 2** Common fish disease and prevention method for tilapia farming

| Disease name | morbidity season distribution | symptom | Prevention method |
|---|---|---|---|

| | | | |
|---|---|---|---|
| T. spp | Early spring, summer and winter. wet weather | Gill tissue damaged | 0.5mg/L~0.7mg/L Copper Sulfate, ferrous sulfate mixture for all over the pond（5:2） |
| chilodoniasis | December, March to May | Skin and gill are pale, body surface is light blue or covered by gray membrane | 0.5mg/L~0.7mg/L Copper Sulfate, ferrous sulfate mixture for all over the pond（5:2）, soak that in saltwater(2.5%)for 20min |
| Ichthyophthiriasis | December to June | White cysts are all over the body surface, gill and fin | Soak 3.5% saltwater and 1.5% magnesium sulfate for 15min, or mix 0.38mg/L dry chilli powder and 0.15mg/L ginger fillet, then boil that, splash the water into the pond for 2 days. |
| saprolegniasis | All the year, especially Feb to May | Surface hypha multiply as floccules, congestion in the parasitic position | Avoid fish body injury: soak fish in saltwater (2%～3%)for 10min，or splash salt 400mg/L and soda (1:1）in to the pond, or crush gallnut and boil them, them splash the gallnut water into the pond (1.5kg~2.5kg /667m2) |
| streptococcicosis | When water temperature is 25℃～28℃ | Surface become black，eyeballs and body is out of shape, eyeball is bulgy, cornea is turbid, anus is red and swollen | (1)avoid high density aquaculture ,enhance feed management (see 5.2.1). (2)In early stages of disease, fish can heal themselves through improving water and feed quality. 1 mg/L～2 mg/L bleaching powder can be splashed all over the ponds (28％ chlorine). (3)during attack, chlorine |

| | | | |
|---|---|---|---|
| | | | dioxide(auxiliary material) can be splashed into the ponds to disinfect the ponds, at the same time feed the fishes allicin for3～5 d, during the fifth day, Probiotics 0.5 ppm～0.8 ppm should be splashed into the ponds to improve water quality. |
| bacterial infected skin diseases | High density aquaculture, the overwintering period | Body surface hyperemia, scales begin to fall off, skin is fester . | In early stages of disease, fish can heal themselves through improving water and feed quality. 1 mg/L～2 mg/L bleaching powder can be splashed for all over the ponds (28％chlorine). |
| Note: Fish drug using and withdrawal time should meet the requirement of NY5071 | | | |

### 6.3 Safe disposal for sick and dead fish

6.3.1 Timely collection

- Dead fish and dying fish shall be cleaned up in time to avoid to further exposure to water or under sun. This will stop spreading infectious bacteria and reduce infection source.
- Next, dead fish shall be sent to centralized treatment in distant area away from farming area and water supplying resources.

6.3.2 Deep bury

- Bury dead fish deeply is a common approach: Firstly, dig a deep pit at 1.5 m depth with 1.5 to 2 m diameter; add 2cm of lime in the bottom, then add dead fish followed by another layer of lime again… repeat as needed; eventually cover the top layer with soil of at least 1 m depth. The surface shall be covered with another layer of lime. The surface soil shall not be compressed to prevent gas and liquid leakage.
- Bury place shall be marked out clearly

6.3.3 Transportation control

Sick fish shall not be transferred to other plant or market.

6.3.4 How to dispose tools

- Tools that were in contact with sick or dead fish are strictly prohibited to cross-use;

- Tools shall be disinfected by bleaching powder (concentration 30mg/kg); soak the tools into Strong Chlorine. Process shall follow the standard of "Biosafety treatment for pathogen-infected aquatic animals".

6.3.5 Dispose records

Entire disposal process shall be recorded. (Record table refer to "Biosafety treatment for pathogen-infected aquatic animals")

# 7 Regional Cooperation

## 7.1 Community Relationships

Aquaculture farms are usually located in rural areas where other non-aquaculture community members also use natural resources around neighborhood. Therefore, it is important to ensure mutual beneficial partnerships among fish farmers and their neighbors. The Code aims to encourage farmers to develop a cooperative atmosphere and network within farming community.

7.1.1 Farmers should have cooperative attitude when developing a rational exploitation plan to use land and water resources in a balanced approach of maximizing local socio-economic benefits and environmental management.

7.1.2 Farmers are responsible to maintain a clean and organized outlook through adopting necessary hygiene measures to remove farming wastes that might pollute community;

7.1.3 Aerators and other equipment shall be well maintained to avoid unnecessary noise disturbing local residents.

## 7.2 Cooperation, mutual assistance and sharing

7.2.1 Actively create or participate in farmers' co-ops

- Nearby farmers shall join local farmer associations or cooperatives, to implement internal supervision system of collaborating organizations;
- Farmers shall actively learn from each other and mutually respect to create self-discipline, solidarity, mutual trust and win-win business atmosphere;
- Farmers co-op and association shall play a key role in decision-making for water resource allocation and utilization within community;
- Farmers from different region shall strengthen information sharing, cooperation, and implementation of the Code.

7.2.2 Information sharing within the industry

- Supplier of fingerlings, feed and fish drug in the region shall actively share up-to-date technical information with farmers;
- Processing plant and buyers shall share with farmer the information on market demand timely and consumer feedbacks on the product.

7.2.3 Jointly tackle disease and extreme weather

- When wastewater needs to be discharged, farmers shall give at least 24-hours of notice to downstream potentially affected farms, to remind drainage contamination,

therefore reducing cross-farm infection.

- When a farm has an epidemic disease, the disease information shall be disclosed and shared with neighbors. Notice within 24 hours to warn neighboring farms and cooperative members shall be sent for a more rigorous disease control and prevention measures.
- When a farm has an outbreak, the information shall be reported to provincial industry organizations and government departments within 12 hours (including time, location, species, farm volume, symptoms, mortality, adopted control measures, contacts information etc. Epidemic information shall be reported in accordance with levels of responsibility step by step.
- When farm suffer extreme weather such as typhoons, floods and droughts etc., farmers shall unite around farmer's co-op and association to jointly make rational decision. Learning their lessons from disaster, farmers shall help other farmers to prepare for next disaster (for example, pond embankment reinforced, retain or discharge excessive water in advance, to take leakproof measure etc.).
- During disaster recovery, farmers shall unite in order to protect the collective interests of farming community and reasonably fight for a variety of relief and support rebuilding after disasters and resuming production as soon as possible.