



# CODE OF GOOD AQUACULTURE PRACTICES FOR SHRIMP AND CRAB

PNS/BAFS 197:2017

## EXPLANATORY MANUAL



**DEPARTMENT OF AGRICULTURE (DA)**  
BUREAU OF AGRICULTURE AND FISHERIES STANDARDS (BAFS)

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Code of Good Aquaculture Practices (GAqP) for  
Shrimp and Crab (PNS/BAFS 197:2017)

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# Introductory Note

This Explanatory Manual (EM) is a supplement to the Philippine National Standard (PNS) Code of Good Aquaculture Practices (GAqP) for Shrimp and Crab (PNS/BAFS 197:2017). The Standard outlines practices that prevent or minimize the risks involved in aquaculture production in brackish waters. The EM includes Explanatory Notes and sample images, in addition to the PNS text-based provisions, providing a more thorough explanation of the PNS requirements covering food safety, animal health and welfare, environmental integrity, and socio-economic aspects in aquaculture production.

A Technical Working Group (TWG) consisting of representatives from technical divisions and experts from the Department of Agriculture-Bureau of Fisheries and Aquatic Resources (DA-DA-BFAR), DA-National Fisheries Research Development Institute (DA-NFRDI), Department of Science and Technology-Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development (DOST-PCAARRD), and the Tambuyog Development Center, a private sector representative, developed the EM. The establishment of this TWG was formalized through Special Order (SO) No. 272, series of 2023, which created the TWG for the Development of Knowledge Products of PNS.

This EM is intended to help readers of all backgrounds (e.g., regulatory personnel, industry professionals, or individuals interested in aquaculture) gain an in-depth understanding of the provisions of the PNS. Furthermore, it aims to provide further clarity, insights, and inspiration for the regulatory agency and the target industry to adopt and implement the PNS requirements.

This EM was made possible, through the permission of selected private aquaculture farms, to capture the photographs needed to explain the provisions of the Standard. The Explanatory Notes were mainly sourced from publications of reputable organizations and anecdotal experiences, enhancing the comprehensibility of the content.

# Director's Message



I am pleased to present the Explanatory Manual for the Philippine National Standard (PNS) Code of Good Aquaculture Practices for Shrimp and Crab (PNS/BAFS 197:2017). In line with our commitment to becoming more customer-oriented, this Explanatory Manual is specifically designed to assist you to better understand the PNS and implement its provisions more clearly. Following the results from the Focus Group Discussions (FGD) with regulatory agencies, we recognize the need to enhance and ensure a consistent understanding of the PNS. Technical terms and various interpretations of the minimum requirements for GAqP have made uniform and consistent implementation challenging.

Therefore, we have created this Explanatory Manual to simplify the use and enhance understanding of the PNS.

The Department of Agriculture -Bureau of Fisheries and Aquatic Resources (DA-BFAR) has consistently provided support, providing significant technical recommendations, that led to the development of this Explanatory Manual. Our aim is to make it practical and meaningful, serving as a helpful resource for DA-BFAR Fishing Regulations Officers and Aquaculturists to support their regulatory activities. Our ultimate goal is to transform the PNS document into an empowering tool for all relevant stakeholders. By addressing challenges in implementing our PNS, we hope to create an environment where the PNS is understood, embraced, and effectively adopted.

I extend my sincere gratitude to the Technical Working Group (TWG) for their invaluable contributions to the development of this Explanatory Manual. Together, we strive for a future where the PNS is the basic language for consumer safety and trade.

**KAREN KRISTINE A. ROSCOM, PFT, PhD**  
Director IV

# List of Acronyms

<b>ASEAN</b>	Association of Southeast Asian Nations
<b>BAFS</b>	Bureau of Agriculture and Fisheries Standards
<b>DA</b>	Department of Agriculture
<b>DA-AO</b>	Department of Agriculture - Administrative Order
<b>DA-BFAR</b>	Bureau of Fisheries and Aquatic Resources
<b>DENR</b>	Department of Environment and Natural Resources
<b>DOH</b>	Department of Health
<b>DILG</b>	Department of Interior and Local Government
<b>DOST</b>	Department of Science and Technology
<b>EMB</b>	Environmental Management Bureau
<b>FAO</b>	Fisheries Administrative Order
<b>FAO</b>	Food and Agriculture Organization
<b>FIFO</b>	First-in First-out
<b>GAqP</b>	Good Aquaculture Practices
<b>LGU</b>	Local Government Unit
<b>MC</b>	Memorandum Circular
<b>NACA</b>	Network of Aquaculture Centres in Asia-Pacific
<b>NBFTC</b>	National Brackishwater Fisheries Technology Center
<b>NRCP</b>	National Residue Control Program
<b>PCAARRD</b>	Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development
<b>PNS</b>	Philippine National Standard
<b>WOAH</b>	World Organisation for Animal Health

# List of Related Laws and Regulations

## **Republic Act (RA) 8550 of 1998**

The Philippine Fisheries Code as amended by RA 10654

## **Department of Agriculture (DA) Administrative Order (AO) No. 30 Series of 1991 - Department of Health (DOH) Administrative Order (AO) No. 111-B Series of 1991**

Rules and Regulations to Implement Prescribing Requirements for the Veterinary Drugs and Products

## **Department of Agriculture (DA) Administrative Order (AO) No. 14 Series of 2006**

Implementation of the National Veterinary Drug Residues Control Program and Creation of the Inter-Agency Committee

## **Department of Agriculture (DA) Administrative Order (AO) No. 12 Series of 2007**

Revised Implementing Rules and Regulations on the Registration of Feed Establishments and Feed Products

## **Department of Agriculture (DA) Administrative Order (AO) No. 24 Series of 2009**

Implementing Guidelines on the National Veterinary Drug Residues Control Program in Foods Pursuant to Administrative Order No. 14 S. 2006

## **Joint DOH and DA Administrative Order (AO) No. 2013-0026**

Rules on the Regulation of Veterinary Drugs and Products, Veterinary Biological Products, and Veterinary Drug Establishment

## **Department of Environment and Natural Resources (DENR) - Environmental Management Bureau (EMB) Memorandum Circular (MC) No. 2014-005**

Guidelines for Coverage Screening and Standardized Requirements under the Philippine Environmental Impact Statement System (PEISS) amending relevant portions of MC 2007-002

## **Department of the Interior and Local Government (DILG) Memorandum Circular (MC) No. 2018-59**

Policies and Guidelines on the Regulation and Monitoring of Fishery Activities in Municipal Waters

## **Department of Environment and Natural Resources (DENR) Administrative Order (AO) No. 2021-19**

Updated Water Quality Guidelines (WQG) and General Effluent Standards (GES) for Selected Parameters

## **Fisheries Administrative Order (FAO) 214 Series of 2001**

Code of Practice for Aquaculture

# List of Related Laws and Regulations

**Fisheries Administrative Order (FAO) 216 Series of 2001**

Obstruction to navigation in streams, rivers, lakes, and bays

**Fisheries Administrative Order (FAO) 233 Series of 2010**

Aquatic Wildlife Conservation

**Republic Act (RA) 9003 of 2000**

Ecological Solid Waste Management Act

**Joint DA-DENR-DILG Administrative Order (AO) No. 01 Series of 2008**

Defining/Identifying the Areas of Cooperation and Collaboration among the Department of Agriculture (DA), Department of Environment and Natural Resources (DENR) and the Department of the Interior and Local Government (DILG) in the Planning, Management and Control of Aquaculture Development to Mitigate Impacts on the Environment

**Republic Act (RA) 10631 of 2013**

Philippine Animal Welfare Act

**Republic Act (RA) 9231 of 2003**

An Act Providing for the Elimination of the Worst Forms of Child Labor and Affording Stronger Protection for the Working Child

**Republic Act (RA) 9710 of 2008**

An Act Providing for the Magna Carta of Women

**Republic Act (RA) 10911 of 2016**

Anti-Age Discrimination in Employment Act

**Republic Act (RA) 11058 of 2018**

An Act Strengthening Compliance with Occupational Safety and Health Standards and Providing Penalties for Violations Thereof

**Presidential Decree (PD) No. 442 of 1974**

Labor Code of the Philippines

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# Foreword

The Technical Services Division (TSD) of the DA-BAFS generated a Priority List for PNS Promotion for 2023 based on established prioritization criteria. One of the priority PNS for 2023 promotion is the PNS Code of GAqP for Shrimp and Crab (PNS/BAFS 197:2017).

This Standard is designed to cover the practices that prevent or minimize the risk associated with aquaculture production in brackish waters. The Code primarily focuses on four aspects of aquaculture production: food safety, animal health and welfare, environmental integrity, and socio-economic. Furthermore, the Code applies to aquaculture farms or projects, such as hatcheries, nurseries, and grow-outs, intended for shrimp and mangrove crab culture.

To assist regulatory officers of the DA-BFAR and other relevant stakeholders, this EM was developed to provide supplementary material to the Standard, further clarify the text of the Standard, and provide more specific details on the minimum compliance requirements for shrimp and crab aquaculture production. The EM serves as a reference material and practical guide for regulatory personnel and producers in adopting the minimum compliance requirements of the Code of GAqP for shrimp and crab.

A TWG was created specifically for this purpose. This TWG assisted in completing the EM in 2023, given the expressed urgency for this supplementary material to facilitate trade. The EM was drafted through a series of field data gathering (FDG) activities conducted in Zambales and Negros Occidental. The photographs and other relevant information gathered during these FDG activities were incorporated in the EM. The TWG discussed and finalized the draft through a series of meetings and writeshops over a period of 7 months (April to October 2023).

## Scope

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are provided as Explanatory Notes inside a yellow box in black font color.



## 1 Scope

This Code of Good Aquaculture Practices (GAqP) for shrimp and crab covers practices that aim to prevent or minimize the risk associated with aquaculture production in brackish waters. This Code covers the following aspects of aquaculture production namely: a) food safety, b) animal health and welfare, c) environmental integrity, and d) socio-economic.

This Code applies to aquaculture farms or projects, such as, but not limited to, hatcheries, nurseries, and grow-out intended for shrimp and mangrove crab culture.

This Code consists of minimum compliance requirements.

### Explanatory Note:

The mangrove crab and shrimp species covered in the Standard are the following:

#### Mangrove crab

*Scylla serrata*

*S. olivacea*

*S. tranquebarica*

*S. paramamosain*

#### Shrimp

*Penaeus monodon* (Black tiger shrimp)

*P. vannamei* (Whiteleg shrimp)

### Normative References

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are provided as Explanatory Notes inside a yellow box in black font color.



## 2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including amendment) applies.

- a) ASEAN Good Aquaculture Practices (GAqP) for Shrimp Farming
- b) Good Aquaculture Practice Farmers Guidance Workbook

### Definition of Terms

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are provided as Explanatory Notes inside a yellow box in black font color.



### 3 Definition of Terms

#### 3.1

##### **aquaculture farm**

refers to an aquaculture production establishment (either land- or water-based); usually consisting of holding facilities (tanks, ponds, raceways, pens, cages), plant (buildings, storage, processing), service equipment and stock

#### 3.2

##### **biosecurity**

refers to set of practices that will reduce the probability of pathogen introduction and its subsequent spread from one place to another

#### 3.3

##### **chemicals**

refer to any substance either natural or synthetic that can affect the live fish, its pathogens, and the water, equipment used for production or the land within the aquaculture establishment

#### 3.4

##### **competent authority**

refers to the bureau or agency mandated by law with responsibility and competence for ensuring and supervising the implementation of sanitary and phytosanitary (SPS) measures

#### 3.5

##### **diseased crustaceans**

refers to a crustaceans on or in which pathological changes or other abnormalities that affect safety and quality are apparent

#### 3.6

##### **extensive farming**

refers to raising crustaceans under conditions of little or incomplete control over the growing process and production conditions where their growth is dependent upon endogenously supplied nutrient inputs

#### **Explanatory Note:**

A farming system is defined based on stocking density and the amount of commercial feeds provided. Extensive farming is one of the farming systems having low stocking density and is highly dependent on natural food, resulting in minimal or no use of commercial feeds (Mitigating Impact from Aquaculture in the Philippines, n.d.). Below is an example of the stocking density of mangrove crab and shrimp in an extensive farm:

Table 1. **Sample stocking density of mangrove crab and shrimp in an extensive farm**

Mangrove crab	Shrimp	
	<i>P. monodon</i>	<i>P. vannamei</i>
500 to 1,000 pcs/ha	1 to 5 postlarvae PL/m <sup>2</sup>	5 to 10 PL/m <sup>2</sup>



It is important to emphasize that the stocking density of mangrove crab and shrimp in an extensive farm can vary, influenced by several factors, including technological advancements.

### 3.7 feed additive

refers to chemicals other than nutrients for crustaceans that are approved for addition to their feed

### 3.8 aquaculture feed

refers to fodder intended for crustaceans in aquaculture establishments, in any form and of any composition

### 3.9 hatchery

refers to a [water-based or] land-based structure growing or culturing crustacean for breeding and fish seed production

### 3.10 intensive farming

refers to raising crustacean under controlled growing process and production conditions where their growth is completely dependent on externally supplied fish feed

#### **Explanatory Note:**

Intensive farming has a high stocking density and is highly dependent on commercial feeds (Mitigating Impact from Aquaculture in the Philippines, n.d.). Shrimp is usually raised in this type of farming system with a stocking density of 16–30 PL/m<sup>2</sup> for *P. monodon* and 31–60 PL/m<sup>2</sup> for *P. vannamei*.

**3.11****semi-intensive farming**

refers to raising crustacean under conditions of partial control over the growing process and production conditions where their growth is dependent upon endogenously supplied nutrients and externally supplied shrimp and crab feeds

**Explanatory Note:**

Semi-intensive farming has medium stocking density and utilizes both natural food and commercial feeds (Mitigating Impact from Aquaculture in the Philippines, n.d.). For semi-intensive farming, the stocking density of shrimp is 6-15 PL/m<sup>2</sup> for *P. monodon* and 11-30 PL/m<sup>2</sup> for *P. vannamei*.

**3.12****veterinary drug**

refers to any substance applied or administered to crustaceans whether used for therapeutic, prophylactic or diagnostic purposes or for modification of physiological functions or behavior

## Site Selection

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are provided as Explanatory Notes inside a yellow box in black font color.



## 4 Site Selection

### 4.1 Location

- 4.1.1** Aquaculture farms should be located in area where risk of pollution or contamination can be controlled or mitigated to an acceptable level.

#### **Explanatory Note:**

Proper selection of a site is essential for the success of an aquaculture farm. The following factors affect the operation of an aquaculture farm:

#### **Ecological**

Ecological factors include water supply (quality and quantity), climate, hydrological characteristics, soil characteristics, and land. The sources of water supply for aquaculture farms may include but are not limited to creeks/canals, estuaries, lagoons, deep wells, and seas.

The following laboratory analyses help establish the water quality used in an aquaculture farm:

1. physical (temperature, turbidity, total dissolved solids)
2. chemical (pH, alkalinity, dissolved oxygen, salinity)
3. biological (density of plankton)
4. microbiological properties (test for specific pathogens)

Moreover, information on temperature, the pattern of precipitation, the incidence of heavy storms, floods, and water elevation should be considered.

#### **Biological**

Biological and operational factors cover the species to be cultured, availability of resources/stock, the system of culture (extensive, semi-intensive, intensive), and operational methods (monoculture and polyculture).

Monoculture is a farming method of single species in one production unit.

Polyculture is farming of two species or more in one culture system.

#### **Economic and social**

Some examples of economic and social factors are the availability of electricity, telephone or radio connections, equipment, supplies, security, and conflicts. Staff with adequate experience in pond management and skilled and semi-skilled laborers are also necessary to carry out pond operations. Another thing to consider is political realities (FAO, 1984).

As stated in DA-BFAR FAO No. 214 Series of 2001 *Code of Practice for Aquaculture*, potential sites for aquaculture are thoroughly evaluated by DA-BFAR to ensure that ecological and social conditions are sustained and protected. The following practices ensure that the sites selected are appropriate for aquaculture farms:

- Water source in the area shall be evaluated as to its quality and quantity;
- Tidal patterns, freshwater influences, flood levels, offshore currents, and existing water uses shall be determined;
- Sustainability of topography, soil, and ecosystem for siting and construction of ponds shall be ascertained;
- Long-term climatological records for the last five years shall be acquired to determine the occurrence of floods, droughts, storms, and other calamities in the area;
- Existing flora and fauna shall be determined relative to ecologically sensitive areas such as migration routes, nesting grounds, etc.;
- Alternatives to mitigate potential negative environmental and social impacts shall be considered;
- Regulatory requirements for the site shall be documented and possible alternatives shall be considered for compliance with regulations; and
- The availability of the workforce in the area shall be surveyed.



Source: HOCPO Farm, n.d.

**Image 1a. Aerial shot of an aquaculture farm located away from major sources of contamination**



Source: DA-BFAR-NBFTC, n.d.

**Image 1b. Aerial view of an aquaculture farm located away from major sources of contamination**



Source: Google Earth, n.d.

**Image 1c. Sample location map**



On the other hand, a Certificate of Non-Coverage (CNC) is a document issued by the DENR-EMB certifying that, according to the project description, the project is not covered by the EIS System. Thus, the project is not required to secure an ECC.



Image 2b. Sample of Certificate of Non-Coverage

**4.1.3** Proof of legal rights, privileges or ownership of the farm area (license to operate or business permit from the local government unit) and its location map.

**Explanatory Note:**

Consistent with Republic Act 8550 (RA 8550), the Philippine Fisheries Code of 1998 as amended by RA 10654, the DILG issued Memorandum Circular No. 2018-59 *Policies and Guidelines on the Regulation and Monitoring of Fishery Activities in Municipal Waters*, which requires fish hatcheries, fish breeding facilities, and private fishponds to be registered with the LGU. Moreover, all fishponds, fish pens, and fish cage operators are required to report the type of species and production volume annually.



**Image 3. Sample certificates and permits (sanitary permit to operate, fire safety inspection certificate, BIR certificate of registration, mayor's permit) as proof of legal compliance**

## 4.2 Lay-out and design

**4.2.1** Aquaculture farm should be designed with proper space for its facilities and should integrate biosecurity measures to prevent cross contamination and threat to security.

### Explanatory Note:

Good biosecurity practices result in farm productivity, product quality, trade, and profitability (Sub-committee on Aquatic Animal Health, 2016). Facilities in an aquaculture farm are constructed considering the parameters below:

- Prevent entry of animals and unauthorized persons.
- There are designated areas for different operations in the farm (i.e. laboratory, storage of equipment, feeds, and chemicals), if applicable.
- The packing/storage area is located near the main entrance of the farm or at least physically separated from the production area.
- There is a separate area for the quarantine of sick or introduced animals.
- There is a tire bath/disinfectant spray at the entrance of the farm to sanitize the vehicle.
- There are footbaths and handwashing stations at the entrance to the farm.



*Image 4a.*  
**Installed concrete fence with barbed wire surrounding the farm for security**



*Image 4b.* **Crab fence to prevent entry of pathogen carriers**



*Image 4c.*  
**Protection nets to prevent crabs from escaping and prevent entry of other animals**



Image 4d. **Examples of bird scaring device**



Image 4e. **Vehicle passing through a tire bath at the entrance of the facility**



Source: DA-BFAR, n.d.

**Image 4f. Disinfectant spray at the entrance of the facility**



**Footh Bath**

**Hand Sanitizer**

**Image 4g. Foot bath and hand sanitizer at the entrance of the pond**

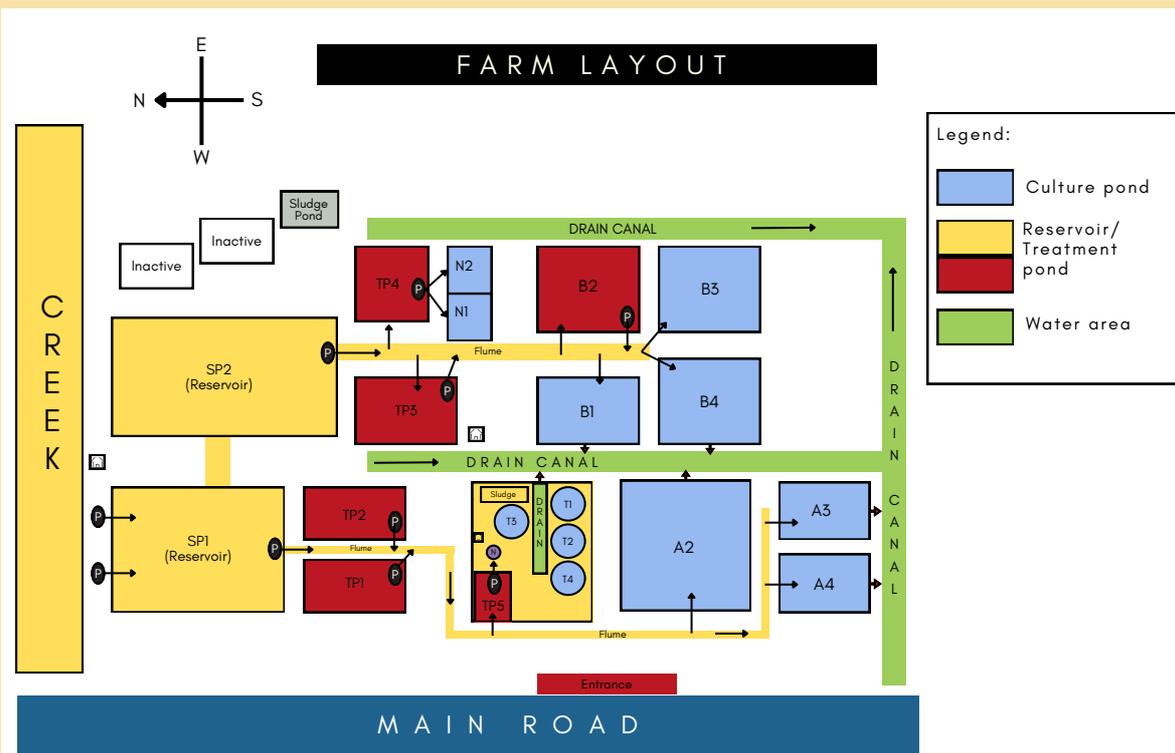


Image 4h. Sample farm lay-out of an intensive shrimp farm

**4.2.2** Integrated farming may be allowed provided measures are in place to avoid contamination.

### Explanatory Note:

Integrated farming means producing crustaceans alongside poultry, livestock, and crops wherein the by-products of one farming sub-system (e.g. fish, poultry, crop) become a valuable input for the other. Integrated farming utilizes the land and water resources of the farm resulting in maximum and diverse agricultural yield at low financial and labor costs (FAO, 1992).

Based on PNS/BAFS 135:2014 Code of Good Aquaculture Practices (GAqP) the following are the measures to be observed to avoid contamination:

1. segregating aquaculture activities with livestock activities;
2. installing proper segregating devices (e.g. fences); and
3. farm layout reflecting the different structures of the farm (e.g. location of ponds in relation to livestock houses).

**4.2.3** The design of culture facilities should meet the biological needs of shrimps and crabs from grow-out to harvest.

**Explanatory Note:**

The biological needs of shrimps and crabs include respiration, excretion of waste, and feeding. These needs are considered during the design (i.e. depth and surface area) and maintenance of culture facilities (Spaargaren, 1997).

The types of culture facilities for shrimps include:

<p>1. Pond</p>	<p>Earthen, High Density Polyethylene (HDPE) liner</p>	<p>A properly designed pond allows efficient water management, harvest of cultured species, waste collection and removal, and feeding. The most common pond designs for shrimp culture are square and rectangle (Tamil Nadu Agricultural University, n.d.).</p>
<p>2. Tank</p>	<p>Concrete, Semi concrete HDPE liner</p>	<p>Tank-based culture of shrimps has the following considerations:</p> <ul style="list-style-type: none"> <li>• water quality parameters;</li> <li>• management of waste removal; and</li> <li>• implementation of efficient feeding strategies.</li> </ul>



Image 5a. Earthen pond for shrimp culture



Source: DA-BFAR, 2022

*Image 5b. Pond with High Density Polyethylene (HDPE) liner for shrimp culture*



*Image 5c. Circular tanks for shrimp culture*

The biological needs of crabs are dependent on the crab species and culture conditions where they are cultured, whether indoors or outdoors. Crabs are commonly raised in earthen brackishwater ponds with other fish species to reduce the crabs' cannibalism.

Pens in mangrove areas can also be another culture facility for crabs. It can be rectangular, square, or irregular in shape and the size ranges from 500 - 1000m<sup>2</sup> (SEAFDEC, 2016).



Image 5d. **Earthen pond for crab culture**

**4.2.4** Reservoir pond for incoming water and settling pond for effluents should be available.

**Explanatory Note:**

A reservoir pond is for conditioning pond water before distribution. It also acts as water storage when water quality is inconsistent and when supply is limited (Tamil Nadu Agricultural University, n.d.).



Image 6a. **Reservoir pond of an intensive shrimp farm**

An efficient way to reduce suspended solids from the effluent before its discharge is the use of a settling pond (Alune, 2021).



*Image 6b.* **Settling pond of an intensive shrimp farm**

**4.2.5** Buffer zone should be observed in accordance with existing regulation.

#### **Explanatory Note:**

Buffer zones are vegetated filter strips or zones situated between natural resources and adjacent areas subject to human modifications (e.g. clearing land for aquaculture). These zones provide a wide variety of ecological functions and benefits which include flood control, improvement of water quality, stabilization of the shoreline, erosion control, and provision and protection of fish and wildlife habitats (Bavins, et. al., 2000).

Based on DA-BFAR FAO No. 214 s. 2001, for brackishwater aquaculture farms, a buffer zone is at least 100 meters from the sea to the main peripheral dike, 50 meters along the river banks (for typhoon-prone areas) and 50 meters from the sea, and 20 meters along the river banks (for non-typhoon prone areas), shall be left undisturbed for ecological reasons and physical protection from flooding and wave action.



Image 7. **Buffer zones of a shrimp farm**

# Facilities and Sanitation

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are provided as Explanatory Notes inside a yellow box in black font color.



## 5 Facilities and Sanitation

### 5.1 Facilities

**5.1.1** Facilities for disposal of solid and liquid wastes should be available in a suitable area and compliant with existing regulation.

#### Explanatory Note:

RA 9003 Ecological Solid Waste Management Act of 2000 mandates the segregation of solid wastes from the source. Below are the minimum standards and requirements for segregation and storage of solid waste before collection:

- separate container for each type of waste; and
- solid waste containers shall be properly marked or identified as “compostable”, “non-recyclable”, “recyclable”, or “special waste”.

Disposal in open dump sites is not allowed instead, sanitary landfill sites are the final disposal area for solid wastes.



*Image 8a.* **Sample illustration of properly marked solid waste containers**

The DA-BFAR Joint DA-DENR-DILG Administrative Order No. 01 Series of 2008 provides proper waste management in the aquaculture industry through these practices:

1. effluents, sediments, and other wastes shall be properly disposed of through the use of wastewater treatment and settling ponds;
2. outfall shall be so designed that no significant impact of effluents on natural waters occurs beyond the mixing zone;
3. sediment from ponds, canals, or settling basins shall be put back into the area from which it was eroded, used as earth fill, or disposed of through some other environmentally responsible way; and
4. discharged water shall meet water quality standards under DENR Administrative Order No. 35-90 on Revised Effluent Regulations of 1990.



*Image 8b. Sludge pond for liquid wastes from cultured facilities*



*Image 8c. Drain canal installed in the farm*

**5.1.2** Fuel, chemical substances (sanitizer, fertilizer and reagents), feed and veterinary drugs should be stored separately in a safe condition.

### Explanatory Note:

Separate storage for fuel, chemical substances, feed, and veterinary drugs prevents contamination, thereby reducing the risk of mixing in case of accidental breakage, fire, earthquake, or emergency response (Princeton University Environmental Health Safety, n.d.; Safe Storage of Cleaning Equipment and Materials, n.d.).



Image 9a. Separate storage area for (a) chemical substances and (b) hazardous wastes

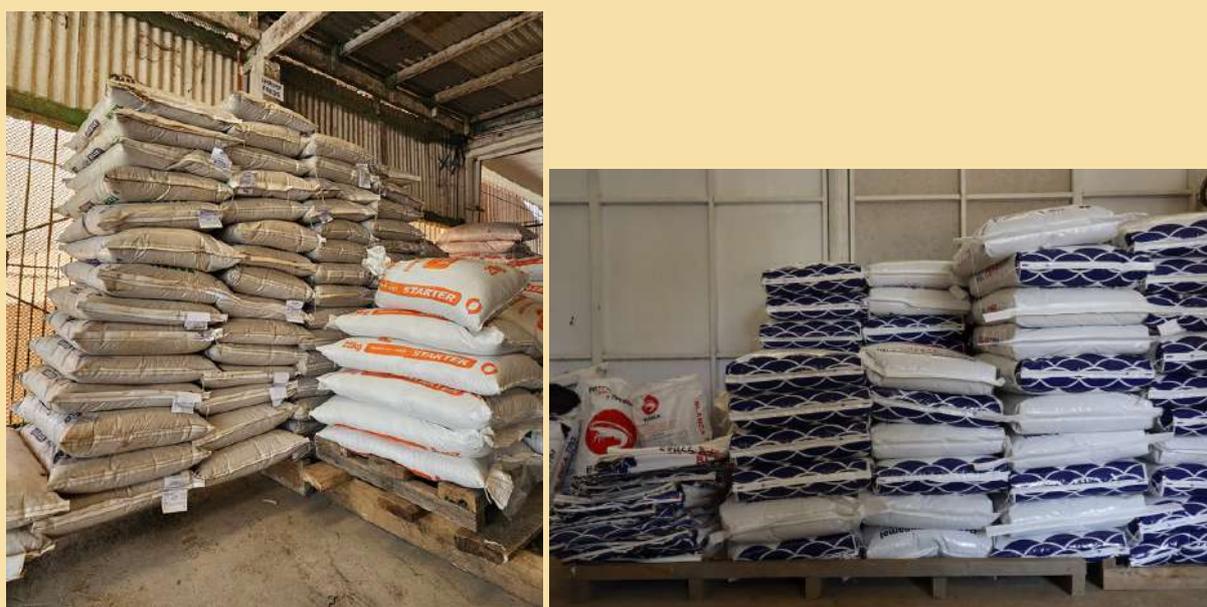


Image 9b. Safe and proper storing of shrimp feeds



*Image 9c. Properly stored chilled fish used as feed for crabs*

## 5.2 Sanitation

- 5.2.1** Aquaculture farm facilities and their surroundings should be maintained in a clean and hygienic condition.

### Explanatory Note:

Clean surroundings promote a good and healthy working environment.



*Image 10.* **Clean surroundings of an aquaculture farm**

- 5.2.2** Containers, equipment and farm facilities should be maintained in good condition for ease in cleaning and sanitizing.

**Explanatory Note:**

Maintaining equipment in good condition is important in terms of operational efficiency, safety and maximizing utilization.



*Image 11a.* (From left to right) **Sinkers and aerator cord maintained in good condition and sanitized before and after use**



*Image 11b.* **Farm equipment stored and maintained in proper condition**

### 5.3 Waste removal

- 5.3.1 Waste should be properly segregated and removed at least once a day.
- 5.3.2 Waste containers and the waste storage premises should be cleaned and sanitized after each use.
- 5.3.3 Waste should be stored such that it is not a source of contamination.
- 5.3.4 Organic waste after harvest should be disposed of properly to prevent contamination.

#### Explanatory Note:

Waste removal can be carried out through the central drain installed at the center of the tank.



**Image 12. Removal of sludge through the central drain typically available in intensive farm**

# Farm Management

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are provided as Explanatory Notes inside a yellow box in red font color.



## 6 Farm Management

### 6.1 Aquaculture Farm preparation

#### 6.1.1 Aquaculture farm preparation practices should minimize risk for cross-contamination.

#### Explanatory Note:

Aquaculture farm preparation is comprised of the following methods:

Table 2. **Methods of farm preparation**

Method	Description	Applicability	Species
Draining and drying	Before stocking and after harvest, ponds are drained totally and dried for several weeks until the soil cracks or when it is hard enough to support one's weight without allowing the surface to sink more than 5 cm when walking across it.	Earthen ponds	Shrimp and Crab
	This is the most practical, cheap and effective method of discarding unwanted species that can be competitors for feed or predators of cultured species (FAO, 1986; 2011).		
	Liner ponds and concrete tanks are totally drained through the use of pumps and are dried for several days or weeks.	HDPE liner ponds Concrete tank	
Repair	Screens and scarelines are checked for repairs. Liner ponds and concrete tank are checked if there are damages and cracks.	Earthen ponds HDPE liner ponds Concrete tank	Shrimp and Crab
Cleaning and disinfection	Sediments, algae and other organic matter that accumulated on the surface of the pond or tank are removed by brushing manually or using a pressure washer prior to disinfection. Excess cleaning water is discharged in a biosecure manner before disinfectants are applied. After disinfection, the liner pond or tank is rinsed thoroughly the liner to get rid of all residues and let it dry completely (WOAH, 2023).	HDPE liner ponds Concrete tank	Shrimp
Tilling/cultivation of pond bottom	This method enhances soil quality by exposing of the subsoil, thus, hastening the oxidation process and release of nutrients (FAO, 1986; 2011).	Earthen ponds	Shrimp and Crab

Table 2. (continued)

Method	Description	Applicability	Species
Liming	Calcium and magnesium compounds are applied to the soil to reduce its acidity, speed up organic matter decomposition, and enhance fertilizer reaction. However, excessive liming can be harmful because it reduces the availability of phosphorus by precipitating insoluble calcium or magnesium phosphate (FAO, 1986; 2011).	Earthen ponds	Shrimp and Crab
	Applying lime helps in correcting water pH.	HDPE liner ponds Concrete tank	
Control of unwanted species	<p>There are two methods of controlling unwanted species:</p> <ul style="list-style-type: none"> <li>Physical - The physical control of unwanted species is done through drying of pond. Other physical approaches include installation of appropriate screens in the outlet/inlet gates to prevent entrance of unwanted species, proper maintenance of dikes and water gates to prevent leakage and eliminate boring organisms such as snakes, and putting up traps and bird-scaring devices.</li> </ul>	Earthen ponds	Shrimp and Crab

Table 2. (continued)

Method	Description	Applicability	Species
Control of unwanted species	<ul style="list-style-type: none"> <li>Chemical - The chemical control of unwanted species is done through the use of pesticides derived from plant extracts. These are recommended for these are biodegradable and contribute to the fertility of pond soil. The most commonly used pesticides are rotenone, tea seed cake, ammonium sulphate, tobacco dust and calcium carbide (FAO, 1986; 2011).</li> </ul>	Earthen ponds	Shrimp and Crab
Fertilization	<p>This method is important and necessary to extensive and semi-intensive farming. This method relies on natural food. Application of organic and inorganic fertilizers improve the natural food production.</p> <ul style="list-style-type: none"> <li>Organic fertilizers - These are agricultural by-products, which include rice bran and molasses (Green, 2015).</li> <li>Inorganic fertilizers - These are synthetic fertilizers which consist of concentrated amounts of at least one of the major plant nutrients such as nitrogen, phosphorous and potassium (FAO, 1986).</li> </ul>	Earthen ponds	Shrimp and Crab
Water conditioning	In this method, water is treated to improve its quality to meet the requirements for shrimp culture (Shingare, et. al., 2019).	Earthen pond HDPE liner	Shrimp

Below are images showing the methods of aquaculture farm preparation.



*Image 13a. Drying of pond as part of aquaculture farm preparation*



*Image 13b. Farm personnel tilling the pond using a rake*



*Image 13c. Farm personnel applying lime by broadcasting*



*Image 13d. Farm personnel applying fertilizer*

**6.1.2** Prohibited chemicals or biological substances should not be used in aquaculture farm preparation.

### Explanatory Note:

Listed below are the allowed chemicals and their usage for pond and culture system preparation.

Table 3. **Chemicals used for farm preparation**

<b>Piscicide (For use in pond preparation or early culture only)</b>	<b>Use</b>
Saponin	eradicate unwanted fish
Rotenone	
Organophosphates (OP) - two most commonly used OP are dichlorvos (dichlorovos) and trichlorfon (dipterex, and neguvon)	pest control
<b>Culture system preparation</b>	<b>Use</b>
Calcium hypochlorite	pH correction
Calcium chloride	
Lime	increase pH and improve alkalinity
Zeolite	water conditioning
Ethylenediaminetetraacetic acid (EDTA)	heavy metal control
Sodium thiosulphate	

(Sources: ASEAN, 2013; Kim, et. al. 2023; Ore, et. al. 2022)

- 6.1.3** Fertilizers, prebiotics, probiotics and chemicals should be used in accordance with the instructions on the manufacturers label or as advised by the competent authority.

### Explanatory Note:

Fertilizers are registered under the Fertilizer and Pesticide Authority (FPA). The list of registered fertilizer products is available on the FPA website <https://fpa.da.gov.ph>. Further, probiotics and prebiotics are registered under the BAI per Joint DOH and DA Administrative Order No. 2013-0026.



*Image 14. Sample chemicals used in aquaculture farms with legible instructions on the manufacturers' label*

## 6.2 Water management

**6.2.1** Water for culture should be of a quality suitable for the production of shrimp and crab which are safe for human consumption. Water should conform with the existing standard set by the competent authority.

### Explanatory Note:

During site selection, the water source should be tested to know its chemical characteristics and adjust the water quality parameters within acceptable limits. For instance, water with high ammonia levels can be lowered to safe levels by passing it through a biofilter (Wyk & Scarpa 1999). The DENR issued DENR Administrative Order (AO) No. 2021-19 *Updated Water Quality Guidelines (WQG) and General Effluent Standards (GES) for Selected Parameters* to serve as a reference for water quality parameters.

DATE: May 9 2023													
POND	DO		Ph		Alkalinity >80ppm	TEMP		SALINITY 10-30 ppt	AMMONIA <0.5	NITRITE <0.2	HARDNESS >1500	DOC M/TH	CalMag M
	AM	PM	AM	PM		AM	PM						
A1	7.31	4.27	7.4	7.7	180-6	30.8	32.4		1	0.5		380	1157
A2	4.02	5.14	7.7	8.1	190-0	30.9	35.0		5	1		420	839
A3	3.49	5.84	7.9	8.2	240-0	30.2	32.1		3	1		420	1081
B1	3.72	5.01	7.3	8.0	120-0	30.9	32.5		0.5	0.5		400	632
B2	4.74	4.60	7.8	8.1	150-0	30.4	32.6		0.5	0.7		420	1470

Image 15. Sample daily monitoring record of water quality parameters

**6.2.2** Water should be properly screened, settled, aerated and maintained as suitable for cultured stock.

**Explanatory Note:**

The installation of screens, filter foam, and the use of paddle wheels are among the methods utilized to ensure proper water screening and aeration.



*Image 16a.* Pond gate with screen to filter incoming and outgoing water for earthen ponds



*Image 16b.* Incoming water passing through a filter foam for HDPE liner ponds



*Image 16c.* **Paddle wheels aid in providing aeration for cultured stock**

### 6.2.3 Water quality should be regularly monitored to ensure suitability and safety.

#### Explanatory Note:

Water quality is an important factor for the growth and survival of cultured species. The following water quality parameters are monitored for both crab and shrimp:

Table 4. **Water quality parameters for crab and shrimp**

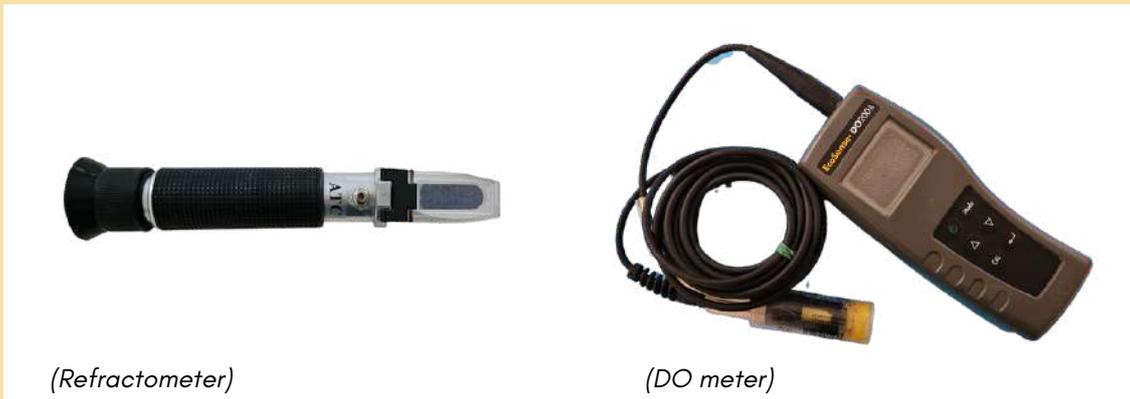
Parameter	Optimum range	
	Crab	Shrimp
Dissolved oxygen	>3 ppm	5.0 – 9.0 ppm
pH	8.0 – 8.5	7.0 – 8.3
Temperature	23 – 30 °C	28 – 32 °C
Salinity	10 – 34 ppt	15 – 35 ppt
Unionized ammonia (NH <sub>3</sub> )	<0.25 ppm*	0.03 ppm
Nitrite (NO <sub>2</sub> )	<10 ppm at salinities >15 ppt; <5 ppm at salinities <15 ppt*	1 ppm
Alkalinity	> 80 ppm (ideally 120 ppm)*	> 100 ppm

\*Range as for *Penaeus monodon*

(Sources: Baliao et al., 1999; Durai et. al., 2021; FAO, 2011; Department of Primary Industries and Fisheries, 2006)



Image 17a. Sample test kit for monitoring water quality in earthen ponds



(Refractometer)

(DO meter)

Image 17b. Equipment used in monitoring water quality

### 6.3 Stocking Density

Stocking density should be optimum to the species and to the culture system as specified in Annex A.

#### Explanatory Note:

Table 5. **Stocking density of mangrove crab and shrimp based on culture system**

Species	Culture system stocking	Density <sup>a</sup>
1. Mangrove Crab		
a. <i>Scylla serrata</i> b. <i>S. olivacea</i> c. <i>S. tranquebarica</i> <i>S. paramamosain</i>	Extensive <sup>b</sup>	500 - 1000 pcs/ha
2. Shrimp		
a. <i>Penaeus monodon</i> (Black tiger shrimp)	Extensive	1 - 5 PL/m <sup>2</sup>
	Semi-intensive	6 - 15 PL/m <sup>2</sup>
	Intensive	16 - 30 PL/m <sup>2</sup>
b. <i>Penaeus vannamei</i> (Whiteleg shrimp)	Extensive <sup>c</sup>	5 - 10 PL/m <sup>2</sup>
	Semi-intensive <sup>d</sup>	11 - 30 PL/m <sup>2</sup>
	Intensive <sup>e</sup>	31 - 60 PL/m <sup>2</sup>

<sup>a</sup> depending on the culture practices and other parameters for aquaculture

<sup>b</sup> aquasilviculture and polyculture with fish

<sup>c</sup> polyculture with 5,000 pcs/ha of tilapia

<sup>d</sup> greenwater technology with 650-1000 pcs @50g of Tilapia in a middle pen

<sup>e</sup> reservoir with greenwater technology

# Feeds and Feeding

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are provided as Explanatory Notes inside a yellow box in red font color.



## 7 Feeds and Feeding

### 7.1 Origin of feed and feed substances

- 7.1.1** Commercial feeds, feed ingredients, additives and premixes should be obtained from a company registered and monitored by the competent authority.
- 7.1.2** Imported feeds should be obtained from a company registered and monitored by the competent authority in compliance with existing regulations and in conformity with the existing standards.

#### Explanatory Note:

Commercial aquaculture feeds are any complete feed prepared, manufactured by a duly registered feed mill/processing plant, distributed, and traded for consumption by aquatic animals raised for food or pleasure. They can be in the form of pellet, crumble, or mash feeds. Pellet feeds are in agglomerated form, which is produced by compacting and forcing the product through die openings by a mechanical process. On the other hand, crumble feeds are in granular form and mash feeds are in meal form (BAFS, 2010).



Source: Canva, n.d.

*Image 18. Forms of commercial aquaculture feeds*

As stated in the DA-AO No. 12 s. 2007 *Revised Implementing Rules and Regulations on the Registration of Feed Establishments and Feed Products*, any person, partnership, firm, corporation, cooperative or association desiring to engage in the manufacture, importation, exportation, sale, trading, or distribution of feeds, feed ingredients, concentrates, base mixes, feed supplements, feed additives, premixes, specialty feeds, special feed nutrient preparations or other feed products shall first be registered with DA-BAI.

For the list of registered feed establishments, the information is accessible through the BAI website [www.bai.gov.ph/stakeholders](http://www.bai.gov.ph/stakeholders).

**7.1.3** Live feeds and natural food should comply with the health certification from in-country trans-boundary movement from the competent authority.

**Explanatory Note:**

Health certificates for live feeds and natural food transported within the country can be obtained from the nearest DA-BFAR Office.

Health Certificate No. \_\_\_\_\_

**I. CONSIGNOR**  
 Name of Shipper  
 Address  
 Name of Company/Facility  
 Address  
 Telephone Number  
 Registration Number

**II. COMMODITY**  
 Description of Commodity  
 Scientific Name  
 Quantity (no. of pieces/legs)  
 Location of Source  
 Wild caught / Culture  
 Tank Number  
 Pond/Cage Number

**III. CONSIGNEE**  
 Name of Consignee  
 Address  
 Registration Number  
 Telephone Number

**IV. SHIPMENT DETAILS**  
 Place of Loading  
 Address  
 Date of Departure  
 Means of Transport  
 Port of Destination

**V. DECLARATION**  
 This is to certify that the above-mentioned commodity with Sample Code \_\_\_\_\_ were subjected to laboratory analysis and showed **NEGATIVE results** for \_\_\_\_\_  
 (Name of Disease/s/Taxa/Microbes)  
 Issued at the **BFAR-ICD Quezon City** on \_\_\_\_\_ for trans-boundary movement of live fish and fishery/aquatic products in compliance with relevant rules, regulations and legislations of the Republic of the Philippines.

By the Authority of the Director:  
 \_\_\_\_\_  
 Certifying Officer

Free of charge  
 BFAR-ICD  
 Quezon City

Free indicated  
 OR No:  
 OR Date:

This Certificate is valid only for 7 days from the date of issuance.

Source: DA-BFAR, n.d.

**Image 19. Health Certificate for transboundary movement of live fish and fishery/aquatic products**

## 7.2 Feed quality

**7.2.1** The content of additives and veterinary drugs should comply with the existing regulations and conform to existing standards.

### Explanatory Note:

Aquaculture feed is comprised of protein, lipids, carbohydrates, vitamins, and minerals at levels that comply with the nutrient requirements for the intended species. Feed additive is an ingredient or combination of ingredients added to the basic mixed feed to fulfill a specific need which include, but are not limited to, acidifiers, antioxidants, aromatics, deodorizing agents, flavor enhancers, mold inhibitors, pellet binders, preservatives, sweeteners, toxin binders, etc. It is usually used in micro-quantities and requires careful handling and mixing. Feed additive has no nutritive value but is added to the feed to improve its quality and efficacy (BAFS, 2015).

Below is a table showing the nutrient standards for complete feeds of shrimp.

Table 6. **Nutrient standards for complete feeds**

Feed type for prawns/shrimps	Crude protein % NLT	Crude fat % NLT	Crude fiber % NMT	Ash % NMT
<b>A. <i>Penaeus monodon</i></b>				
a. Larval diet	(50) <sup>1</sup>	4	4	16
b. Fry mash	38	4	4	16
c. Starter crumble/pellet	37	4	4	16
d. Grower pellet	35	4	4	16
e. Finisher pellet	32	4	5	16

Table 6. (continued)

Feed type for prawns/shrimps	Crude protein % NLT	Crude fat % NLT	Crude fiber % NMT	Ash % NMT
<b>B. <i>Penaeus vannamei</i></b>				
a. Larval diet	(50) <sup>1</sup>	4	4	16
b. Fry mash	38	4	4	16
c. Starter crumble/pellet	35	4	4	16
d. Grower pellet	30	4	4	16
e. Finisher pellet	26	4	5	16

Legend: **NLT** - not less than    **NMT** - not more than    <sup>1</sup> values are requirement levels  
(Source: BAFS, 2010)

Moreover, below is an example of nutrient composition of a commercial feed for crabs.

Table 7. **Guaranteed proximate analysis of a commercial feed for crabs**

Feed type for crab	Crude protein % min.	Crude fat % min.	Crude fiber % max.	Crude Ash % max.
Pre-starter (Mash)	45	8	4	16
Starter (Crumble)	42	8	4	16
Starter (Powder)*	42	8	4	16
Grower (Powder)*	38	6	4	16
Fattener (Powder)*	34	7	4	16

\*For dough-type feeds preparation

Note: Powder feeds must be turned into dough-type by mixing it with water with ratio of 1:0.5-1.

(Source: Tateh Aquafeeds, n.d.)

**7.2.2** Packages should be properly labeled with the description of composition, storage conditions, expiry date, feeding rate and other necessary guidance in English language.

### Explanatory Note:

In accordance with PNS/BAFPS 84:2010 *Aquaculture Feeds*, labels shall be placed on a conspicuous place on the container or package showing the following information:



Illustrated by Tecson (2023)

Image 20a. Sample feed sack with proper labels

- 1 Brand name or trademark of the product
- 2 Generic name, type or class and form of the product
- 3 Recommended species and species life stage
- 4 BAI Sticker
- 5 The name "Product of the Philippines"
- 6 Name and complete address of the company
- 7 Net weight in metric equivalent
- 8 Accepted or official name of each and every ingredient used in the product
- 9 Guaranteed analysis of the product:
  - minimum percent of Crude Protein
  - minimum percent of Crude Fat
  - maximum percent of Crude Fiber
  - maximum percent of Moisture
  - maximum percent of Ash

Meanwhile, the BAI sticker contains the following information:

- BAI Registration Number of the company and the product
- Net weight in metric equivalent
- Storage condition
- Control/code/batch/lot number
- Date of manufacture
- Best before date
- Name and address of the manufacturer
- Exporter and/or supplier

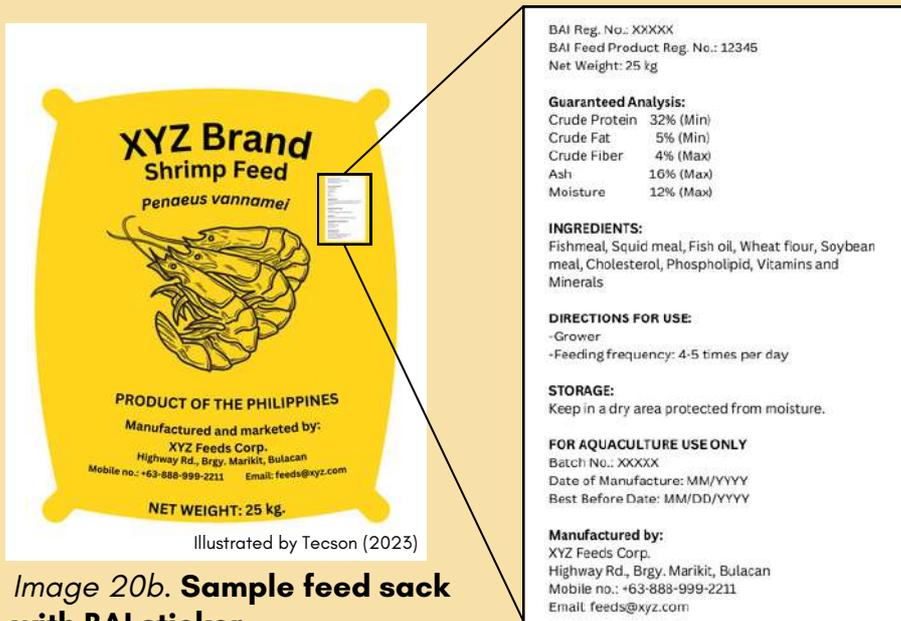


Image 20b. Sample feed sack with BAI sticker

### 7.2.3 Feeds should be applied on a first-in, first-out bases.

#### Explanatory Note:

First-in, first-out (FIFO) method is used to ensure freshness and quality of feeds. Feedstock stored for the longest time must be utilized first.

Below are the advantages of this method:

1. Feeds are utilized before the expiry date; and
2. Staff can easily determine the volume of feeds to order and store (Agriculture Sector Education and Training Authority, 2006).

### 7.3 Feeding

#### 7.3.1 Feeding practices should minimize the risk for biological, chemical and physical contaminations of feeds and crustaceans.

##### Explanatory Note:

Feeds are prone to contamination when not properly handled. Biological contaminants include fungi, viruses, parasites, and bacteria (*Salmonella*, *Listeria*, *E. coli*) (FAO, 2004). Meanwhile, identified chemical contaminants are veterinary drug and pesticide residues, mycotoxin, heavy metals (mercury, lead, cadmium), and agricultural and other chemicals (solvent residues, melamine) (Tacon, et. al., 2008). Physical contaminants are foreign objects such as wood, glass, metal, or plastic (WOAH, 2023).

Aquaculture feeds are given through the following methods:

- Broadcasting. This is done by spreading the feeds evenly into the pond surface. The use of boats is needed for bigger ponds to reach the mid-portion.



Image 21a. Broadcast feeding of shrimps as one method of feeding

- Feeding tray with a given amount of feeds. This is done by distributing the feeding trays in various parts of the pond usually tied at four corners and suspended into the water column.



*Image 21b. Feeding tray used in feeding shrimps*

- Automatic feeder. This dispenses a certain amount of feed at a given time during 24 hours. It has a timing device that can be set to provide feed in small quantities several times every day (FAO, 1986).



*Image 21c. Automatic feeder installed in the circular tank*





*Image 21d. Improved flat-bottom boat, paddle and basin used in broadcast feeding*



*Image 21e. Farm worker preparing for feeding of shrimps*

The feeding scheme depends on the recommendation or guide given by the feed manufacturer. This information is included in the packaging of the feed (FAO, n.d., SEAFDEC, 1989).

Table 8. **Sample feeding scheme for shrimp**

Shrimp size (g)	Feed type	Feed shape	Feed size (mm)	Feeding rate (% of biomass per day)	Feeding frequency (no./per day)
PL25-1	Starter 1	Crumble	0.5-0.9	13-9	1-2
1-2	Starter 2	Crumble	0.9-1.2	9-6	2-4
2-4	Starter 3	Crumble	1.2-1.8	6-4	4
3-7	Grower 4	Pellet	1.8 x 2-3	5-3.5	4
6-15	Grower 5	Pellet	2.0 x 3-4	3.5-2.5	4
Above 12	Finisher 6	Pellet	2.2 x 3-5	2.5-1.9	4-5

(Source: FAO, n.d.)

For mangrove crabs, feeding frequency is once or twice every day to lessen the risk of cannibalism. Feeds are given late in the afternoon and early evening when the crabs are active (FAO, 2011).

Table 9. **Sample feeding rates for mangrove crab - wet weight using fresh diets (70-80% moisture)**

Species	Daily feed provided as % body weight - on stocking	Daily feed provided as % body weight - towards end of crop	Reference
<i>S. paramamosain</i>	10-15	3-5	Thach, 2009
<i>Scylla</i> spp.	10	5	Baliao, De Los Santos & Franco, 1999
<i>S. paramamosain</i>	4-6	4-6	Dat, 1999
<i>S. serrata</i> , <i>S. tranquebarica</i> , <i>S. olivacea</i>	5-10	5-10	Quinitio, 2004

Note: Dry artificial diet feeding rates will be lower because of low moisture level.  
(Source: FAO, 2011)

Table 10. **Sample feeding scheme for crabs using commercial feeds**

Crab length (cm)	Average body weight (g)	Feed type	Feeding rate (% of body weight)	Feeding frequency (no./per day)
0.5-2	0.09-5	Pre-starter (Mash)	12-10	6-4
2.5-6	6-30	Starter (Crumble)	9-6	4-3
2.5-6	6-30	Starter (Powder)*	9-6	4-3
6-15	30-800	Grower (Powder)*	6-3	3-2
12-up	400-up	Fattener (Powder)*	5-2.5	2-1

\*For dough-type feeds preparation

*Note: Powder feeds must be turned into dough-type by mixing it with water with a ratio of 1:0.5-1.*

*(Source: FAO, 2011)*

### 7.3.2 Feeding practices should ensure the maintenance of water and sediment quality.

#### Explanatory Note:

Farm workers ensure that they only prepare the required amount of feed based on the feeding schedule per day to prevent wastage and the accumulation of organic matter in pond bottoms. Below is the formula for computing the daily feed ration.

$$\text{Daily feed ration (kg/day)} = \frac{\text{ABW (g)} \times \text{No. of stocks (pcs)} \times \% \text{ SR} \times \% \text{ FR}}{1,000}$$

Legend:

ABW - average body weight

SR - survival rate

FR - feeding rate

High concentrations of organic matter in pond bottoms lead to the deterioration of sediment quality, resulting in adverse effects on water quality. This organic matter mixes with the fine mineral particles that also settle at the pond bottom creating a flocculent layer above the sediment-water interface. The flocculent layer and fluid sediment layer affect water quality by utilizing dissolved oxygen and releasing and adsorbing nutrients. Additionally, microbial activity in anaerobic zones of the flocculent layer produces toxic microbial metabolites such as nitrite and hydrogen sulfide which enter the water and are lethal to cultured species. Water quality parameters should be monitored regularly to ensure these are within the optimum range (Boyd, 2003, 2004).

### 7.3.3 Live feeds and natural food should be of good quality, healthy and safe.

#### Explanatory Note:

In selecting live feeds for extensive farms, the following factors are considered (FAO 1988):

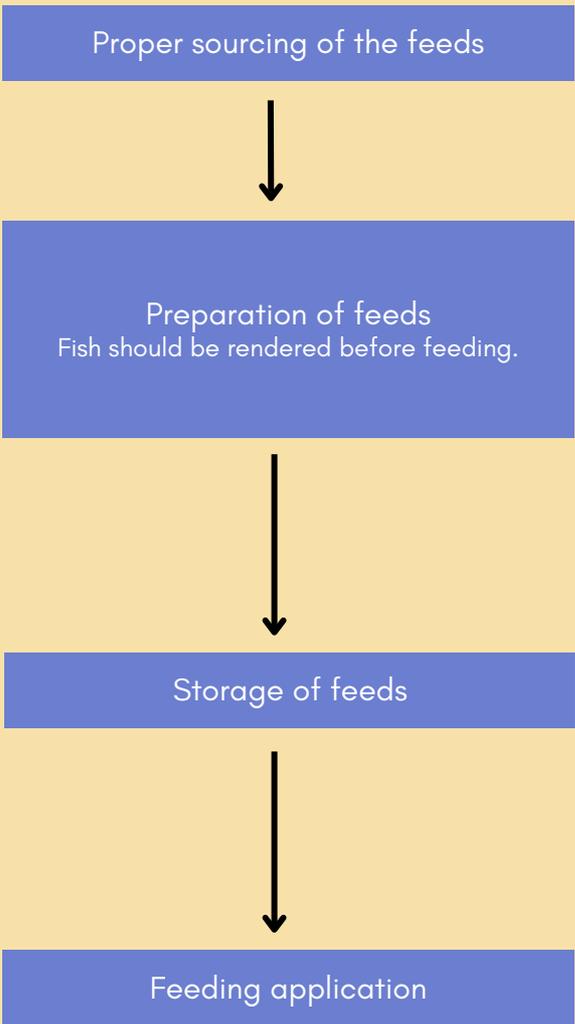
- live feed contains high dietary value particularly Highly Unsaturated Fatty Acids (HUFA) which are necessary for the growth and survival of shrimp and crab larvae; and
- live feed is easily produced/collected in large quantities.

**7.4 Use of non-pelleted/fresh feed**

If non-pelleted feeds or fresh feeds (e.g. trash fish, chicken entrails) are used in the farm as aquaculture feed, the protocol on the administration should be provided.

**Explanatory Note:**

Below are the proper steps for administering non-pelleted or fresh feeds:



Source: DA-BFAR-NBFTC, n.d.

**Image 22a. Farm personnel chopping fish to be used as feed**



**Image 22b. Low value/feeding fish stored in the refrigerator**



Source: DA-BFAR-NBFTC, n.d.

**Image 22c. Feeding crabs with prepared fresh feeds**

# Shrimp and Crab Health Management

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are provided as Explanatory Notes inside a yellow box in red font color.



## 8 Shrimp and crab health management

### 8.1 Farm operation should follow existing protocol on aquatic animal health.

#### **Explanatory Note:**

An Aquatic Animal Health Plan is a comprehensive approach to strengthen aquaculture biosecurity including management of aquatic animal health (FAO et al., 2020). The contents of an aquatic animal health plan include:

1. Description of farm;
2. List of species cultured;
3. Disease preventive measures;
4. Pond preparation protocol;
5. Biosecurity procedure;
6. Water management protocol;
7. Treatment;
8. Records of animal health monitoring;
9. Frequency and method of removal of infected and dead animals;
10. Mechanism for responding to disease outbreaks; and
11. Reporting.

Surveillance is an important component of an Aquatic Animal Health Plan. Surveillance is a systematic series of investigations of a particular population of aquatic animals conducted to determine the incidence of disease (WOAH, 2022). Bondad-Reantaso et al. (2021) developed a 12-point surveillance checklist that guides the implementation of surveillance programs for aquatic diseases. The said checklist contains the following elements:

1. Hazard/disease scenario setting;
2. Defining data collection objective;
3. Definition of population;
4. Clustering of disease;
5. Case/outbreak definition;
6. Diagnostics/field and laboratory tests;
7. Study design and sampling;
8. Data flow and management;
9. Data analysis and methodology;
10. Validation and quality assurance;
11. Human and financial resources and logistics requirements; and
12. Putting surveillance in the bigger picture.

8.2 Shrimp and crab intended for farming and restocking should be clinically healthy.

**Explanatory Note:**

Clinically healthy shrimp and crab can be confirmed through the results of laboratory analyses.

**REPORT OF TEST**

Customer: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Contact Information: \_\_\_\_\_  
 Sample Type: \_\_\_\_\_  
 Source of Sample: \_\_\_\_\_  
 Date Received: \_\_\_\_\_  
 Date Analyzed: \_\_\_\_\_

Analysis	Test Method	Specification	Result
e.g. White Spot Syndrome Virus (WSSV)	e.g. PCR-IQ2000 WSSV Detection and Prevention System	e.g. Limit of Detection (LOD): 10 copies/µl	e.g. Negative

REMARKS:  
 1. Test results presented in this report relate only to the sample tested and as received.  
 2. The laboratory is not responsible for the sampling stage of the submitted sample.  
 3. No part of this report may be reproduced or transmitted without the written permission of the Laboratory Manager.  
 4. This report shall not be used for advertisement.

DATE ISSUED: \_\_\_\_\_

Analyzed by: \_\_\_\_\_  
 Analyt: \_\_\_\_\_  
 Credited by: \_\_\_\_\_  
 Technical Manager: \_\_\_\_\_  
 Approved by: \_\_\_\_\_  
 Laboratory Manager: \_\_\_\_\_

Form No. OF 7431  
 Revision No. 1  
 Effective Date: 10/09/2022

Source: DA-BFAR, n.d.

Image 23a. Sample report of laboratory analysis conducted

**HEALTH CERTIFICATE FOR TRANSBOUNDARY MOVEMENT OF LIVE FISH AND FISHERY/AQUATIC PRODUCTS**

Health Certificate No. RFLQU3-2317-1234

**I. CONSIGNOR**  
 Name of Shipper: Juan Dela Cruz  
 Address: San Felipe, Zambales  
 Name of Company/Facility: ABC Shrimp Hatchery  
 Address: San Felipe, Zambales  
 Telephone Number: 0917-123-4567  
 Registration Number: HAC00-R32AM-1-01-2023-PV

**II. COMMODITY**  
 Description of Commodity: Live Shrimp Post Larvae  
 Scientific Name: Penaeus vannamei  
 Quantity (no. of pieces/kg): 500,000 pcs.  
 Location of Source: San Felipe, Zambales  
 Wild caught / Culture: Culture  
 Tank Number: 1  
 Pond/Cage Number: N/A

**III. CONSIGNEE**  
 Name of Consignee: XYZ Farm  
 Address: Puerto Princesa, Palawan  
 Registration Number: FR-RAB-PAL-001-01012023-FV  
 Telephone Number: 0918-1234567

**IV. SHIPMENT DETAILS**  
 Place of Loading: Ninoy Aquino International Airport  
 Address: Pasay City  
 Date of Departure: 18 August 2023  
 Means of Transport: By Air  
 Port of Destination: Puerto Princesa, Palawan

**V. DECLARATION**

This is to certify that the above-mentioned commodity with Sample Code \_\_\_\_\_ NEGATIVE results for WSSV and AHPND/EMS.

Issued at the **BFAR-FQU 3 Brgy. Maimpis, City of San Fernando, Pampanga** and fishery/aquatic products in compliance with relevant rules, regulations and legislations of the Republic of the Philippines.

By the Authority of the Director:  
 \_\_\_\_\_  
 Certifying Officer

Form released: 05/28  
 OI No.: 12915R  
 OI Date: 12 August 2023

This Certificate is valid only for 7 days from the date of issuance.

Source: DA-BFAR, n.d.

Image 23b. Sample HC showing that live shrimp post larvae are free from diseases

**8.3** A suitable risk-based animal health surveillance scheme by the fish farmer according to aquatic animal health plan recommended by the competent authority should be in place.

**8.4** Surveillance program should be in place for diseases of shrimp and crab.

**Explanatory Note:**

Surveillance program is spearheaded by DA-BFAR following the flow chart below:

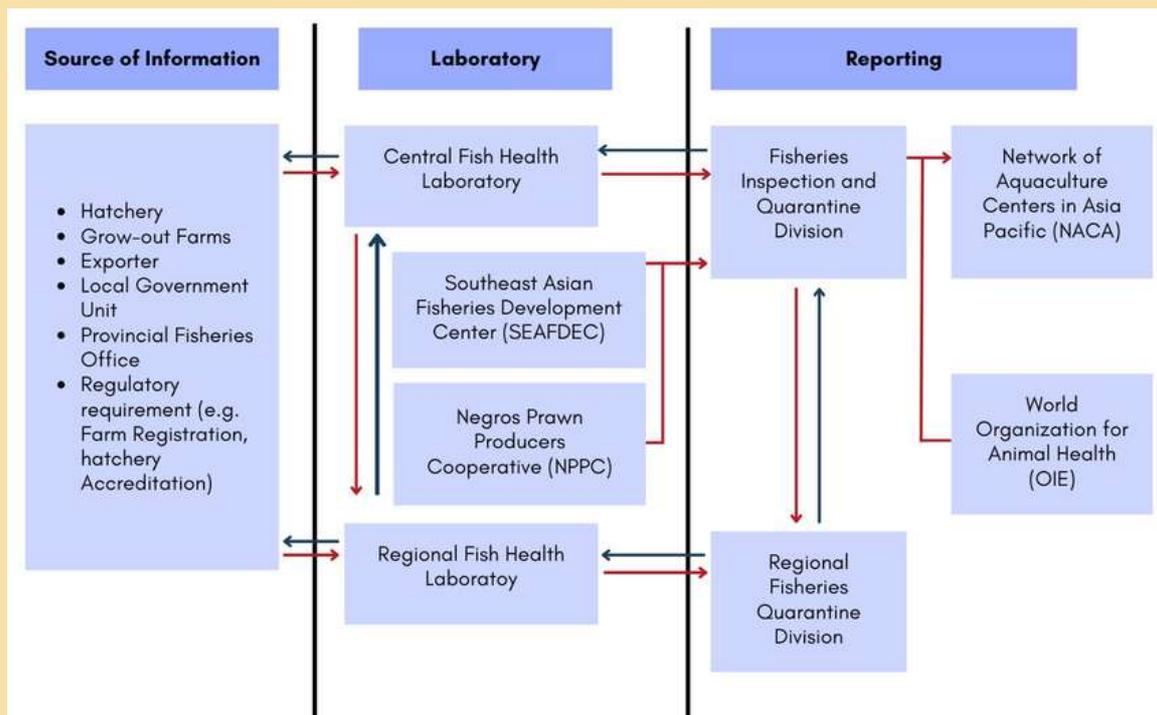
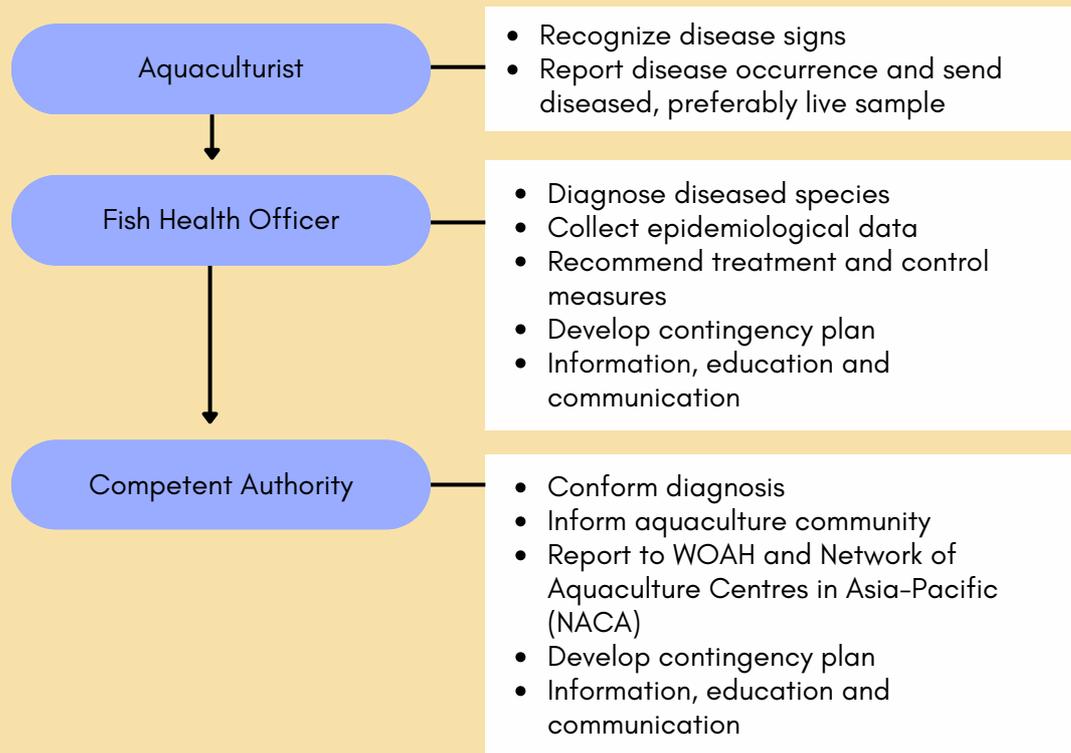


Image 24. Disease surveillance program flow chart

**8.5** Measures for the notification and control of diseases of shrimp and crab should be in place.

### Explanatory Note:

Below is the flow diagram showing the actions taken from the farm level up to the competent authority during a disease emergency.



(Source: SEAFDEC Aquaculture Department, 2020)

**8.6** Shrimp, crab and products placed on the market should be safe for human consumption.

**Explanatory Note:**

Shrimp and crab samples undergo laboratory testing to check if they contain any veterinary drug residues. The list of allowed veterinary drugs and their corresponding maximum residue limits (MRLs) can be found in Annexes A and B. The DA-BFAR is mandated under the DA AO No. 14 s. 2006 to implement the National Residue Control Program (NRCP) for fish and fishery/aquatic products. The objective of the NRCP is to detect illegal treatments, especially banned antibiotics, and to control compliance for residue of veterinary drugs and other substances with MRL.

Table 11. **Current list of DA-BFAR and private recognized laboratories conducting veterinary residue analyses**

DA-BFAR Laboratory	Location
National Fisheries Laboratory Division	Quezon City
Regional Fisheries Laboratory - III	Pampanga
Regional Fisheries Laboratory - IVA	Laguna
Regional Fisheries Laboratory - VI	Iloilo City
Regional Fisheries Laboratory - VII	Cebu City
Private Recognized Laboratory	Location
SENTROTEK	Mandaluyong City
SGS Philippines and its affiliate laboratories	Makati City

- 8.7** A designated quarantine facility should be maintained for treatment of ill diseased shrimp and crab. Handling and disposal of diseased shrimp, crab and eggs for disease control purposes should follow existing protocol of competent authority.

**Explanatory Note:**

Quarantine is a method of isolating a group of aquatic animals, acclimating them to their new environment, observing them for a specific period, and testing and treating them for any diseases, if required. This process is applied to new animals that will be introduced to a facility, animals that will be moved from one area to another, and cultured species with diseases.

Table 12. **Strategies/steps for the quarantine of stocks**

Strategy/Step	Description
Isolation	New stocks or sick species are physically separated and placed in the designated quarantine facility.
Water supply	Water used for the quarantined stocks is separate from that of the main farm.
Water discharge	Water discharge should be treated and disposed in a biosecure manner.
Equipment isolation	Equipment used is exclusive for the quarantined stocks only.
Sanitation of equipment	Equipment should undergo proper sanitation and disinfection to avoid cross-contamination.
Human access	Access to quarantine facility should be controlled and personnel should adhere to biosecurity measures such as changing of clothes and shoes or use of disposable coverings and disinfecting of hands and passing through foot baths.

(Sources: WOA, 2022; Yanong & Erlacher-Reid. 2012)

Further, proper disposal of dead species and those suspected to be disease-carrying should be done. According to FAO 233 S. 2010 *Aquatic Wildlife Conservation*, disposal of dead animals, parts, or derivatives is done by burying or rendering. Preventive measures such as treatment/chemical application, disinfection of affected compartments, and destruction of sick animals may be applied by the operator (Somga, et al., 2019).



Image 25. **Disposal area for dead shrimps**

# Chemical and Biological Substances Use

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are provided as Explanatory Notes inside a yellow box in red font color.



## 9 Chemical and Biological Substances Use

- 9.1** Substances requiring prescription should be procured under adequate supervision by qualified experts and used by a trained technician authorized by the competent authority. Non-prescription substances should be used according to manufacturer's instructions and as specified on the label.

### **Explanatory Note:**

According to DA AO No. 30 S. 1991-DOH AO No. 111-B S. 1991, "Rules and Regulations to Implement Prescribing Requirements for the Veterinary Drugs and Products", only duly licensed veterinarians, whether in private practice or employed in a private institution/corporation or the government, are authorized to prescribe drugs.

- 9.2** Drug residues should not be present in the body of shrimp and crab by observing withdrawal period to ensure that the maximum residue level (MRL) is acceptable based on the standards set by Codex or trading partners.

### **Explanatory Note:**

Veterinary drug residue includes the parent compounds and/or their metabolites in any edible and inedible portion of the animal product and residues of associated impurities of the veterinary drug concerned or the amount of the drug that can be detected in edible and inedible tissues at a specified time after the administration of the drug ceases.

Withdrawal time/period is the time between the last drug administration and the collection of edible tissues or products from a treated animal that ensures the contents of residues in food comply with the maximum residue limit for this veterinary drug (DA AO No. 24 S. 2009).

Adhering to the recommended withdrawal period indicated on the drug label reduces veterinary drug residues to safer levels that do not exceed the maximum residue limit.

The PNS/BAFS 177:2023 Live, Fresh Chilled, and Fresh Frozen Crabs - Product Standard lists down the MRL of veterinary drug residues in crab (see Annex A). While PNS/BAFS 70:2023 Fresh Chilled and Fresh Frozen Shrimps and Prawns - Product Standard enumerates the MRL of veterinary drug residues in fresh chilled or fresh frozen shrimps (see Annex B).

- 9.3** Veterinary drugs, medicated feeds, chemical and biological substances should be obtained from registered and authorized manufacturers and suppliers and should be used only when necessary.
- 9.4** Veterinary drugs, medicated feeds, chemical and biological substances should be only those permitted and registered according to existing regulations.

**Explanatory Note:**

As defined in the Joint DOH and DA Administrative Order No. 2013-0026, BAI shall register veterinary drugs and products, intended solely for animal use and license the establishments manufacturing, distributing, importing, exporting, and selling the same.

The list of Registered Veterinary Drugs and Products, and establishments is available at the BAI website or directly go to the link:

[www.bai.gov.ph/stakeholders](http://www.bai.gov.ph/stakeholders).

# Harvesting and Transport

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are provided as Explanatory Notes inside a yellow box in red font color.



## 10 Harvesting and Transport

### 10.1 Harvesting

**10.1.1** Harvesting equipment (e.g. containers) and paraphernalia should ensure the quality of the products.

#### **Explanatory Note:**

Using appropriate harvesting equipment and paraphernalia can reduce stress, physical damage, and mortality in harvested shrimp and crab. Furthermore, it is important to ensure that such equipment does not contribute to contamination, and when applicable, contact surfaces meet food-grade standards.



*Image 26a.* **Bag nets used for harvesting shrimps**



*Image 26b.* **Cast net used for sampling or partial harvesting of shrimps**



Image 26c. **Containers for harvested shrimps**



Image 26d. **Crab pots or traps**

- 10.1.2** Harvesting should be planned in advance and timed to prevent shrimp and crab from being exposed to high temperatures.

**Explanatory Note:**

Harvest activities are done during the cooler time of the day to avoid unnecessary stress to the cultured species. Crabs are harvested after a culture period of 4–5 months and once they reach the marketable size (FAO, n.d.; 2011).

Meanwhile, shrimps are harvested as early as 3 months of culture. Shrimps are harvested when they are not molting to avoid soft-shelled shrimps which have lower market prices. Harvest activities for shrimps are best done when they are active, typically shortly after sunset and before sunrise. This timing ensures that shrimps are of good quality and not molting (FAO & SEAFDEC, 1986; Apud, et.al, 1983).

- 10.1.3** Harvested shrimps should be properly chilled.

**Explanatory Note:**

Harvested shrimps are washed and immediately immersed in chilled water at a temperature of 0–4°C. Potable water or clean seawater is used for washing and cooling shrimps to avoid contamination (FAO, 2009; BAFS, 2020).

Chilling delays the onset of melanosis or black spot formation in shrimps. Melanosis does not pose food safety hazards but it can be perceived as poor quality by consumers (FAO & SEAFDEC, 1986; BAFS, 2021).



*Image 27a. Immediate chilling of harvested shrimps*



*Image 27b. Container with ice and harvested shrimps*

- 10.1.4** Practices should ensure that the viability of live shrimp and crab is not affected by physical damage or stress.
- 10.1.5** Shrimp and crab should be quickly and hygienically handled, using practices that do not cause physical damage to the product.

### Explanatory Note:

Shrimps can either be harvested partially or totally.

Partial harvesting is usually applied in culture operations with higher stocking density such as semi-intensive and intensive culture. This is done through the use of a selective harvesting net where only bigger shrimps are trapped. Crabs can also be partially harvested using crab pots of different designs. These pots are baited to attract the crabs.

Meanwhile, total harvesting is done by harvesting 50–80% of the total stock first (ASEAN, 1978; Apud, et.al, 1983). The total harvest is done by continuous trapping or by draining the pond and collecting the crabs by hand from the pond's drain or the lowest part of the pond. During harvest, the crabs are immediately tied with string to handle them safely and to prevent them from injuring each other (FAO, 2011; BAFS, 2023).

The considerations in harvesting shrimps to minimize damage, and avoid stress that can deteriorate product quality are as follows:

- distance of the pond to the chilling tanks;
- schedule and time of harvest; and
- volume of the harvested shrimp.



Image 28a. **Farm personnel harvesting shrimp**



Image 28b. Properly tied mangrove crab

## 10.2 Post-harvest handling and transport

### 10.2.1 Post-harvesting equipment and paraphernalia should be easy to clean and kept in clean condition.

#### Explanatory Note:

Post-harvest equipment and paraphernalia should be:

1. durable and movable and/or being disassembled for easy maintenance, cleaning, disinfection, and monitoring;
2. designed to provide adequate drainage and constructed to ensure that they can be properly cleaned, disinfected, and maintained to prevent contamination; and
3. designed and constructed to minimize sharp inside corners, projections, and tiny gaps to avoid dirt traps (FAO & WHO, 2020).



The Codex Code of Practice for Fish and Fishery Products is accessible through [www.fao.org/fao-who-codexalimentarius](http://www.fao.org/fao-who-codexalimentarius).

Image 29. Cover of Code of Practice for Fish and Fishery Products

- 10.2.2** Operations such as sorting, weighing, washing, draining, packaging should be carried out quickly, hygienically and without damage to the product.

**Explanatory Note:**

Operations such as sorting, weighing, washing, draining, and packaging are done quickly to minimize deterioration and accumulation of microorganisms. Improper handling can lead to damages which hasten spoilage and increase post-harvest losses (FAO & WHO, 2020).

Sorting of harvested shrimp is based on shell hardness and is usually done in portions.



*Image 30a. Transfer of chilled shrimps to sorting table*



*Image 30b. Farm workers sorting the chilled shrimps*



*Image 30c. Draining excess water from the sorted shrimps*



*Image 30d. Weighing of shrimps after draining*

Packaging is done immediately after weighing. Shrimps are packed in a styrofoam box lined with polyethylene bags for insulation and protection. In packaging shrimp, It is recommended to alternately place a thick layer of crushed ice and shrimp.



*Image 30e. Placing a layer of crushed ice before the product*



*Image 30f. Layer of shrimp on top of the crushed ice*



*Image 30g. Placing of crushed ice as top layer*



*Image 30h .* **Shrimps are packed securely**



*Image 30i.* **Styrofoam boxes with products are stacked for transport**

Harvested crabs are checked, cleaned, and stored in a crate or container covered with dampened material such as a hessian sack to lessen desiccation and protect the crabs from flies before transporting them to a processing facility. Preliminary sorting of crabs, based on size, sex, or missing limbs, is done at this point.

Materials used for packaging crabs include perforated or well-ventilated containers such as plastic and wooden crates, woven baskets, and polystyrene and carton boxes. The boxes are marked with “up” arrows to show which way they should be stacked.

Additionally, crabs are packed with their head and claws tilted facing the top of the box. This arrangement minimizes the risk of crabs being partially untied and pushing their claws through the box which can injure handlers (BAFS, 2023; FAO, 2011).

- 10.2.3** Food additives and chemicals, which are used in contact with products, should comply with prevailing legal requirements.

**Explanatory Note:**

Food additives are substances added to food to maintain or improve its safety, freshness, taste, texture, or appearance (WHO, n.d.). The DOH-FDA provides an updated list of allowed food additives. The information may be accessed through the website of the FDA or this link: <https://www.fda.gov.ph/archives/>

- 10.2.4** Transport should be carried out in clean and easy to clean facilities (boxes, containers, vehicle etc.).

**Explanatory Note:**

Chilled shrimps are placed in styrofoam boxes which are properly arranged in the transport vehicle for delivery.



*Image 31a.* **Arranging of styrofoam boxes in the transport vehicle**



Following appropriate transport conditions help lessen the impact of welfare issues and maintain product quality. Below are the ways in transporting live shrimp and crab out of water and in water.

Table 13. **Considerations in transporting live shrimp and crab**

Transport out of water	Transport in water
<ul style="list-style-type: none"> <li>• handle live shrimp and crab gently</li> <li>• keep them out of bright light for this triggers stress and lowers survival rate</li> <li>• do not stack boxes too high to avoid damage due to weight of boxes and products</li> <li>• avoid direct contact of the product with ice</li> </ul>	<ul style="list-style-type: none"> <li>• conduct tank operations within controlled parameters (temperature, salinity, pH, dissolved oxygen)</li> <li>• keep out of bright light for this triggers stress and lowers survival rate</li> <li>• periodic monitoring of equipment condition for long distance transport</li> <li>• stocking density should be appropriate based on the capacity of the holding tank</li> </ul>

(Source: Bennison, 2000)

**10.2.6** Fresh shrimp should be transported and maintained at a temperature of 0–4 °C.

**Explanatory Note:**

The recommended temperature range for fresh shrimp inhibits microbial growth. To maintain the temperature requirement during transport, shrimps are packed in polyethylene bags with crushed ice and placed inside a styrofoam box.

## Biodiversity

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are provided as Explanatory Notes inside a yellow box in red font color.



## 11 Biodiversity

### 11.1 Escapes and captive stocks

Screens, barriers and containment ponds where applicable, should be available and limit the incidence of escape to the natural environment of cultured species at acceptable level of risk.

#### Explanatory Note:

Screens and barriers prevent the entry of invasive species and spread of diseases (Jones et al., 2021 & Buchmann, 2022).



Image 32a. **Screen surrounding the sluice gate**



Image 32b. **Pond gate installed with screen**



*Image 32c.* **Net enclosure around the pond**



*Image 32d.* **Screens installed above the ponds**

## 11.2 Predator control

The use of lethal methods in eradicating non-shrimp and crab predators, especially those classified as vulnerable by the International Union for Conservation of Nature and Natural Resources (IUCN) should be avoided.

### **Explanatory Note:**

Non-lethal methods for capturing predators include (IUCN, 2017):

1. use of traps (cage or box trap, neck hold trap);
2. use of nets (drop net, drift net, hoop net); and
3. manual capture or capture by hand.

Some examples of vulnerable species are the Japanese night heron, Sarus Crane, Philippine Duck, Common Pochard, and King Cobra. The list of vulnerable species classified by the IUCN may be viewed at [www.iucnredlist.org/](http://www.iucnredlist.org/)

### Animal Welfare

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are provided as Explanatory Notes inside a yellow box in red font color.



## 12 Animal Welfare

### 12.1. Growth and survival

A suitable and healthy environment should be maintained to promote good growth and survival.

#### **Explanatory Note:**

A suitable and healthy environment adheres to the basic needs of cultured species such as food and water quality measured in terms of pH, temperature, and salinity (Refer to Explanatory Note of Section 6.2.3 for the optimum range of water parameters). In addition, the stocking density of shrimp and crab follows the recommendation in Section 6.3. This allows movement of the species within the pond or tank, equal distribution of food, and easy disease management.

According to RA 8485 *The Animal Welfare Act of 1998* as amended by RA 10631, the five basic freedoms of animals for animal welfare are:

1. Freedom from hunger or thirst;
2. Freedom from discomfort;
3. Freedom from pain, injury or disease;
4. Freedom to express normal behavior; and
5. Freedom from fear and distress.

Animal welfare also contributes to the quality and safety of the products sold in the market (Fish Welfare Initiative, n.d.).

# Personnel Health and Hygiene

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are provided as Explanatory Notes inside a yellow box in red font color.



**13 Personnel Health and Hygiene**

**13.1** Workers should be trained on farm level hygienic practices to ensure they are aware of their roles and responsibilities for protecting aquaculture products from contamination and deterioration throughout the production cycle.

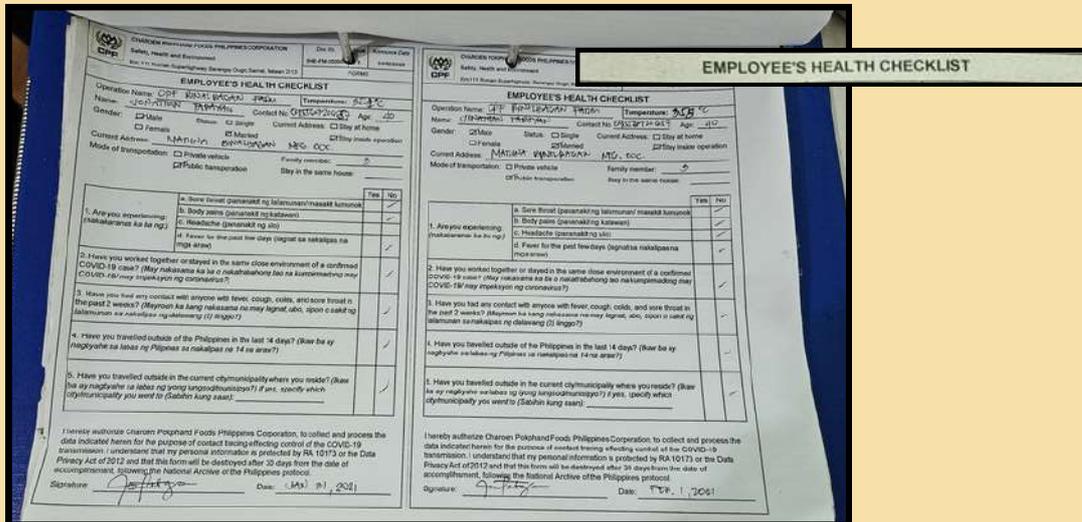
**Explanatory Note:**

Provision of training for farm workers may be in-house training conducted by the company or by external entities such as DA-BFAR National Centers and feed companies.

**13.2** Personnel should be physically fit to work in the aquaculture facilities and those personnel who could contaminate the products should not be allowed.

**Explanatory Note:**

A health checklist can help in ensuring that personnel are physically fit to work. This may include the assessments related to general physical health, contagious diseases, and other health issues that may pose risk to the aquatic environment or product quality.



**Image 33. Employees health checklist to ensure farm workers are fit to work**

**13.3** Workers should wear suitable and appropriate working clothes.

**Explanatory Note:**

A sample of working clothes is shown in Image 34. Wearing of appropriate clothing based on the nature of work can help in workplace safety and personal hygiene.



**Image 34. Farm worker wearing appropriate working clothes**

**13.4** Smoking, spitting or drinking alcohol in the working and storage premises shall not be allowed.

**Explanatory Note:**



**Image 35. Sample signage within the farm**

Clear and visible signage is one way of communicating rules in the working and storage premises. This can be placed strategically to constantly remind the workers.

# Traceability and Record Keeping

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are provided as Explanatory Notes inside a yellow box in red font color.



14 Traceability and Record Keeping

14.1 Adequate records should be kept on aquaculture farm management activities (e.g. preparations and water quality controls).

**Explanatory Note:**

Records can be in the form of logbooks, digital applications, or software that can keep the data or information on the farm activities. Samples of records are shown in the images below.

AREA	POND NO.	DATE	DOC	STOCKING	STOCKING DENSITY	ABW	WEEKLY GAIN	BIOMASS (t)	FCR	SURVIVAL ESTIMATE	TONS / HECTARE
5,544 m <sup>2</sup>	1	5/24/23	57	980,000	176 m <sup>2</sup>	12.5	2.7	9,360	1.19	90%	23.2
5,460 m <sup>2</sup>	2	5/24/23	37	708,643	128 m <sup>2</sup>	5.75	2.55	4,074	0.89	100%	7.5
5,600 m <sup>2</sup>	3	5/24/23	37	745,940	133 m <sup>2</sup>	5.8	2.6	4,326	0.92	100%	7.7
5,600 m <sup>2</sup>	4	-	-	-	-	-	-	-	-	-	-
4,715 m <sup>2</sup>	5	-	-	-	-	-	-	-	-	-	-
4,588 m <sup>2</sup>	6	-	-	-	-	-	-	-	-	-	-
5,616 m <sup>2</sup>	7	-	-	-	-	-	-	-	-	-	-
5,616 m <sup>2</sup>	8	5/24/23	37	745,940	133 m <sup>2</sup>	4.2	1.66	3,133	1.02	100%	5.5
7,030 m <sup>2</sup>	9	5/24/23	57	1,100,000	156 m <sup>2</sup>	10.07	1.07	7,009	1.26	90%	14.0
4,400 m <sup>2</sup>	10	5/24/23	57	770,000	175 m <sup>2</sup>	13.0	2.0	9,009	0.94	90%	14.0
5,168 m <sup>2</sup>	12	5/24/23	70	809,704	156 m <sup>2</sup>	18.0	4.0	9,273	1.20	90%	23.6
5,148 m <sup>2</sup>	13	5/24/23	93	823,650	161 m <sup>2</sup>	22.0	2.0	3,771	1.53	90%	25.0
5,016 m <sup>2</sup>	14	5/26/23	70	850,189	169 m <sup>2</sup>	15.0	2.0	9,238	1.21	90%	22.5
5,478 m <sup>2</sup>	15	5/26/23	70	885,613	161 m <sup>2</sup>	15.0	2.0	8,507	1.21	90%	21.3
4,650 m <sup>2</sup>	16	5/24/23	43	760,664	163 m <sup>2</sup>	27.0	2.0	7,214	1.49	90%	28.0
6,291 m <sup>2</sup>	17	5/11/23	87	944,775	130.51 m <sup>2</sup>	19.0	-	14,159.6	1.46	88.8%	32.15 Harvested
5,698 m <sup>2</sup>	18	5/26/23	86	951,615	167 m <sup>2</sup>	20.0	3.0	7,605	1.41	90%	25.0
5,726 m <sup>2</sup>	19	5/26/23	86	951,615	166 m <sup>2</sup>	20.0	3.0	7,011	1.54	90%	24.4

TOTAL AREA: 47,441 m<sup>2</sup>

Image 36a. Sample record of farm activities

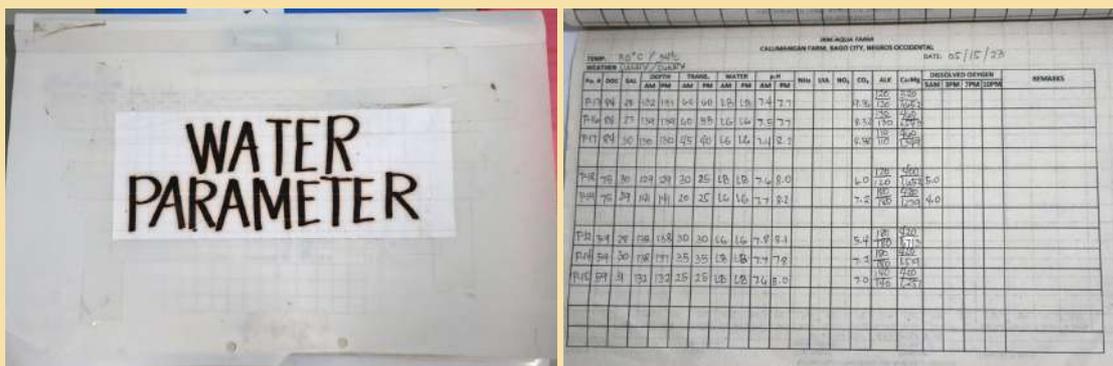


Image 36b. Sample record of monitoring water parameters

- 14.2** Adequate records should be kept on the origin and the type of shrimp post larvae and crablets used.
- 14.3** Adequate records should be kept on the date, type, origin and use of feeds and feed ingredients.

### Explanatory Note:

Maintaining records of feed and feed ingredients enables the monitoring and assessment of feed efficiency and management. Shown below is an example of records of feeds and feeding.

Date	Pond	DOC	Feed No.	Meals						Auto Feed		F/D	Acc. Feed	A.I.
				1st CT	2nd CT	3rd CT	4th CT	5th CT	6th CT	FC	Kg			
5/29/20	Tank1	5	02/03	3/2	15/2	10	2/2	00	3/2			20/9	116	
	Tank2	7	02/03	4/2	4/2	00	4/2	4/2				16/9		
	Tank3	1	02/03	-	4/2	00	4/2	00	5/3			09/7		
	Tank4													
	N-Tank	32	02/03	-	3/5	3/5	3/5	3/5				12/20		

Image 37. Sample record of feeds and feeding

- 14.4** Traceability records for animal health and movement of shrimp and crab should be completed and maintained.

14.5 Records on harvesting should be maintained for traceability purposes.

**Explanatory Note:**

Other than traceability purposes, records on harvesting can also serve as the basis for the management and planning of harvest, inventory, marketing, and, research and development. Samples of records are shown in the images below.

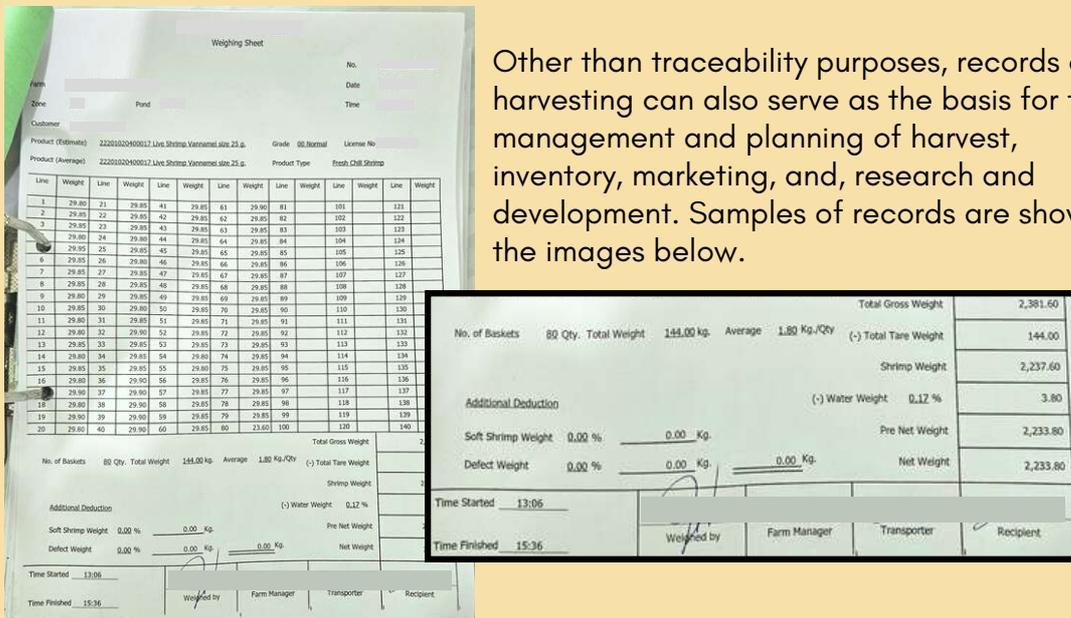


Image 38. Sample record indicating the time started, time finished and volume of harvest

14.6 Adequate records on the buyers of final products should be kept (one-step-forward traceability).

**Explanatory Note:**

One-step-forward traceability means that the farms or producers should be able to identify the customers/buyers of their products. This is important during product recalls (FAO and WHO, 2012).



Image 39. Sample record of buyer

- 14.7** All records should be kept, maintained and made accessible during culture and for at least 24 months after harvesting.

**Explanatory Note:**

The 24-month duration of record keeping is aligned with the standard on ASEAN GAqP for Food Fish.

# Labor and Community

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are provided as Explanatory Notes inside a yellow box in red font color.



**15.1** Child labor

Proactive anti-child labor policy should exist in the farm and shall be compliant with the existing regulation.

**Explanatory Note:**

Under RA 9231 of 2003 *An Act Providing for the Elimination of the Worst Forms of Child Labor and Affording Stronger Protection for the Working Child*, children below 15 years old shall not be employed unless the child works directly under the sole responsibility of his/her parents or guardian and his/her employment does not endanger his/her life, safety, health and morals, and does not interfere with his/her schooling.

**15.2** Anti-discrimination or unequal treatment of employee policy**15.2.1** Workers should not be discriminated against on the basis of gender, race, religion, culture and age.**Explanatory Note:**

Under the Presidential Decree (PD) No. 442 of 1974 *Labor Code of the Philippines* "the State shall afford protection to labor, promote full employment, ensure equal work opportunities regardless of sex, race or creed, and regulate the relations between workers and employers."

Other regulations related to anti-discrimination are as follows:

1. RA 10911 of 2016 commonly known as the Anti-Age Discrimination in Employment Act; and
2. RA 9710 of 2008 commonly known as an Act providing for the Magna Carta of Women.

**15.3** Training on safety

Safety procedures and orientation prior to the start of work should be available at the farm.

**Explanatory Note:**

The RA 11058 of 2018 *An Act Strengthening Compliance with Occupational Safety and Health Standards and Providing Penalties for Violations Thereof* aims to increase compliance to the Occupational Safety and Health (OSH) standards in the Philippines and provides corresponding penalties for any violation.

In line with this, the employer is responsible for the provision of comprehensive job safety instructions or orientation to all workers particularly to those individuals who are new to the job.

**15.4** First aid and safety measures**15.4.1** First aid kit should be available in the farm; and**15.4.2** Laborers should be able to demonstrate awareness on the different first aid and safety measures.**Explanatory Note:**

The Labor Code of the Philippines requires employers, depending on the nature and conditions of work, to have first-aid medicines and equipment available at all times, and provide training in first-aid treatment.

**15.4.3** Electrical connections, hazardous materials, farm inputs and implements which may pose danger, toxification, untoward accidents or eventual deaths to workers should strictly undergo regular inspections, inventory, check-up, repairs and replacements as necessary.**Explanatory Note:**

With RA 11058 of 2018, the employer must inform the workers about the hazards and health risks associated with their work, including preventive measures to reduce or eliminate these risks, as well as procedures in case of emergency.

**15.5** Wages and working hours**15.5.1** Workers should receive fair treatment and salary consistent with existing laws and other regulations.**Explanatory Note:**

According to the Labor Code of the Philippines, the earnings of an employee are fixed or determined by factors such as time, task, piece, commission, or other method of calculation which is paid by an employer under a written or unwritten contract for work completed or to be completed, including services rendered or to be rendered. This encompasses fair and reasonable value of board, lodging, or other facilities provided by the employer to the employee.

**15.6** Living conditions for employees**15.6.1** Living quarters of stay-in laborers, technicians and aides should be safe and clean.**15.6.2** Potable water and clean toilets should be made available.**15.6.3** Basic amenities should be provided to farm workers.**Explanatory Note:**

Basic amenities for farm workers include clean drinking water, adequate toilet facilities for proper hygiene, and clean living quarters (if provided). Some of amenities observed in aquaculture farms are shown in the images below.



Image 40a. **Exterior of workers' quarters**



*Image 40b. Interior of workers' quarters*



*Image 40c. Provision of recreational area for workers*

**15.7** Social aspects

**15.7.1** Farm operation shall demonstrate equal rights on public land and water use for local communities following national laws and regulations.

**Explanatory Note:**

One example of regulation is the DA-BFAR FAO 216 s. 2001 *Obstruction to navigation in streams, rivers, lakes, and bays* which prohibits the construction of water and land-based structures that can impede navigation or flow of tide.

**15.7.2** Farms should minimize the potential adverse impact on the local community during all phases of farm operation.

**15.7.3** Farms owners and workers should maintain a harmonious relationship with the community.

**Explanatory Note:**

Activities conducted with the community include hiring of workers, dental and medical mission, and tree planting.

# Annexes



**Annex A**

Maximum residue limits (MRL) of veterinary drug residues in crab

<b>Compounds or Veterinary Drugs</b>	<b>Regulatory Limit</b>	<b>Reference</b>
<b>Banned antibiotic residue</b>		
1. Chloramphenicol (CAP)	Absent	DA AO No. 60 s.1990 and Department of Health (DOH) AO No. 91 s.1990
2. Nitrofurans and its metabolites	Absent	DOH-DA Joint Administrative Order No. 2 s. 2000
3. Nitroimidazole and metabolites	Absent	EU Commission Regulation No. 37/2010
<b>Allowed antibiotic residue</b>		
4. Chlortetracycline	200 µg/kg (sum of chlortetracycline, oxytetracycline and tetracycline)	PNS/BAFS 48:2022 (Veterinary drug residues in food - Product standard - Maximum Residue Limit
5. Oxytetracycline	200 µg/kg (sum of chlortetracycline, oxytetracycline and tetracycline)	
6. Amoxicillin	50 µg/kg	
7. Sulfamethazine	100 µg/kg (total sulfonamides present)	EU Commission Regulation No. 37/2010
8. Trimethoprim	50 µg/kg	

(contd)

Compounds or Veterinary Drugs	Regulatory Limit	Reference
9. Sulfadiazine	100 µg/kg (total sulfonamides present)	EU Commission Regulation No. 37/2010
10. Oxolinic Acid	100 µg/kg	
11. Erythromycin	200 µg/kg Erythromycin A (marker residue)	
12. Florfenicol	1000 µg/kg (sum of florfenicol + florfenicol amine)	

Source:

BAFS, 2023. Live, Fresh Chilled and Fresh Frozen Crabs - Product Standard PNS/BAFS 177:2023

**Annex B**

Maximum residue limits (MRL) of veterinary drug residues in shrimp

Compounds or Veterinary Drugs	Regulatory Limit	Reference
<b>Allowed antibiotic residue</b>		
1. Chlortetracycline	200 µg/kg (sum of chlortetracycline, oxytetracycline and tetracycline)	PNS/BAFS 48:2022 (Veterinary drug residues in food - Product standard - Maximum Residue Limit
2. Oxytetracycline	200 µg/kg (sum of chlortetracycline, oxytetracycline and tetracycline)	
3. Amoxicillin	50 µg/kg	
4. Sulfamethazine	100 µg/kg (total sulfonamides present)	EU Commission Regulation No. 37/2010
5. Trimethoprim	50 µg/kg	
6. Sulfadiazine	100 µg/kg (total sulfonamides present)	
7. Oxolinic Acid	100 µg/kg	
8. Erythromycin	200 µg/kg erythromycin A (marker residue)	
9. Florfenicol	1000 µg/kg (sum of florfenicol + florfenicol amine)	

Source: BAFS, 2023. Fresh Chilled and Fresh Frozen Shrimps and Prawns - Product Standard PNS/BAFS 70:2023

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# Technical Working Group



**Department of Agriculture**  
**Technical Working Group (TWG) on the Development of the**  
**Explanatory Manual for Good Aquaculture Practices (GAqP) for Shrimp and Crab**

*DA Special Order No. 272 series 2023*  
*Creation of TWG for the Development of Knowledge Products of PNS*

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This Explanatory Manual (EM) serves as supplementary learning material for the Philippine National Standard (PNS) – Code of Good Aquaculture Practices (GAqP) for Shrimp and Crab (PNS/BAFS 197:2017). The EM aims to aid stakeholders by promoting uniform understanding and interpretation of the PNS to ensure efficient adoption and implementation of the Standard.

PNS/BAFS 197:2017 was developed to support Filipino shrimp and crab farmers and to promote sustainable farming.

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