

PHILIPPINE NATIONAL STANDARD

**PNS/BAFS 349:2022
ICS 67.020**

Application of General Principles of Food Hygiene to the Control of Foodborne Parasites — Guidelines



BUREAU OF AGRICULTURE AND FISHERIES STANDARDS
BPI Compound, Visayas Avenue, Diliman, Quezon City, 1101 Philippines
Trunkline: **(632)8928-8741 to 64 loc 3301-3319**
E-mail: info.dabafs@gmail.com
Website: www.bafs.da.gov.ph

Foreword

In the Philippines, Section 9 (Setting of food safety standards) of the Republic Act No. 10611 (Food Safety Act [FSA] of 2013) mandated the Department of Agriculture (DA) and Department of Health (DOH) to “adopt Codex standards, except when these are in conflict with what is necessary to protect consumers and scientific justifications exists for the action taken”. To fulfill these mandates under the FSA of 2013, the Bureau of Agriculture and Fisheries Standards (BAFS) of the Department of Agriculture (DA) issued a call for proposal to the DA Food Safety Regulatory Agencies (FSRA) in 2021. The BAFS-DA requested the DA FSRA to prioritize their top 10 Codex standards based on their regulatory, trade, and market requirements. Among the list of applicable Codex standards for primary and postharvest foods, the DA-FSRA identified CXG 88-2016 (Guidelines on the application of general principles of food hygiene to the control of foodborne parasites) as one of the priority standards for adoption.

In response, the BAFS-DA initiated the development of the Philippine National Standard (PNS) on the guidelines for the application of general principles of food hygiene to the control of foodborne parasites with the guidance of a Technical Working Group (TWG) in 2022. This TWG was created under Special Order (SO) No. 103, series of 2022 (Creation of TWG for the development of PNS for agriculture and fishery products, machineries, and infrastructures), SO No. 350, series of 2022 (Addendum to Special Order No. 103), and SO No. 487, series of 2022 (Addendum to Special Order No. 103). The TWG was composed of representatives from the relevant government agencies, academe/research institutions, private sector organizations, and Civil Society Organizations (CSO). The draft PNS underwent a series of TWG meetings and stakeholder consultations conducted physically and via online platforms before its endorsement to the DA Secretary for approval.

This PNS is an adaptation of the CXG 88-2016 (Guidelines on the application of general principles of food hygiene to the control of foodborne parasites). Any modifications from the original Codex document to consider the conditions in the Philippines are written in italicized text for distinction. This document was written in accordance with the formatting and editorial rules of the Standardization Guide No. 1 (Writing the Philippine National Standards) developed by the Standards Development Division (SDD) of the BAFS-DA.

Table of Contents

Foreword	i
Introduction	iii
1 Scope	1
2 Use	2
3 Normative References	2
4 Terms and Definitions	6
5 Primary Production	8
5.4 Meat and Meat Products	9
5.5 Milk	11
5.6 Fish and fishery products	12
5.7 Fresh fruits and vegetables	14
6 Establishment: Design and Facilities	16
7 Control of Operation	16
7.1 Control of food hazards	16
7.2 Key aspects of hygiene control systems	17
8 Establishment: Maintenance and Sanitation	18
9 Establishment: Personal Hygiene	18
10 Product Information and Consumer Awareness	18
10.1 Product information	18
10.2 Consumer education	18
11 Training	19
11.3 Instruction and supervision	20
Bibliography	21

Introduction

Foodborne parasites are a major public health burden worldwide (World Health Organization [WHO], 2015), particularly in areas with poor sanitary facilities and in populations that traditionally consume raw and undercooked food dishes. Infections may have prolonged, severe, and sometimes fatal outcomes, and result in considerable hardship in terms of food safety, security, quality of life, and negative impacts on livelihood.

The joint Food and Agriculture Organization of the United Nations (FAO) / WHO report on Multicriteria-Based Ranking for Risk Management of Foodborne Parasites (2014) lists 24 parasite species, genera, or families that ranked highest in global public health concern. The top eight highly ranked parasites are *Taenia solium*, *Echinococcus granulosus*, *Echinococcus multilocularis*, *Toxoplasma gondii*, *Cryptosporidium* spp., *Entamoeba histolytica*, *Trichinella* spp, and Opisthorchiidae. The ranking was based on seven criteria of which five were public health related. The ranking was based on worldwide impacts and regionally other foodborne parasites may be more important. The ranking indicates that the foodborne parasites of greatest concern from a global public health perspective are not limited to a single parasite group or a food vehicle but span a number of different parasites groups and food vehicles.

Knowledge of parasite life cycles, transmission routes, and environmental requirements is needed to understand which control measures may be effective. Foodborne parasites are transmitted to humans by ingestion of *primary or postharvest foods* that are contaminated as a consequence of the parasite's life cycle (e.g., meat that contains *Trichinella* larvae or *Toxoplasma* tissue cysts) or that are contaminated with soil or water carrying infective stages of parasites (e.g., cysts, oocysts, eggs). In the first case, human infection can occur through the consumption of an infective stage in raw, undercooked, or poorly processed meat and offal from domesticated animals, game, fish, crustaceans, cephalopods, and molluscan shellfish. In the second case, human infection can occur from ingestion of infective stages in water and on foods such as fresh fruit and vegetables resulting from animal or human fecal contamination (e.g., oocysts of *Cryptosporidium* spp. in fresh vegetables).

Control of foodborne parasites can be achieved through the prevention of infection of farmed food animals (e.g., livestock, poultry, fish) with infective stages, the prevention of contamination of fresh and processed foods with infective stages, and/or the inactivation of parasites in or on foods during *postharvest stage(s)*. Control during primary production is important for many parasite/food combinations, while control measures during postharvest are necessary for other parasite/food combinations. During a parasite hazard analysis, producers should consider how the product will be further *postharvest-treated*, prepared, and consumed in order to determine appropriate parasite control measures. Education and awareness-raising are important components of consumer protection from foodborne parasitic diseases and, in many cases, may be the only feasible option available.

The first step of foodborne parasite risk management should be identifying any potential parasite hazard(s) applicable to the food being produced (Codex Alimentarius Commission [CAC], 2013). The details of the epidemiology (both human and animal disease) and the life cycle of each parasite are essential in the identification, prevention, and control of the risks associated with that parasite. Epidemiological data collection in food and environmental parasite surveys can be effective in identifying hazards and collecting information to be used for risk management strategy decisions. Surveillance for parasitic diseases in humans is complicated by the often-prolonged incubation periods, sub-clinical nature, unrecognized chronic sequelae and lack of easily available diagnostic procedures.

The occurrence and distribution of parasitic species in the raw commodities used for food can be affected by climate changes, land use, and other environmental factors. The spread of foodborne parasitic diseases is also affected by human behavior (for instance, environmental contamination by human feces due to the lack of latrines and human-to-human contact that spread parasite eggs and cysts), demographics, and global trade. For example, globalization of food trade offers new opportunities for parasite dissemination into new areas.

The primary purpose of *this Standard* is to provide guidance on preventing, reducing, inactivating, or otherwise controlling foodborne parasite hazards that present a public health risk. These guidelines provide science-based advice to *competent authorities* and the food industry with the aim of protecting the health of consumers against foodborne parasites and ensuring fair practices in food trade. The guidelines also provide information that will be of value to consumers and other interested parties.

1 Scope

These guidelines for the control of foodborne parasites are applicable to all foods, especially those foods identified in the FAO/WHO report, from primary production *and postharvest stages to consumption*. They should complement guidelines in place for any other pathogens (e.g., bacteria and viruses).

Control measures should be applied to parasite hazards in proportion to the public health risk. *Special measures should be in place to reduce the identified risk from specific parasites that are endemic to an area.*

Clause 5 (Primary production) is subdivided into four food categories: i) Meat, ii) Milk, iii) Fish and fishery products, iv) Fresh fruits and vegetables.

The Scope of these categories is the same as provided in the following codes:

- a) Meats: *Philippine National Standards(PNS)/Bureau of Agriculture and Fisheries Standards (BAFS) 168:2015 (Code of Hygienic Practice [COHP] for meat)*, especially raw meat.
- b) Milk: *PNS/BAFS 210:2017 (COHP for milk)*
- c) Fish and Fishery products, especially raw fish:
 - i) *PNS/BAFS 236:2018 (Code of Practice [COP] for live and raw bivalve molluscs)*
 - ii) *PNS/BAFS 279:2019 (COP for fresh and quick-frozen raw scallops)*
 - iii) *PNS/BAFS 297:2020 (COP for the processing of shrimps and prawns)*
 - iv) *PNS/BAFS 298:2020 (COP for the processing of lobsters)*
 - v) *PNS/BAFS 299:2020 (COP for the processing of cephalopods)*
 - vi) *PNS/BAFS 300:2020 (COP for processing of fresh-chilled and frozen minced fish)*
 - vii) *CXC 52-2003 (COP for fish and fishery products)*
- d) Fresh Fruits and Vegetables: *PNS/BAFS 233:2018 (COHP for fresh fruits and vegetables)*, especially fruits and vegetables consumed raw.

The remaining sections contain guidelines applicable to the food chain after primary production (i.e., postharvest stages and consumption of postharvest foods), but are not subdivided into food categories.

These guidelines were adopted from CXG 88-2016 (Guidelines on the application of general principles of food hygiene to the control of foodborne parasites) with modifications to consider the conditions in the Philippines.

2 Use

These guidelines follow the format of the CXC 1-1969 (General principles of food hygiene) and should be used in conjunction with it *and with other relevant codes of practice as stated in the Scope*.

The World Organisation for Animal Health (WOAH, founded as OIE) develops standards for the prevention, detection, and control of some foodborne parasites at the primary production stage. Therefore, these guidelines should also be used in conjunction with relevant articles of the OIE codes and manuals and the OIE/FAO Guide to Good Farming Practices for Animal Production Food Safety.

Flexibility in the application of the guidelines is important. They are primarily intended for use by government risk managers and *food business operators (FBO)* in the design and implementation of food control systems.

3 Normative References

The following documents are referred to in the text in such a way that some or all their contents constitute the requirements of this document. The latest edition of the referenced documents (including any amendments) applies.

Bureau of Agriculture and Fisheries Product Standards (BAFPS)-
Department of Agriculture (DA). (2008). Code of Good Animal
Husbandry Practices (GAHP) (PNS/BAFPS 60:2008).
[https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2021-02-24-
PNS-BAFPS%2060-2008-Code%20GAHP.pdf](https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2021-02-24-PNS-BAFPS%2060-2008-Code%20GAHP.pdf)

Bureau of Agriculture and Fisheries Standards (BAFS)-DA. (2014). Code of
Good Aquaculture Practices (GAqP) (PNS/BAFS 135:2014).
[https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2021-02-24-
PNS%20BAFS%20135_2014%20Code%20of%20GAqP.pdf](https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2021-02-24-PNS%20BAFS%20135_2014%20Code%20of%20GAqP.pdf)

BAFS-DA. (2015a). COHP for meat (PNS/BAFS 168:2015).
[https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2021-02-24-
PNSBAFS168-2015COHPforMeat.pdf](https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2021-02-24-PNSBAFS168-2015COHPforMeat.pdf)

BAFS-DA. (2016). Code of GAHP for chickens —broilers and layers
(PNS/BAFS 184:2016).
[https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2021-02-26-
PNS%20BAFS%20184.2016.%20GAHP%20Chicken%20Broilers%20La
yers.pdf](https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2021-02-26-PNS%20BAFS%20184.2016.%20GAHP%20Chicken%20Broilers%20Layers.pdf)

BAFS-DA. (2017a). Code of GAHP for beef cattle and buffalo (PNS/BAFS
200:2017).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%202020-2017-GAHP%20Beef.pdf

BAFS-DA. (2017b). Code of GAHP for dairy cattle and water buffalo (PNS/BAFS 199:2017).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20199-2017%20GAHP%20Dairy.pdf

BAFS-DA. (2017c). Code of GAHP for goats (PNS/BAFS 201:2017).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20201-2017-GAHP%20Goats.pdf

BAFS-DA. (2017d). Code of GAHP for sheep (PNS/BAFS 202:2017).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20202-2017-GAHP%20Sheep.pdf

BAFS-DA. (2017e). Code of Good Aquaculture Practice (GAqP) for milkfish and tilapia (PNS/BAFS 196:2017).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20196_2017%20-%20Code%20of%20Good%20Aquaculture%20Practices%20for%20Milkfish%20and%20Tilapia.pdf

BAFS-DA. (2017f). Code of GAqP for oyster and mussel (PNS/BAFS 207:2017).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20207_2017%20-%20Code%20of%20GAqP%20for%20Oyster%20and%20Mussel.pdf

BAFS-DA. (2017g). Code of GAqP for shrimp and crab (PNS/BAFS 197:2017).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20197_2017%20-%20Code%20of%20Good%20Aquaculture%20Practices%20for%20Shrimp%20and%20Crab.pdf

BAFS-DA. (2017h). COHP for milk (PNS/BAFS 210:2017).

http://www.bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20210-2017%20%20COHP%20Milk.pdf

BAFS-DA. (2018a). Code of GAHP for poultry hatchery (PNS/BAFS 263:2018).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20263-2018%20-%20Final_GAHP%20for%20Poultry%20Hatchery.pdf

BAFS-DA. (2018b). COHP for fresh fruits and vegetables (PNS/BAFS 233:2018).

http://www.bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20233_2018.pdf

BAFS-DA. (2018c). COP for live and raw bivalve molluscs (PNS/BAFS 236:2018).

http://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20236-2018%20-%20Code%20of%20Practice%20for%20Bivalve%20Molluscs.pdf

BAFS-DA. (2019a). Code of GAHP for ducks (PNS/BAFS 271:2019).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20271-2019-final%20draft%20GAHP%20for%20Ducks.pdf

BAFS-DA. (2019b). Code of GAHP for swine (PNS/BAFS 267:2019).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20267_2019%20GAHP%20for%20Swine.pdf

BAFS-DA. (2019c). Code of good animal feeding (PNS/BAFS 282:2019).

http://www.bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20282%202019%20Good%20Animal%20Feeding.pdf

BAFS-DA. (2019d). Code of GAqP on hatchery for freshwater prawn (PNS/BAFS 281:2019).

[https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20281%20GAqP%20on%20Hatchery%20for%20Freshwater%20Prawn%20\(1\).pdf](https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20281%20GAqP%20on%20Hatchery%20for%20Freshwater%20Prawn%20(1).pdf)

BAFS-DA. (2019e). Code of GAqP on hatchery for shrimp (PNS/BAFS 280:2019).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2022-08-23-PNS%20280%20GAqP%20on%20Hatchery%20for%20Shrimp.pdf

BAFS-DA. (2019f). COP for fresh and quick frozen raw scallops (PNS/BAFS 279:2019).

http://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20279%20-%202019%20COP%20Scallop%20Products.pdf

BAFS-DA. (2020a). COP for the processing of cephalopods (PNS/BAFS 299:2020).

[http://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNSBAFS%20299.200%20\(1\).pdf](http://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNSBAFS%20299.200%20(1).pdf)

BAFS-DA. (2020b). COP for the processing of fresh-chilled and frozen minced fish (PNS/BAFS 300:2020).

[http://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNSBAFS%20300.2020%20\(1\).pdf](http://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNSBAFS%20300.2020%20(1).pdf)

- BAFS-DA. (2020c). COP for the processing of lobsters (PNS/BAFS 298:2020).
http://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNSBAFS%20298.2020.pdf
- BAFS-DA. (2020d). COP for the processing of shrimps and prawns (PNS/BAFS 297:2020).
http://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNSBAFS%20297.200.pdf
- BAFS-DA. (2020e). GAHP — animal welfare and environmental sustainability for chicken and duck (PNS/BAFS 296:2020).
https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNSBAFS%20296%20GAHP%20Animal%20Welfare%20and%20Environmental%20Sustainability%20for%20Chicken%20and%20Duck.pdf
- BAFS-DA. (2021). Seaweeds — Code of GAqP (PNS/BAFS 208:2021).
[https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2021-10-19-PNS%20BAFS%20208-2021%20Seaweeds%20-%20Code%20of%20Good%20Aquaculture%20Practices%20\(GAqP\).pdf](https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2021-10-19-PNS%20BAFS%20208-2021%20Seaweeds%20-%20Code%20of%20Good%20Aquaculture%20Practices%20(GAqP).pdf)
- BAFS-DA. (2022). Grouper — Code of GAqP (PNS/BAFS 334:2022).
[https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS.BAFS%20334.2022_PNS%20Grouper%20-%20Code%20of%20Good%20Aquaculture%20Practices%20\(GAqP\).pdf](https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS.BAFS%20334.2022_PNS%20Grouper%20-%20Code%20of%20Good%20Aquaculture%20Practices%20(GAqP).pdf)
- Codex Alimentarius Commission (CAC). (2016). Guidelines on the application of general principles of food hygiene to the control of foodborne parasites (CXG 88-2016). https://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252Fstandards%252FCXG%2B88-2016%252FCXG_088e.pdf
- CAC. (2020). General principles of food hygiene (CXC 1-1969 rev. 2020).
https://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252Fstandards%252FCXC%2B1-1969%252FCXC_001e.pdf
- Food and Agriculture Organization (FAO) of the United Nations (UN). (2014). FAO Technical paper on assessment and management of fish safety and quality-Current practices and emerging issues.
<https://www.fao.org/3/i3215e/i3215e.pdf>

FAO and World Health Organization (WHO). (2020). COP for fish and fishery products (CXC 52-2003 rev. 2016). Rome.

<https://doi.org/1034060/cb0658en>

FAO / WHO / World Organisation for Animal Health (OIE). (2005). Guidelines for the surveillance, prevention and control of taeniasis/cysticercosis.

https://apps.who.int/iris/bitstream/handle/10665/43291/9290446560_eng.pdf?sequence=1&isAllowed=y

FAO/WHO/OIE. (2007). Guidelines for the surveillance, management, prevention, and control of trichinellosis.

http://www.trichinellosis.org/uploads/FAO-WHO-OIE_Guidelines.pdf

OIE & WHO. (2002). WHO/OIE Manual on *Echinococcus* in human and animals: a public health problem of global concern.

<http://whqlibdoc.who.int/publications/2001/929044522X.pdf>

World Organisation for Animal Health (WOAH). (2022). Aquatic animal health code.

<https://www.woah.org/en/what-we-do/standards/codes-and-manuals/aquatic-code-online-access/>

WOAH. (2022). Terrestrial animal health code.

<https://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/>

4 Terms and Definitions

For the purpose of this standard, the following definitions apply:

4.1

aquaculture

farming, during part or the whole of their life cycle, of any aquatic animals, except mammalian species, aquatic reptiles and amphibians, intended for human consumption, but excluding species covered in Section 7 of CXC 52-2003 (*Code of practice for fish and fishery products*). These aquatic animals are referred to as “fish” in the Code’s Section 2.2 and Section 6 (FAO & WHO, 2020)

4.2

cyst

transmission stage (*i.e.*, *infective stage*) of a parasite that can cause infection when consumed. Environmental cysts are resistant to outside conditions and can be transferred with soil, dust, and water to food. Tissue cysts are located within animal tissues (CAC, 2016, *modified*)

4.3**feed**

any single or multiple materials, whether processed, semi-processed or raw, which is intended to be fed directly to food-producing animals (BAFS-DA, 2019c; CAC, 2008)

4.4**fish**

any of the cold-blooded (ectothermic) aquatic vertebrates. Amphibians and aquatic reptiles are not included (FAO & WHO, 2020)

4.5**fish farm**

aquaculture production unit (either land- or water-based), usually consisting of holding facilities (e.g., tanks, ponds, raceways, cages), plant (e.g., buildings, storage, processing), service equipment and stock (FAO & WHO, 2020, *modified*)

4.6**foodborne parasite**

any parasite that can be transmitted to humans by ingesting food (CAC, 2016)

4.7**food business operator (FBO)**

person engaged in food business including one's agents and is responsible for ensuring that the requirements of this Act are met by the food business under one's control (Food Safety Act [FSA] of 2013, 2013)

4.8**host**

organism which harbors the parasite (CAC, 2016)

4.9**larvae**

immature form of helminths, before the development of the mature stage. Larvae can be infective or not (CAC, 2016)

4.10**oocyst**

environmental *and* developmental stage of coccidian parasites, produced through sexual reproduction in the definitive host. Oocysts can be infective or not when produced or shed (CAC, 2016, *modified*)

4.11**postharvest stages**

stages in the food supply chain involving the minimal transformation of plant- and animal foods after primary production such as removal of field heat for fruits, slaughter of animals, sorting, grading, and cutting of fresh plant and animal foods, icing and freezing, and the milling and storage of grain (FSA of 2013, 2013)

4.12**primary production**

production, rearing or growing of primary products including harvesting, milking and farmed animal production up to slaughter; and the rearing and growing of fish and other seafood in aquaculture ponds. It also includes fishing, and the hunting and catching of wild products (FSA of 2013, 2013)

5 Primary Production

- 5.1** It is necessary to conduct a hazard analysis to identify the foodborne parasite hazards that could be present in the food and feed production environment and that may contaminate foods during primary production. Control of parasites during primary production is particularly important when subsequent control steps during *postharvest stages* may not be adequate to eliminate the hazard or reduce it to an acceptable level.
- 5.2** Sources of parasitic contamination of food and food-producing animals at the primary production site include feed, water, soil, workers, untreated manure, sludge or fertilizers contaminated by feces of human and/or domestic and wild animals, or proximity to other activities which could result in run-off or flooding with contaminated water. Therefore, attention to water quality throughout the food chain, *particularly* from primary production, *postharvest* to consumption of *primary and postharvest* foods is very important. In addition to the above, food-producing animals feeding on other live and dead animals (e.g., mammals, fish, birds, invertebrates), are important sources of parasitic infections.
- 5.3** Farm workers in endemic areas may be infected with parasites without feeling ill or showing any symptoms. In order to minimize the probability for contamination of the *primary* production environment with parasitic stages from human feces, on-farm sanitary facilities should be installed and used (e.g., functional latrines in the field that do not leak contaminants into the primary production area) and an adequate means of hygienically washing [e.g., scrubbing under running water] and drying hands). Waste from sanitary facilities should be hygienically disposed of in such a way as to eliminate contact of potentially infectious feces with animals or pastureland.

5.4 Meat and Meat Products

Important meat-transmitted foodborne parasites include, but are not limited to, *Taenia solium* (pigs), *Toxoplasma gondii* (pigs, cattle, chickens, sheep, goats, horses), *Trichinella spiralis* (pigs, horses) and other *Trichinella* spp. (pigs, horses), *Taenia saginata* (cattle), *Sarcocystis* spp. (pigs, cattle), and *Spirometra* spp. (fish, reptiles, and amphibians). Certain foodborne parasites present in domestic animals may be transmitted to food of plant origin via fecal contamination (e.g., *Echinococcus* spp., *Cryptosporidium* spp., *Fasciola* spp., and *Giardia duodenalis*). These parasites are not associated with human illness from consumption of meat; however, they should be controlled in animal production in order to interrupt their life cycle. For information on specific food vehicles for these parasites, see Table 2 (Parasites and main food vehicles) in FAO/WHO report on Multicriteria-Based Ranking for Risk Management of Food-Borne Parasites (2014).

5.4.1 Environmental hygiene

5.4.1.1 Refer to Section 3.1 of CXC 1-1969 (General principles of food hygiene), and *Clause 5.1.1.4 of PNS/BAFS 168:2015 (COHP for meat)*, the relevant Chapters of the OIE Terrestrial Animal Health Code, and the relevant clauses of the various PNS related to GAHP as cited in Clause 2 (Normative References) of this PNS.

5.4.1.2 Feces of domestic and wild animals, as well as human feces, may contain parasites (e.g., *Toxoplasma* oocysts in felids; *Taenia* eggs in human feces), that are infective to food-producing animals. Some parasites may also be transmitted to domestic animals or other animal hosts when these animals eat infected tissues from other animals. Where parasites will not be controlled at a later *postharvest* stage, the feasibility of controlling environmental introduction of foodborne parasites during primary production with available methods should be determined before primary production begins. The risk associated with the introduction of organic material (e.g., fecal and other material that may contain oocysts or eggs) from non-food-producing animals into the production environment should also be assessed.

5.4.2 Hygienic production of food sources

5.4.2.1 For information related to the control of parasites related to animal feed, refer to the *PNS/BAFS 282:2019 (Code of good animal feeding)*, *Clause 5.1.1 of the PNS/BAFS 168:2015 (COHP for meat)*, the relevant Chapters of the OIE Terrestrial Animal Health Code, the relevant clauses of the various PNS related to GAHP as cited in Clause 2 (Normative References) of this PNS, the WHO/FAO/OIE Guidelines for the surveillance, prevention and control of taeniasis/cysticercosis, and the FAO/WHO/OIE Guidelines for the surveillance, management, prevention and control of trichinellosis.

- 5.4.2.2** Where indicated by a hazard analysis, control measures and/or hygienic practices that prevent foodborne parasites from contaminating foods or infecting *food-producing* animals during primary production, or that reduce contamination to an acceptable level should be implemented.
- 5.4.2.3** Fully enclosed animal housing systems, or other systems that prevent intrusions of potentially contaminated small animals or unauthorized people, combined with other good production practices, can be effective in controlling foodborne parasite hazards in meat, since such systems have been demonstrated to be effective for a number of parasites (e.g., *Trichinella* spp., *Toxoplasma*).
- 5.4.2.4** Feed should be effectively protected against rodents (e.g., *Trichinella* spp. control), cats (e.g., *Toxoplasma gondii* control), and other animals. All dead animals should be immediately removed from feed storage and food-producing animal production areas and *should be* disposed of in a safe manner.
- 5.4.2.5** Primary producers should supply water that is not a significant source of transmission of foodborne parasites to food-producing animals and to the extent possible block access of food-producing animals to surface water and untreated water collection systems to minimize the potential for infection with parasites.
- 5.4.2.6** In order to assess whether foodborne parasite controls at primary production are properly implemented and effective, control measures should be documented and verified. Animal disease surveillance may be a useful tool for assessing control measure needs/gaps; however, because of the practical limitations of sampling and testing methodology, testing cannot assure the absence of a parasite hazard.
- 5.4.3 Cleaning, maintenance, and personnel hygiene at primary production**
- Refer to the relevant chapters of the OIE Terrestrial Animal Health Code *and the relevant clauses of the various PNS related to GAHP as cited in Clause 2 (Normative References) of this PNS* for recommendations on cleaning, disinfection, and personal hygiene.
- 5.4.4 Monitoring and surveillance at primary production**
- 5.4.4.1** Refer to the relevant chapters of the OIE Terrestrial Animal Health Code *and the relevant clauses of the various PNS related to GAHP as cited in Clause 2 (Normative References) of this PNS*. Surveillance and monitoring of foodborne parasites in food animals and in species that are potential sources of parasites could be effective in developing risk management strategies. Monitoring and surveillance can be useful as tools to verify the effectiveness of parasite controls and should begin at primary production.

5.4.4.2 Assurance that a parasite hazard is adequately controlled can be attained through the demonstration of properly implemented controls and hygienic practices, which may be supported by a series of negative test results over a sufficient time period through a risk-based surveillance program. It is important to exchange information *among the competent authorities and the stakeholders involved*.

5.5 Milk

Consumption of unpasteurized milk has been associated with outbreaks of cryptosporidiosis and toxoplasmosis. Contamination of unpasteurized milk with *Cryptosporidium* spp. may result from unsanitary milking conditions, such as when the udders are not properly cleaned. Outbreaks of toxoplasmosis have been associated with the consumption of unpasteurized goat and camel milk. Infective stages of *Toxoplasma* in recently infected animals may be excreted in the milk and might result in milk-borne infection. For information on specific food vehicles for these parasites, see Table 2 (Parasites and main food vehicles) in FAO/WHO report on Multicriteria-Based Ranking for Risk Management of Food-Borne Parasites (2014).

5.5.1 Environmental hygiene

5.5.1.1 Refer to *Section 4.1 of PNS/BAFS 210:2017 (Code of hygienic practice for milk)*.

5.5.1.2 *All domestic animals, particularly cats, which are known hosts of both Toxoplasma and Cryptosporidium spp. should be excluded, to the extent possible, from farms and primary production, handling and storage areas used for dairy herds (e.g., cattle, buffaloes, goats, and sheep).*

5.5.2 Hygienic production of food sources

Refer to the *PNS/BAFS 282:2019 (Code of good animal feeding)* and *Clause 4.1 of the PNS/BAFS 210:2017 (COHP for milk)*.

5.5.3 Handling, storage, and transport

Refer to appropriate clauses of the *PNS/BAFS 210:2017 (COHP for milk)*.

5.5.4 Cleaning, maintenance, and personnel hygiene at primary production

Refer to *Clause 4 of the PNS/BAFS 210:2017 (COHP for milk)*.

5.6 Fish and fishery products

Important fish-transmitted foodborne parasites include Opisthorchiidae in freshwater fish, *Paragonimus* spp. in freshwater crustaceans, Anisakidae in marine fish, crustaceans, and cephalopods, Heterophyidae in freshwater/brackish water fish, *Microphallidae* in freshwater shrimp, *Gnathostomidae* in freshwater fish and *Capillariidae* in freshwater/brackishwater, and Diphyllbothriidae in freshwater and marine fish. For information on specific food vehicles for these parasites, see Table 2 (Parasites and main food vehicles) in FAO/WHO report on Multicriteria-Based Ranking for Risk Management of Food-Borne Parasites (2014).

5.6.1 Environmental hygiene

5.6.1.1 Refer to Sections 6.1.1 and 6.1.2 of the CXC 52-2003 (COP for fish and fishery products) *and the relevant clauses of the various PNS related to the COP for fish and fishery products and to GAqP as cited in Clause 2 (Normative References) of this PNS.*

5.6.1.2 Wild fish, and aquacultured fish without controlled rearing conditions, may contain parasites that infect people. The environment of wild fish cannot be controlled, requiring measures to be taken at a later stage of the food chain (e.g., *postharvest stages*) for fish that will be consumed raw.

5.6.1.3 The source of water used for aquaculture fish farming can be a risk factor for parasitic infections. The larval stages of certain trematodes, which may be present in fish farm water, can penetrate fish skin and infect fish tissues. Aquaculture primary producers should use clean water and seek appropriate guidance on water quality and should prevent influx of contaminated water (including wastewater). The hygienic suitability of the water, under both normal and rainstorm conditions, should be assessed.

5.6.1.4 Where feasible, material derived from on-board evisceration of fish showing signs of infection by parasites communicable to humans should not be disposed of at sea unless it has undergone a treatment that kills the parasites, in order not to maintain the parasite life cycle.

5.6.1.5 Some aquaculture methods may reduce a parasite hazard to an acceptable level. Closed systems with controlled feed and environment conditions can effectively eliminate parasites that normally occur in wild fish.

5.6.2 Hygienic production of food sources

5.6.2.1 Refer to Section 3 of the CXC 52-2003 (COP for fish and fishery products), *the relevant clauses of the PNS/BAFS 282:2019 (Code of good animal feeding) and the various PNS related to the COP for fish and fishery products and to GAqP as cited in Clause 2 (Normative References) of this PNS,* the

relevant Chapters of the OIE Aquatic Animal Health Code, and the FAO fisheries and aquaculture technical paper 574 (Technical paper on assessment and management of fish safety and quality-current practices and emerging issues).

- 5.6.2.2** To prevent potential transmissions of parasites, fingerlings should only be purchased from producers who implement reliable source management systems and GAqP. Fingerlings collected from the wild may contain foodborne parasites that remain a hazard in adult fish.
- 5.6.2.3** Animals and people infected with foodborne parasites may excrete parasite eggs that enter water *systems* and develop into larval stages that subsequently infect farmed fish. In order to minimize the opportunity for contamination of the production environment with parasitic stages from human feces, on-farm sanitary facilities should be installed (e.g., functional latrines), and an adequate means of hygienically washing and drying hands.
- 5.6.2.4** Animals, including dogs and cats, are hosts for freshwater trematode fishborne parasites and should be excluded from land-based fishponds to the extent possible. Good practices include not feeding raw meat/offal of fish to dogs and cats, preventing fish-eating mammals from accessing fishponds, and controlling the population of semi-domesticated or stray/feral dogs and cats in close vicinity of fish farms. Workers infected with or being treated for fish-borne trematodes (liver and intestinal flukes) should be excluded from the farm environment during treatment.
- 5.6.2.5** Attention should also be given to animals that serve as intermediate hosts (i.e., hosts which harbor the larval developmental stages of the parasite prior to maturity) in the life cycle of fishborne parasites. For example, in the case of aquaculture, the exclusion of snails, as intermediate hosts for fishborne trematodes, from fish farm areas may help interrupt trematode life cycles in fishponds. *Some pond preparation practices such as drying of pond prior to stocking may be a cost-effective and efficacious method in eradicating the intermediate hosts such as snails and parasite larvae (FAO, 1997).* For wild fish, intermediate hosts cannot be controlled, and fish migrate from different areas with varying risks for exposure to parasites. *Hence, further steps (e.g., thorough cooking) to eliminate the presence of parasites are recommended.*
- 5.6.2.6** Using raw fish as feed for aquaculture is likely to introduce a risk of parasitic infection, therefore it should be avoided as much as possible. Raw fish used for feed may be previously frozen in order to inactivate parasites. It is particularly important to inactivate parasites in feed where the fish will not be subsequently frozen and may be consumed raw.
- 5.6.2.7** Toilets should not directly empty into land-based fishponds. Fishponds should be protected from contamination from human and animal feces, pollution with sewage and other wastes. Untreated human and animal excreta should not

be used as fertilizer or as fish food to reduce transmission to intermediate hosts.

- 5.6.2.8** Where needed, control measures at primary production should be assessed in order to determine if they are properly implemented and effective. Fish surveillance may be a useful tool for assessing control measure needs/*gaps*; however, because of the practical limitations of sampling and testing methodology, testing cannot assure the absence of a parasite hazard.

5.6.3 Handling, storage, and transport

- 5.6.3.1** Eviscerating fish without any undue delay during harvest is helpful to prevent migration of Anisakidae larvae from the viscera into the flesh after harvest.

- 5.6.3.2** Refer to Sections 6.3.5 and 6.3.6 of the CXC 52-2003 (COP for fish and fishery products), *the relevant clauses of the various PNS related to GAqP as cited in the Normative References*, and the relevant Chapters of the OIE Aquatic Animal Health Code for considerations for transport.

5.6.4 Cleaning, maintenance, and personnel hygiene at primary production

Refer to Sections 3.4 and 3.5 of the CXC 52-2003 (COP for fish and fishery products), *the relevant clauses of the various PNS related to GAqP as cited in the Normative References* and the relevant Chapters of the OIE Aquatic Animal Health Code.

5.6.5 Monitoring and surveillance at primary production

- 5.6.5.1** Examining fish for live fishborne parasites may be a useful tool to assess the effectiveness of fishborne parasite preventive control measures. *Monitoring and surveillance should be done to develop and review risk management strategies.*

- 5.6.5.2** Assurance that a parasite hazard is adequately controlled may be attained through demonstration of properly implemented controls and hygienic practices, which may be supported by a series of negative test results over a sufficient time period through a risk-based surveillance program.

5.7 Fresh fruits and vegetables

Important fruit- and vegetable-transmitted foodborne parasites include, but are not limited to, *Taenia solium*, *Echinococcus granulosus*, *Echinococcus multilocularis*, *Toxoplasma gondii*, *Entamoeba histolytica*, *Cryptosporidium* spp., *Ascaris* spp., *Giardia duodenalis*, *Fasciola* spp., *Cyclospora cayetanensis*, *Trichuris trichiura*, *Balantidium coli*, and *Toxocara* spp. For information on specific food vehicles for these parasites, see Table 2

(Parasites and main food vehicles) in FAO/WHO report on Multicriteria-Based Ranking for Risk Management of Food-Borne Parasites (2014).

Certain fruits and vegetables are consumed raw without a cooking or freezing step or disinfection to kill parasites. In this case, controls that reduce the parasite hazard to an acceptable level during primary production are especially important.

5.7.1 Environmental hygiene

5.7.1.1 Refer to *Clause 5.1 of PNS/BAFS 233:2018 (COHP for fresh fruits and vegetables)*.

5.7.1.2 Areas for cultivation of fresh fruits and vegetables need to be assessed in terms of their susceptibility to direct or indirect fecal contamination from wild animals, domestic animals and/or humans, whether from run-off, flooding, irrigation water, or natural fertilizers. *Adequate control measures should be implemented to manage any identified risks prior to site selection for cultivation.*

5.7.2 Hygienic production of food sources

5.7.2.1 Refer to the *PNS/BAFS 233:2018 (COHP for fresh fruits and vegetables)* and the WHO/OIE Manual on Echinococcus in Human and Animals.

5.7.2.2 The use of biological soil amendments of animal origin, particularly on *primary food*, should be managed to minimize the potential for contamination with parasites (e.g., adequately treating manure). Parasite eggs and oocysts can survive for years in the environment and can be highly resistant to environmental changes; for example, *Ascaris* eggs can remain viable in anaerobically digested sewage sludge.

5.7.2.3 In case the presence of infected snail intermediate host (Lymnaeidae) is identified, aquatic plants, such as watercress, grown in the area should not be harvested for raw consumption in order to prevent infection with *Fasciola hepatica* and *F. gigantica*.

5.7.2.4 Flooding may cause contamination of crops with water containing the parasite eggs, cysts, and oocysts from animal or human feces. After such events, *primary foods* should be evaluated for risk of contamination and where there is a risk, proper disposal of the affected *primary food* is needed.

5.7.3 Cleaning, maintenance, and personnel hygiene at primary production

Refer to *Clauses 5.2.3 and 5.4 of the PNS/BAFS 233:2018 (COHP for fresh fruits and vegetables)*.

6 Establishment: Design and Facilities

The postharvest *operations* establishment should be designed to exclude animals that may excrete feces that contain parasite stages. The layout should minimize the introduction of soil that may contain feces from animals and parasite stages from the outside environment (e.g., changing boots/clothes at the entrance of the establishment).

7 Control of Operation

7.1 Control of food hazards

7.1.1 Control measures are used to address specific foodborne parasite hazards (e.g., as part of a Hazard Analysis and Critical Control Point [HACCP]-based system). Contamination of foods during *the postharvest stages* with parasites transmitted by the fecal-oral route is typically controlled by a stringent application of hygiene control systems, which could be referred to as, e.g., Good Hygiene Practices (GHP) and Sanitation Standard Operation Procedures (SSOP). These prerequisite programs, together with validated interventions for specific parasites provide a framework for the control of foodborne parasites.

7.1.2 During the parasite hazard analysis, FBO should consider how the product will be further handled, prepared, and consumed in order to determine appropriate parasite controls. Where the hazard analysis indicates the presence of a significant foodborne parasite hazard, slaughter and other postharvest operations should have control measures in place that prevent or eliminate the hazard or reduce it to an acceptable level.

7.1.3 The hazard analysis may determine that a foodborne parasite hazard is adequately controlled at primary production and postharvest stages. In this case, methods may be used to verify that previous control measures are adequate, such as inspecting the implementation of control measures at the primary producer, and for some products, testing incoming product for the presence of parasites.

7.1.4 Various *postharvest operations* have been shown to control parasites in selected food items, but the conditions needed to inactivate parasites are subject to substantial variability depending on the parasites, the food matrix and the location of parasites in the food matrix. Specific *postharvest operations* should be subject to validation based on CXG 69-2008 (Guidelines for the validation of food safety control measures) to ensure consumer protection. Control measures may include freezing, drying, filtration, sedimentation, UV light, ozone, and irradiation. *Specific combinations of postharvest operations i.e., the application of the principles of the hurdle*

concept, to control parasites should be used in accordance with guidance from competent authorities, where available.

7.2 Key aspects of hygiene control systems

7.2.1 Time and temperature control

Time and temperature control treatments (e.g., freezing) that will result in the reduction/elimination of viable parasites are the most commonly used preventive control measures. Such treatments should be done in accordance with validated parameters, as described in relevant and reliable guidelines and other scientific literature.

7.2.2 Specific postharvest steps

7.2.2.1 Freezing

Many parasites in *primary and postharvest foods* are susceptible to freezing. However, specific time/temperature combinations are required to inactivate parasites by freezing, and these are also dependent on the food type and portion size. Some parasites (e.g., *Trichinella nativa* and *T. britovi* larvae or eggs of *Echinococcus multilocularis*) are resistant to freezing. For control of parasites in fish and fishery products intended for raw consumption by freezing, refer to Annex 1 of the CXC 52-2003 (COP for fish and fishery products).

7.2.2.2 Irradiation

Irradiation is a possible measure for parasite control. Refer to *PNS/BAFS 151:2015 (COHP for radiation processing of food)*.

7.2.2.3 Washing

Fruits and vegetables should be washed with water in accordance with *Clause 7.2.2.1 of the PNS/BAFS 233:2018 (COHP for fresh fruits and vegetables)* to reduce parasites. However, it should be noted that most parasite eggs or oocysts are sticky and difficult to remove from fruits and vegetables, particularly those with crevices or folds on the surface.

7.3 Packaging

It should be noted that vacuum packaging does not alter the infectivity of parasites in food.

7.4 Documentation and records

7.4.1 Documentation related to validation, monitoring, and verification activities regarding the control measures used for parasites should be kept.

7.4.2 Monitoring and review of foodborne parasite safety control systems is an essential component of application of a risk management framework (RMF). It contributes to the verification of *postharvest operation* control and demonstrating progress towards achievement of public health goals.

7.4.3 Information on the level of control of parasites at appropriate points in the food chain can be used for several purposes e.g., to validate and/or verify outcomes of food control measures, to monitor compliance with public health goals, and to help prioritize regulatory efforts to reduce foodborne parasite illnesses.

8 Establishment: Maintenance and Sanitation

Pest control systems: Insects, such as flies and cockroaches, and animals such as rodents and birds can transport parasite stages from feces to food and should be controlled.

9 Establishment: Personal Hygiene

Proper personal hygiene such as hand-washing practices should be used to prevent fecal-oral transmission of parasites. For example, workers infected with the tapeworm, *T. solium*, with improper hand-washing practices can spread eggs that result in the severe disease neurocysticercosis.

10 Product Information and Consumer Awareness

10.1 Product information

Labels may be used to help differentiate between *primary and postharvest foods* that are intended for raw consumption and *those* that are intended to be cooked by the consumer. However, even with the beneficial use of labels instructing consumers to cook the *food*, a parasite hazard should be reduced to an acceptable level before marketing *primary and postharvest foods* that are likely to be consumed raw or undercooked.

10.2 Consumer education

10.2.1 In order to increase consumer awareness of foodborne parasite hazards, education is an important component of risk management, and in some cases

may be the only practical option available. Consumers should recognize the risks associated with consumption of raw and *postharvest-treated* meat and fish, as well as the consumption of certain fruits and vegetables that may not be rendered safe simply by washing alone. Consumer advice should be provided on how to prepare foods and on the importance of good hygiene (e.g., handwashing) in order to avoid infection with foodborne parasites. Consumers should always make sure to separate raw foods from cooked food, and ready-to-eat fruit and vegetables to prevent cross-contamination while handling and preparing meals. The WHO Five Keys to Safer Food could assist in this process (WHO, 2006).

- 10.2.2** Education is particularly important for consumers in endemic areas, and in high-risk groups, such as those who are pregnant or immunocompromised (e.g., *Toxoplasma gondii* in pregnant women and immunocompromised groups; *Cryptosporidium* spp. in children, immunocompromised groups, and older adults.) For such consumers, advice on the preparation and consumption of high-risk foods such as fresh produce, adequate cooking of meat and fish prior to consumption and the importance of hygiene (e.g., handwashing) is critical. When people are diagnosed with an *Anisakis* spp. nematodes allergy, they should be advised to avoid eating marine fish.

11 Training

- 11.1** Workers engaged in primary production *and postharvest stages* should be trained and/or instructed in the control of foodborne parasites (e.g., from GAHP to hygiene and sanitation measures) to a level appropriate to the operations they are to perform. Particular attention should be paid to abattoir workers who may be performing *ante-mortem and* post-mortem procedures and food handlers of ready-to-eat foods.

11.2 Training programs

Training programs should contain information on the following, as appropriate to those being trained:

- 11.2.1** The potential for food to be a vehicle of transmission of foodborne parasites if contaminated.
- 11.2.2** The potential sources and routes of transmission of foodborne parasites.
- 11.2.3** The potential for persistence of parasites in/on contaminated *primary and postharvest* foods and *primary* production settings.
- 11.2.4** The need to comply with *relevant COP* and the importance of compliance with such practices, including:

- a) the role of domestic and wild animals in the transmission of certain parasites;
- b) the importance of on-farm sanitation and hygiene in interrupting the life cycle of parasites and minimizing the opportunity for fecal-oral transmission; and
- c) the importance of animal feed management to avoid domestic and wildlife parasite contamination.

11.2.5 Proper hand washing practices and the importance of strict compliance with hand washing instructions at all times, particularly after being in contact with fecal matter. It is advisable to educate each new employee in the proper practices that are to be followed for handwashing.

11.2.6 The importance of adequate *postharvest operations* and preparation to eliminate potential parasite risks.

11.2.7 Task-specific practices to reduce or eliminate the risks of parasites in foods.

11.2.8 *The identification of signs and symptoms in cases of parasite infections.*

11.3 Instruction and supervision

11.3.1 Training and instructions should be given to all new personnel on the transmission and management of foodborne parasites.

11.3.2 Inspectors or other relevant authorities, who inspect fields/*farms* and *postharvest facilities* should also be trained.

11.3.3 Periodic retraining of existing personnel should be given as refresher and to maintain competence level of all personnel.

Bibliography

- Bureau of Agriculture and Fisheries Product Standards (BAFPS)-Department of Agriculture (DA). (2008). Code of Good Animal Husbandry Practices (GAHP) (PNS/BAFPS 60:2008).
https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2021-02-24-PNS-BAFPS%2060-2008-Code%20GAHP.pdf
- Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2014). Code of Good Aquaculture Practices (GAqP) (PNS/BAFS 135:2014). https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2021-02-24-PNS%20BAFS%20135_2014%20Code%20of%20GAqP.pdf
- Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2015a). Code of Hygienic Practice (COHP) for meat (PNS/BAFS 168:2015). https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2021-02-24-PNSBAFS168-2015COHPforMeat.pdf
- Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2015b). Code of Hygienic Practice (COHP) for radiation processing of food (PNS/BAFS 151:2015).
https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2021-02-24-PNS%20BAFS%20151_2015_Radiation%20Processing%20of%20Food.pdf
- Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2016). Code of Good Animal Husbandry Practices (GAHP) for chickens —broilers and layers (PNS/BAFS 184:2016).
https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2021-02-26-PNS%20BAFS%20184.2016.%20GAHP%20Chicken%20Broilers%20Layers.pdf
- Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2017a). Code of Good Animal Husbandry Practices (GAHP) for beef cattle and buffalo (PNS/BAFS 200:2017).
https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20200-2017-GAHP%20Beef.pdf
- Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2017b). Code of Good Animal Husbandry Practices (GAHP) for dairy cattle and water buffalo (PNS/BAFS 199:2017).
https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20199-2017%20GAHP%20Dairy.pdf
- Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2017c). Code of Good Animal Husbandry Practices (GAHP) for goats (PNS/BAFS 201:2017).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20201-2017-GAHP%20Goats.pdf

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2017d). Code of Good Animal Husbandry Practices (GAHP) for sheep (PNS/BAFS 202:2017).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20202-2017-GAHP%20Sheep.pdf

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2017e). Code of Good Aquaculture Practice (GAqP) for milkfish and tilapia (PNS/BAFS 196:2017).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20196-2017-%20Code%20of%20Good%20Aquaculture%20Practices%20for%20Milkfish%20and%20Tilapia.pdf

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2017f). Code of Good Aquaculture Practices (GAqP) for oyster and mussel (PNS/BAFS 207:2017).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20207-2017-%20Code%20of%20GAqP%20for%20Oyster%20and%20Mussel.pdf

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2017g). Code of Good Aquaculture Practice (GAqP) for shrimp and crab (PNS/BAFS 197:2017).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20197-2017-%20Code%20of%20Good%20Aquaculture%20Practices%20for%20Shrimp%20and%20Crab.pdf

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2017h). Code of Hygienic Practice (COHP) for milk (PNS/BAFS 210:2017).

http://www.bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20210-2017-%20COHP%20Milk.pdf

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2018a). Code of Good Animal Husbandry Practice (GAHP) for poultry hatchery (PNS/BAFS 263:2018).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20263-2018-%20Final_GAHP%20for%20Poultry%20Hatchery.pdf

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2018b). Code of Hygienic Practice (COHP) for fresh fruits and vegetables (PNS/BAFS 233:2018).

http://www.bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20233_2018.pdf

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2018c). Code of Practice (COP) for live and raw bivalve molluscs (PNS/BAFS 236:2018).

http://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20236-2018%20-%20Code%20of%20Practice%20for%20Bivalve%20Molluscs.pdf

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2019a). Code of Good Animal Husbandry Practice (GAHP) for ducks (PNS/BAFS 271:2019).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20271-2019-final%20draft%20GAHP%20for%20Ducks.pdf

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2019b). Code of Good Animal Husbandry Practice (GAHP) for swine (PNS/BAFS 267:2019).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20267-2019%20GAHP%20for%20Swine.pdf

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2019c). Code of good animal feeding (PNS/BAFS 282:2019).

http://www.bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20282%202019%20Good%20Animal%20Feeding.pdf

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2019d). Code of Good Aquaculture Practices (GAqP) on hatchery for freshwater prawn (PNS/BAFS 281:2019).

[https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20281%20GAqP%20on%20Hatchery%20for%20Freshwater%20Prawn%20\(1\).pdf](https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20281%20GAqP%20on%20Hatchery%20for%20Freshwater%20Prawn%20(1).pdf)

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2019e). Code of Good Aquaculture Practices (GAqP) on hatchery for shrimp (PNS/BAFS 280:2019).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2022-08-23-PNS%20280%20GAqP%20on%20Hatchery%20for%20Shrimp.pdf

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2019f). Code of Practice (COP) for fresh and quick frozen raw scallops (PNS/BAFS 279:2019).

http://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20BAFS%20279%20-%202019%20COP%20Scallop%20Products.pdf

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2020a). Code of Practice (COP) for the processing of cephalopods (PNS/BAFS 299:2020).

[http://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNSBAFS%20299.200%20\(1\).pdf](http://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNSBAFS%20299.200%20(1).pdf)

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2020b). Code of Practice (COP) for processing of fresh-chilled and frozen minced fish (PNS/BAFS 300:2020).

[http://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNSBAFS%20300.2020%20\(1\).pdf](http://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNSBAFS%20300.2020%20(1).pdf)

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2020c). Code of Practice (COP) for the processing of lobsters (PNS/BAFS 298:2020).

http://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNSBAFS%20298.2020.pdf

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2020d). Code of Practice (COP) for the processing of shrimps and prawns (PNS/BAFS 297:2020).

http://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNSBAFS%20297.200.pdf

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2020e). Good Animal Husbandry Practices (GAHP) — animal welfare and environmental sustainability for chicken and duck (PNS/BAFS 296:2020).

https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNSBAFS%20296%20GAHP%20Animal%20Welfare%20and%20Environmental%20Sustainability%20for%20Chicken%20and%20Duck.pdf

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2021). Seaweeds — Code of Good Aquaculture Practices (GAqP) (PNS/BAFS 208:2021).

[https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2021-10-19-PNS%20BAFS%20208-2021%20Seaweeds%20-%20Code%20of%20Good%20Aquaculture%20Practices%20\(GAqP\).pdf](https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/2021-10-19-PNS%20BAFS%20208-2021%20Seaweeds%20-%20Code%20of%20Good%20Aquaculture%20Practices%20(GAqP).pdf)

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2022). Grouper — Code of Good Aquaculture Practices (GAqP) (PNS/BAFS 334:2022).

[https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS.BAFS%20334.2022_PNS%20Grouper%20-%20Code%20of%20Good%20Aquaculture%20Practices%20\(GAqP\).pdf](https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS.BAFS%20334.2022_PNS%20Grouper%20-%20Code%20of%20Good%20Aquaculture%20Practices%20(GAqP).pdf)

Codex Alimentarius Commission (CAC). (2008). Code of Practice (COP) on good animal feeding (CXC 54-2004, amd. 2008). [https://www.fao.org/fao-who-codexalimentarius/sh-](https://www.fao.org/fao-who-codexalimentarius/sh-proxy/jp/?Ink=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FStandards%252FCXC%2B54-2004%252FCXP_054e.pdf)

[proxy/jp/?Ink=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FStandards%252FCXC%2B54-2004%252FCXP_054e.pdf](https://www.fao.org/fao-who-codexalimentarius/sh-proxy/jp/?Ink=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FStandards%252FCXC%2B54-2004%252FCXP_054e.pdf)

- Codex Alimentarius Commission (CAC). (2013). Guidelines for the validation of food safety control measures (CXG 69-2008, amd. 2013). https://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FStandards%252FCXG%2B69-2008%252FCXG_069e.pdf
- Codex Alimentarius Commission (CAC). (2016). Guidelines on the application of general principles of food hygiene to the control of foodborne parasites (CXG 88-2016). https://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FStandards%252FCXG%2B88-2016%252FCXG_088e.pdf
- Codex Alimentarius Commission (CAC). (2020). General principles of food hygiene (CXC 1-1969, rev. 2020). https://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FStandards%252FCXC%2B1-1969%252FCXC_001e.pdf
- Food and Agriculture Organization of the United Nations (FAO). (1997). Checklist of the Parasites of Fishes of the Philippines (FAO fisheries technical paper 369). <https://www.fao.org/3/w6598e/w6598e.pdf>
- Food and Agriculture Organization (FAO) of the United Nations (UN). (2014). FAO Technical paper on assessment and management of fish safety and quality: Current practices and emerging issues (FAO fisheries and aquaculture technical paper 574). <https://www.fao.org/3/i3215e/i3215e.pdf>
- Food and Agriculture Organization (FAO) of the United Nations (UN) & World Health Organization (WHO). (2020). Code of practice for fish and fishery products (CXC 52-2003, rev. 2016). Rome. <https://doi.org/10.4060/cb0658en>
- Food and Agriculture Organization (FAO) of the United Nations (UN) / World Health Organization (WHO). (2014). Multicriteria-based ranking for risk management of food-borne parasites (Microbiological Risk Assessment Series No. 23). <https://www.fao.org/3/i3649e/i3649e.pdf>
- Food and Agriculture Organization (FAO) of the United Nations (UN) / World Health Organization (WHO) / World Organisation for Animal Health (OIE). (2005). Guidelines for the surveillance, prevention, and control of taeniasis/cysticercosis. https://apps.who.int/iris/bitstream/handle/10665/43291/9290446560_eng.pdf?sequence=1&isAllowed=y
- Food and Agriculture Organization of the United Nations (FAO) / World Health Organization (WHO) / World Organisation for Animal Health (OIE). (2007). Guidelines for the surveillance, management, prevention, and control of

trichinellosis. http://www.trichinellosis.org/uploads/FAO-WHO-OIE_Guidelines.pdf

Food Safety Act (FSA) of 2013. (2013). Republic Act No. 10611.
<https://www.officialgazette.gov.ph/2013/08/23/republic-act-no-10611/>

World Health Organization (WHO). (2006). Five keys to safer food manual.
<http://www.who.int/foodsafety/publications/5keysmanual/en/>

World Health Organization (WHO). (2015). WHO estimates of the global burden of foodborne diseases: foodborne diseases burden epidemiology reference group 2007-2015. <https://www.who.int/publications/i/item/9789241565165>

World Organisation for Animal Health (OIE) & World Health Organization (WHO). (2002). WHO/OIE Manual on *Echinococcus* in human and animals: a public health problem of global concern.
<http://whqlibdoc.who.int/publications/2001/929044522X.pdf>

World Organisation for Animal Health (WOAH). (2022). Aquatic animal health code.
<https://www.woah.org/en/what-we-do/standards/codes-and-manuals/aquatic-code-online-access/>

World Organisation for Animal Health (WOAH). (2022). Terrestrial animal health code. <https://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/>

Department of Agriculture (DA)
Bureau of Agriculture and Fisheries Standards (BAFS)

Technical Working Group (TWG) for the Adoption of Priority Codex General Standards as Philippine National Standards (PNS) – Sub-Working Group (SWG) 2

Chairperson

Carlos, Angella Melissa
Philippine Society for Microbiology (PSM), Inc.

Vice-Chairperson

Sabino, Noel, PhD
PSM, Inc.

Members

- | | |
|--|--|
| 1 Joco, Maria Lourdes, DVM
Office of the Assistant Secretary for
Regulations (OASR)-DA | 11 Jamandra, Danilo, Jr.
Philippine Coconut Authority
(PCA)-DA |
| 2 Tipa, Hernando
Bureau of Animal Industry (BAI)-DA | 12 Sumagaysay, Jean Nanette
Sugar Regulatory Administration
(SRA)-DA |
| 4 Loja, Joseph Adrian | |
| 5 Roxas, Freda | 13 Elano, Rachel
Food Development Center (FDC)-
DA |
| 6 Somga, Sonia, DVM
Bureau of Fisheries and Aquatic
Resources (BFAR)-DA | |
| 7 Taleon, Christian Allen
Bureau of Plant Industry (BPI)-DA | 14 De Las Peñas, Kris Jenelyn
15 Reyes, Rona Regina, DVM
National Codex Organization
(NCO)-Technical Committee (TC) |
| 8 Platero, Judith
National Dairy Authority (NDA)-DA | 16 Vital, Pierangeli, PhD
University of the Philippines (UP)
Natural Sciences Research
Institute (NSRI) |
| 9 Cruz, Mae Nimfa, DVM | |
| 10 Sebello, Armie Mariel, DVM
National Meat Inspection Service
(NMIS)-DA | |

BAFS Management Team

Roscom, Karen Kristine, PhD
Aquino, John Gregory
Bautista, Karina Angela

Adviser

Mamaril, Vivencio, PhD



BUREAU OF AGRICULTURE AND FISHERIES STANDARDS

BPI Compound, Visayas Avenue, Diliman, Quezon City, 1101 Philippines

Trunkline: (632)8928-8741 to 64 loc 3301-3319

E-mail: info.dabafs@gmail.com

Website: www.bafs.da.gov.ph