DUS DARS 1107

DRAFT UGANDA STANDARD

First Edition
2023-mm-dd

Freshwater aquatic animal production farms — Good aquaculture practices

Reference number
DUS DARS 1107: 2023

Compliance with this standard does not, of itself confer immunity from legal obligations

A Uganda Standard does not purport to include all necessary provisions of a contract. Users are responsible for its correct application

The Executive Director
Uganda National Bureau of Standards
P.O. Box 6329
Kampala
Uganda
Tel: +256 417 333 250/1/2
Fax: +256 414 286 123
E-mail: info@unbs.go.ug
Web: www.unbs.go.ug

National foreword

Uganda National Bureau of Standards (UNBS) is a parastatal under the Ministry of Trade, Industry and Cooperatives established under Cap 327, of the Laws of Uganda, as amended. UNBS is mandated to co-ordinate the elaboration of standards and is

(a) a member of International Organisation for Standardisation (ISO) and

(b) a contact point for the WHO/FAO Codex Alimentarius Commission on Food Standards, and

(c) the National Enquiry Point on TBT Agreement of the World Trade Organisation (WTO).

The work of preparing Uganda Standards is carried out through Technical Committees. A Technical Committee is established to deliberate on standards in a given field or area and consists of key stakeholders including government, academia, consumer groups, private sector and other interested parties.

Draft Uganda Standards adopted by the Technical Committee are widely circulated to stakeholders and the general public for comments. The committee reviews the comments before recommending the draft standards for approval and declaration as Uganda Standards by the National Standards Council.

This Draft Uganda Standard, DUS DARS 1107:2023*, Freshwater aquatic animal production farms — Good aquaculture practices,* is identical with and has been reproduced from a Draft African Standard, DARS 1107:2023*, Freshwater aquatic animal production farms — Good aquaculture practices,* and is being proposed for adoption as a Uganda Standard.

The committee responsible for this document is Technical Committee UNBS/TC 211, *Fish and fishery products*.

Wherever the words, “African Standard " appear, they should be replaced by "Uganda Standard."

AFRICAN STANDARD

DARS 1107

2nd Edition 2023

Freshwater aquatic animal production farms — Good aquaculture practices

Reference No. DARS 1107:2023(E)
ICS 65.150

Table of contents

Foreword

The African Organization for Standardization (ARSO) is an African intergovernmental organization established by the United Nations Economic Commission for Africa (UNECA) and the Organization of African Unity (AU) in 1977. One of the fundamental mandates of ARSO is to develop and harmonize African Standards (ARS) for the purpose of enhancing Africa's internal trading capacity, increase Africa's product and service competitiveness globally and uplift the welfare of African communities. The work of preparing African Standards is normally carried out through ARSO technical committees. Each Member State interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, Regional Economic Communities (RECs), governmental and non-governmental organizations, in liaison with ARSO, also take part in the work.

ARSO Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare ARSO Standards. Draft ARSO Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an ARSO Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ARSO shall not be held responsible for identifying any or all such patent rights.

This African Standard was prepared by the ARSO Technical Committee on Fish, fisheries and aquaculture (ARSO/TC 03).

This African Standard is a technical revision of the earlier ARS 1107:2018, (*Freshwater aquatic animal production farms — Good aquaculture practices)* which is hereby superseded and cancelled

ARSO Central Secretariat
International House 3rd Floor
P. O. Box 57363 — 00200 City Square
NAIROBI, KENYA

Tel. +254-20-2224561, +254-20-3311641, +254-20-3311608

E-mail: arso@arso-oran.org
Web: www.arso-oran.org

ARSO Central Secretariat
International House 3rd Floor
P.O. Box 57363 — 00200 City Square
NAIROBI, KENYA

Tel: +254-20-2224561, +254-20-3311641, +254-20-3311608

E-mail: arso@arso-oran.org
Web: www.arso-oran.org

Freshwater aquatic animal production farms — Good aquaculture practices

1 Scope

This African standard applies to good aquaculture practices (GAP) at all stages in freshwater aquatic animal culture for shellfish, finfish, amphibians and reptiles. in order to produce products of good quality and safe for human consumption.

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 any amendments) applies.

CAC/RCP 52, *Code of practice for fish and fishery products*

3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply.

3.1
freshwater aquatic animal
animals living entirely or most of the time in freshwater or most of the life-cycle living in freshwater including river, canal, swamp reservoir, lake

3.2
freshwater aquatic animal farm
site for freshwater aquatic animal farm consisting of ponds, cages, feed preparation area, buildings and facilities for sanitation services

3.3
pond
man-made water storage for freshwater aquaculture such as earthen pond, cement pond, canvas pond and plastic pond

3.4
cage
container enclosed on all sides and bottom by mesh materials that permit free exchange with surrounding water

3.5
veterinary drug
any substance applied or administered to any food-producing animal, whether used for therapeutic, prophylactic, or diagnostic purposes or for modification of physiological functions or behaviour

3.6
residues of veterinary drugs
veterinary drugs as in 3.5 including parent drug, metabolites and associated impurities in the animal tissue, produce and products of animal which are used for human food

3.7
aquaculture
farming of aquatic organisms including shellfish, finfish, molluscs, amphibians, reptiles

3.8
stocking density
amount of aquatic animal farms stocked per unit of area or volume

3.9
withdrawal time
period of time necessary between the last administration of a veterinary drug to aquatic animal farms, or exposure of these animals to a veterinary drug, and harvesting them to ensure that the concentration of the veterinary drug in their edible flesh intended for human consumption, complies with the maximum permitted residue limits

4 Good aquaculture practices for freshwater aquatic animal farm

,

For the practical application of the concept of good aquaculture practices and operation procedures, the following should be considered:

4.1 Site

Site is the first priority to be considered. The location of freshwater aquatic animal farm should comply with relevant laws and meet the technical requirements in order to obtain quality products.

4.2 Pond

4.2.1 Farm registration is required by contacting the designated competent authority. The registered information will be useful for relevant government agencies to locate the farm and to provide assistance to the farmers. Farmers should provide legal documents on land use rights, or lease contract for farm registration.

4.2.2 The farm shall be kept away from polluted sources, such as industrial factories and waste from communities. Soil and water samples shall be taken for analysis to assess the suspected risk factors from polluted sources. An appropriate method for preventing the impact from pollution can be applied using technology. In case farm is located in flooding areas, protection shall be provided to avoid damage and contamination.

4.2.3 A good design of water inlet and outlet system shall be provided in order to prevent cross contamination among ponds and between inside and outside of farms. In addition, such good systems can save energy and cost of water pumping in and out of the farm as well as facilitate t farm management.

4.2.4 Farm site shall be conveniently accessed such as road for cars, river or canal for boats to facilitate the transport of fry, feed and inputs. Accessibility is essential for cost-effective production and maintaining freshness of products to markets or processing plants and for visitors and inspectors..

4.2.5 Farm site shall have essential basic infrastructures according to farm area condition for convenience of farm management such as electricity for water pump and aerator, or diesel engine water pump, tap, or underground water, or rain water or clean water that fits for consumption.

4.2.6 Earthen Pond shall be impervious in order to reduce the leakage during the culturing period. Soil shall have appropriate properties such that depth, shall be considered during site selection or be able to be improved for safe aquaculture practices.

4.3 Cage

4.3.1 Farmers shall register their farms with the competent authority. The registration will be necessary for official and related authority for identification of location and facilitation of government support.

4.3.2 Cage shall be located in the area where water source is of good quality, suitable, sufficient and of good circulation. Water quality suitable for freshwater aquaculture shall have pH 6.5 - 8 and dissolved oxygen not less than 4 mg / L

4.3.3 In general, cage site shall be located away from polluted sources. In case the cage is subjected to tide or upstream or downstream area, farmer shall acquire information demonstrating the cage is not affected by such pollution. For instance, information of pesticide analyses shall be obtained if there is wastewater discharging from upstream paddy field, or information of Biological Oxygen Demand (BOD) analyses if there is factory (such as sugar factory, paper and pulp factory, or rice mill) located upstream.

4.3.4 Cage site shall be conveniently accessed such as road for cars, river or canal for boats to facilitate the transport of fry, feed and inputs. This convenience is essential for cost-effective production and for maintaining freshness of products to markets or processing plants. It is also convenient for visitors and inspectors to visit the farm.

4.3.5 Cage shall have necessary basic infrastructures according to farm area condition for convenience of farm management such as electricity for water pump, aerator, or diesel engine water pump, tap, or underground water, or rain water or clean water that fits for consumption.

4.3.6 Authorization from the competent authority shall be obtained so that the cages are arranged neatly so as not to have a negative impact on the water source surrounding the cages.

4.3.7 Besides the concern of the environment, placement of cages shall be in the area where it will not obstruct the water flow and the water passage; otherwise, the cages may reduce the flow speed of water or cause social problems and water transportation. In addition, area for cage culture shall be opened, no strong flow of water or wind nor crowed by aquatic plants which hinder water flow through the cage.

5 General farm management

Farm management is a plan to prepare for rearing which is vital for successful aquaculture. If farmers can apply the practices well, suitable to the site and season, there will be only few problems on daily basis.
The recommended practices for earthen pond aquaculture are as follows:

5. 1 Pond preparation

Freshwater aquatic animal farm requires good preparation. In particular, the old culture pond may have the decayed bottom where disease and hydrogen sulphide (H_2S) are accumulated. This may contribute to negative impact on the health of aquatic animal. Therefore, preparation of a new and old pond should be done as follows:

5. 1.1 New Pond

Problem involving acidic soil can be found in new pond. It can be observed by the orange-red rust or yellow colour of soil in the pond. In general, this soil indicates pH 2 - 3 and may not be suitable for aquatic farming because the acidic soil will result in acidic water. In such case, it is recommended to fill water into the pond to cover soil surface for approximately seven days, and then drain water and repeat this until the pH of the soil reaches 6.5 - 8.5. Liming can also be used to adjust pH of the soil by scattering 1250 kg - 1900 kg of lime per hectare around the area. However, if there is not enough water supply, amount of lime shall be increased to 2500 – 3125 kg per hectare until the pH is adjusted as required. Also, chicken or cow manure, dried or decomposed for 60 days, can be used.

5..1.2 Old Pond

After each harvest, sludge at the bottom of pond shall be taken out prior to pond drying process. This sludge shall not be left on the dike or drained directly to the public water resource. It shall be collected in a sludge pond or ploughed with a tractor approximately two to three times to incorporate oxygen into the soil and then dried for two weeks before the next farming. The dike shall be adjusted to be ready for use. If there is waterlogging at the bottom of the pond where some other aquatic animals remain, saponin at the concentration of 15 mg/l - 25 mg/l depending on the salinity of water, or 1 g of 100 % rotenone solution per 1 m^3 of water in culture pond, or 20 g of 5 % rotenone solution per 1 m^3 of water in culture pond shall be diluted and splashed into the pond (rotenone is toxic to fish and insects). Liming shall be used to disinfect and improve quality of the bottom of the pond thereafter.

5.1. Water preparation

Due to the fact that freshwater aquatic animal farming technique is differed among species, water preparation techniques are different. However, the principles are the same. After pond preparation, water shall be pumped into the pond to 30 cm - 50 cm in depth, filtered with double layers of green cloth filter net (mesh size of 24 - 26 meshes/inch) to prevent predators and/or other species from entering in to the pond.

For the first preparation, the dried or 60-day fermented compost at the rate of 625-950 kg/ha or liquid organic fertilizer at the rate of 625 - 1250 l/ha shall be spread around the pond and left for 7 - 8 days until the water turn green. This produces natural feeds in terms of phytoplankton and zooplankton. (Be careful when using liquid organic fertilizer as it will cause rapid reduction of dissolved oxygen in the water. This could lower the dissolved oxygen value in the pond and cause death of aquatic animals in very short time). Subsequently, the pond shall be filled with water up to 1.0 m to 1.2 m depth. If possible, dissolved oxygen value shall be analyzed prior to fry stocking stage.

During culturing period, natural feed shall be produced at all times in order to save the cost of feed as well as to balance the ecosystem in the pond. This can be done by applying the principle of “small amount but high frequency” of the dried or 60-day fermented compost at the rate of 150 - 300 kg/ha/month or liquid organic fertilizer at the rate of 62.5 - 125 lit/ha/month. (For this period, the dissolved liquid organic fertilizer solution shall be spread around the pond and used with care as it could cause rapid reduction of dissolved oxygen in the water. This could harm aquatic animals). Moreover, farmer shall not overfeed during this period because the leftover feed will be the major cause of water pollution.

5..1.4 Water quality for culture pond

Water quality suitable for culture pond shall be as follows:

a) pH of 6.5 - 8.5;

b) BOD not exceed 20 mg/l;

c) Dissolved Oxygen (DO) not less than 3 mg/l;

d) NH_3-N not exceed 1.1 mg/l; and

e) alkalinity not less than 50 mg/l.

5.2.2 Procedures for resolving low level of dissolved oxygen

Level of dissolved oxygen in the pond shall not be less than 3 mg/l. However, the lowest level of dissolved oxygen in water of the pond will commonly occur in early morning. The farmer shall regularly check dissolved oxygen or observe whether there are numbers of aquatic animals swimming at the surface. In such case, aerator shall be operated to increase dissolved oxygen or exchange water in the pond. In addition, temporarily stop feeding or decrease the amount of feed shall be practiced.

5.2.3 Water exchange

In cases where water quality is not suitable and it is necessary to exchange or refill water from outside the farm, water shall be filtered with double layers of green cloth filter net (mesh size of 24 - 26 meshes/inch) to protect larvae from predators and from nature. Effluent from water exchange or during harvest shall not be discharged directly to the public water resources. In case effluent is discharged directly to the public water resources, its parameters shall meet the specification required by laws.

5.2.4 Farm layout

This shall be made available for transport of aquatic animal fry, delivery of inputs, feed, being visited by visitors, fishery extension officers, farm inspection officers, harvest and transport of aquatic produce by the collectors who distribute the produce. Moreover, farmer shall have farm layout for management and planning purposes.

5.2.5 Effluent treatment

Effluent shall be treated prior to discharge whereby the effluent parameters shall meet specifications required by national Laws and regulations.

5.2.6 Technical meetings or training programs

Technical meetings or training programs on farm management, use of production inputs, harvesting, laws and regulations relevant to freshwater aquatic animals farming shall be attended to enhance and develop knowledge.

6 Cage

Farmers shall ensure that their farm practices follow the laws or regulations of freshwater aquatic animal cage approved by the competent authority or responsible agency.

6.1 Cage culture

The following shall be considered in freshwater aquatic cage culture:

(i) Cage location: This shall not obstruct water transport. Setting the cage along the banks is recommended for culturing in canal. In a larger area, the size of cage location can be expanded as appropriate but it shall not obstruct water traffic.
(ii) Cage interval: This shall be at least 50 cm to ease water flow through the cage, and minimize waste accumulation at the bottom of the cage. Furthermore, the depth of the cage shall not be deeper than one metre from the bottom even in the driest season.

6.2 Size of aquatic animal fry and stocking density

Size of the aquatic animals for stocking varies with the mesh size of the cage, while stocking density depends on the size of the aquatic animals. In addition, season is also vital to stocking density. In case of the winter season, the stocking density shall be lower than other seasons because aquatic animals are weaker and more susceptibility to disease. Conditions of the water source are other important factors for stocking density. For example, stocking density in still water such as dam or reservoir shall be less than in the river, which has more suitable flow speed and better quality of water.

6.2.3 Regular cleaning of the cage shall be done, especially for the cage located in the area of still water which can accumulate waste and later cause a problem of water pollution.

6.2.4 In case of low dissolved oxygen in the water, aeration is recommended. This can also be done by exchange of water through the cage by aeration by any appropriate means.

6.2.5 Feeding can be done either by sowing or using feed container. The amount of feed and number of meals in a day shall be suitable for species and age of each aquatic animal. Farmers can start feeding with small amount at several spots and observe the feeding behaviour. For instance, if aquatic animals snatch feed which is thrown into the pond, it can be interpreted that the feed are insufficient. In this

case, new feeding spots shall be increased. If the aquatic animals do not seem to be interested in the feed, farmers shall stop feeding and periodic cleaning of the pond to remove the leftover feed from the pond before it sinks to the bottom because this would easily cause the decay at the bottom of the cage or pond.

6.2.6 Cage layout shall be made suitable for transport of aquatic animal fry, delivery of inputs, feed, being visited by visitors, fishery extension officers, farm inspection officers, harvest and transport of aquatic produce by the collectors who distribute the produce. Moreover, farmer shall have farm layout for management and planning purposes.

6.2.7 The number of cages shall not exceed the capability of the water source in order to prevent the negative impact and preserve the sustainability of the environment. The total number of cages shall not exceed that is permitted by the Department of Fisheries.

6.2.8 Technical meetings or training programmes on farm management, use of production inputs,harvesting, laws and regulation relevant to freshwater aquatic animals farming shall be provided to enhance and develop knowledge of farmers and other relevant workers in applying good aquaculture practices correctly and appropriately.

6.2.9 Farmers shall manage the area, buildings and cagesaccording to good hygienic practices both inside and outside the cage. Equipment shall be cleaned and kept orderly.

7 Inputs

7.1 General

There are varieties of inputs for aquatic animal farming such as fry, feed, feed supplement, vitamins, probiotic, veterinary drugs, liming, salt and chemicals. However, selection of the inputs depends upon age and size of the aquatic animal, stocking density, methods of aquaculture and harvest size. Requirements for input selection are given in7.2.

7.2 Selection of good quality fry

- Good quality and healthy fry, which can better adapt to the environment,
- Fry from the brood stock with good growth rate
- Relevant documents for traceability.
- Appropriate stocking density of the fry shall be considered as over stocking density will cause stress and sickness easily, which will create problems and slow growth.

7.2.1 Farmer shall request official Fry Movement Document (FMD) from hatchery in order to ensure product quality and traceability.

7.2.2 Whenusing manufactured inputs such as feed, feed supplements, and vitamins purchased from factory or distributor, they shall be registered products with the competent authority and label specified nutrition values, production and expiry dates. Before use, farmer shall observe the label to ensure that the feed is in good condition. There shall not be laceration of the package, excessive moisture, mould, and the product shall be within the expiry date to ensure good quality of feed.

7.2.3 Inputs excluding feeds, feed supplements, vitamins, minerals, and other relevant feedstuffs shall be free from prohibited veterinary drugs and chemical residues such as nitrofuran, chloramphenical, and malachite green. Forexample, colouring solution for adjusting water quality shall not contain malachite green; or fine rice bran shall not contain nitrofuran, or chloramphenicol.

7.2.4 In case of feed prepared on farm, raw materials such as fish meal, soybean meal, rice bran, and broken milled rice shall be free from prohibited veterinary drugs and chemicals in order to avoid residues of veterinary drugs and chemicals in the fish tissues.

7.2.5 Tools and equipment for preparing feed on farm shall be clean and hygienic. For instance, prior to or after using those tools and equipment they shall be clean and dried up, maintained to be ready for

use and kept orderly. In addition, preparing feed on farm shall be hygienic, clean, and safe for the aquatic animals and consumers. For instance, ingredients and feeds shall be placed on clean containers, not to contact directly to the ground or the processing floor to protect them from germs and hazardous substances residues. Attention shall be paid to prevent contamination from cockroaches, flies, birds, rats, dogs and cats during the feed preparation process

7.2.6 Feed prepared on farm shall have appropriate quality to meet the nutrient requirements of aquatic animals. Low quality feed will cause slow growth rate which will require longer culturing period, high cost of production, and undersized aquatic animal. These will certainly cause low price of the product.

8.0 Storage of inputs

8.1 Inputs shall be properly and orderly stored, and clearly separated and defined in a hygienic and safe condition in the warehouse and designated area, away from heat, moisture, sunlight, rain, strong wind, with good ventilation system.

8.2 The warehouse shall be protected from disease carriers of aquatic animals and human such as rats, cockroaches, flies, birds, dogs, and cats etc.

8.3 The inputs shall be placed on a pallet, not contact the ground, to prevent from deterioration. For example, feed bag shall be kept in a warehouse and separated from other inputs on a pallet approximately 10 cm above the floor and away from the wall to protect moisture causing the feed to be easily mouldy.

8.4 Veterinary drugs shall be stored in accordance with the instruction specified in the label or attached document. Prescribed veterinary drugs shall be kept separately from others. Veterinary drugs and chemicals for different aquatic animals shall be kept orderly in groups, in closed containers and away from children, pets and unauthorized personnel.

9 Health management for aquatic animals

Protection is the best measure to control and manage aquatic animal health.

Major factors which shall be considered in aquatic animal farming are management and environment. Improper management, such as too high stocking density, mismanagement in production system or farming in vulnerable environment such as climate fluctuation, polluted water, and accumulation of leftover feeds, will lead to stress and causing disease infection of the aquatic animals. Better management will result in better health to recover from sickness. Prevention and treatment of disease depend upon the cause of disease.

Requirements for aquatic animal health management are given in 9.1 to 9.2.

9.1 Pond

9.1.1 Proper preparation of pond and equipment appropriate for culture can prevent disease. In particular, improper preparation of earthen pond used to rear the aquatic animals can cause diseases. Equipment shall be regularly cleaned because they may be in contact with the animals and cause infection, for instance, dirty feed container and leftover feed will be deteriorated and harbour diseases. Wounded animal or animal wounded by scratching with container will be susceptible to the disease and become weak and finally infected.

9.1.2 When the aquatic animals show abnormal sign, the causation shall be considered before applying veterinary drugs or chemicals. After the cause is found, corrective actions on farm and environmental management and improvement shall be taken. For example, a lot of animals floating on the water surface in early morning indicate insufficient dissolved oxygen, therefore aeration shall be carried out by using aerator or spraying water through the air down to the pond using electric pump. If there are other associated occurrences, such as dark green colour in the pond which indicates over

blooming of phytoplankton, water exchange and reduction of the additional feed shall be undertaken. The farmer shall record the symptoms of aquatic animals and other analysis report, where possible, together with each corrective action for further diagnosis of the symptoms effectively.

9.1.3 Where necessary, registered veterinary drugs and chemicals shall be used. Prohibited veterinary drugs and chemicals shall not be used. The instruction on how to use them, especially the withdrawal period, shall be strictly followed. The use of veterinary drugs and chemicals shall be recorded each time and used under the advice of veterinarian or fishery officer with expertise in aquatic animal disease. Expired drugs shall not be used. Records shall be kept for at least two years.

9.1.4 Nitrofuran, chloramphenical, and malachite green, etc., which are prohibited veterinary drugs and chemicals, shall not be used.

9.1.5 Normally, immediate inspection for the cause of death shall be conducted but in the case of outbreak, where large number of death occurred, the competent authority shall be promptly notified. Appropriate methods for carcass for example, burning, burying with the use of disinfectant or lime, etc. shall be used. Water from the infected pond shall be disinfected and treated before discharge.

9.2 Cage

9.2.1 Cage preparation is very important and necessary for culture such as cleaning and unblocking the mesh of cages to improve water circulation. If the cage has been used for diseased aquatic animals, the cage shall be disinfected by chorine, formaldehyde or potassium permanganate before reuse to prevent the spreading of disease. Cage setting location is also an important factor to be considered in order to prevent negative effect on the environment, and accumulation of feed leftover around the cage.

9.2.2 Cage and equipment shall be regularly cleaned throughout the culture process to allow water flow in and out at all times in order to remove the waste. In this case, the good condition for culture will be maintained at all time and will encourage the animals to move and grow more rapidly.

9.2.3 The aquatic animal's health shall be regularly monitored and taken care of, together with checking water quality, for example random checking or observing the abnormal signs, namely floating on the water surface, imbalance swimming, anxious sign, and improper water quality, etc., shall be regularly done. In case of problems, diagnosis shall be conducted so that the corrective action can be appropriately taken prior to disease spread.

9.2.4 When the aquatic animals show abnormal sign, the cause shall be immediately identified and corrective actions on farm and environmental management and improvement shall be taken before applying veterinary drugs and chemicals. For example, if there is unusual number of animals floating on the water surface, water quality shall be analyzed and the daily record of animals' health from the past week shall be checked in search for the cause of the problem. At the same time, the symptoms of aquatic animals and corrective actions taken shall be implemented. In case of low level of dissolved oxygen, appropriate oxygenation methods should be applied, spraying water through the air, cage cleaning, and reducing feed shall be considered. All observations and findings shall be recorded.

9.2.5 Where necessary, registered veterinary drugs and chemicals shall be used. Prohibited veterinary drugs and chemicals shall not be used. The instruction on how to use them, especially the withdrawal period, shall be strictly followed. The use of veterinary drugs and chemicals shall be recorded each time and used under the advice of veterinarian or fishery officer with expertise in aquatic animal disease. Expired drugs shall not be used. Records shall be kept for at least two years.

9.2.6 Nitrofuran, chloramphenical, and malachite green, etc., which are prohibited veterinary drugs and chemicals shall not be used.

9.2.7 Immediate inspection for the cause of death shall be conducted. Transfer of the aquatic animals, where necessary, shall be done carefully and gently. In the case of outbreak, the competent authority, that is, veterinarian or fishery officer or local officer of the Department of Fisheries shall be immediately notified. Appropriate methods for carcass disposal, for example burning, burying with the use of disinfectant or lime, etc. shall be used. In such case, the wastewater from treating of infected animal shall be disinfected and treated before discharge.

10 Farm sanitation

Cage and pond culture shall require good management including farm sanitation as it is necessary for keeping good quality of aquatic products. Daily supervision of farm sanitation will facilitate farmer establishing farm standard in compliance with requirements in 10.1 and 10.2.

10.1 Pond

10.1.1 Discharge from household shall be separated from farm in order to prevent contamination in the water system of the farm, or the release to the pond or farm nearby. For example, household discharge shall not be drained to the same furrow of farm water system or reservoir.

10.1.2 Lavatory shall be completely separated from the farm area. Waste management system shall consider hygienic condition. It is needed to ensure that waste water cannot leak to the farm system. Bacteria contamination, a major cause of gastrointestinal disease, shall be monitored by collecting water sample for analysis of coliform bacteria. Immediate response to such problem shall be conducted. The number of coliform bacteria shall not exceed 5,000 most probable number per 100 millimetres (MPN/100 ml), and the faecal coliform bacteria shall not exceed the natural level. In case that the number of bacteria exceed the value specified by the standard, it is an indication of contamination of waste disposal from lavatory, household, or pets.

10.1.3 Availability of proper treatment system of aquaculture waste i.e. aquatic animal's carcass, veterinary drug and chemical containers required for disposal method of burning or bury depending on type of waste.

10.1.4 Tools used on farm shall be orderly arranged, clean, in hygienic condition, and maintained to be ready for use. Workers' housing, office, feed store, warehouse, feed preparation area, and buildings shall always be kept clean and well maintained.

10.1.5 Good management system and routine collection for garbage are required. Trash bins shall have lids in order to prevent flies, rodents, cockroach, and pets. Garbage shall be correctly abolished in designated area using the proper method.

10.2 Cage

10.2.1 Lavatory shall be completely separated from the cage area. Sanitary condition shall be considered to ensure that waste will not leak and contaminate the system. In case that lavatory is located on land, sewage shall not be directly discharged or leaked to the cage area.

10.2.2 Tools used on farm shall be orderly arranged, clean, in hygienic condition, and maintained to be ready for use. Workers' housing, office, feed store, warehouse, feed preparation area, and buildings shall always be kept clean and well maintained.

10.2.3 Garbage shall not be discarded to the cage area. Garbage collection area shall be properly arranged and well managed. Trash bins shall have lids in order to prevent flies, rodents, cockroach, and pets. Garbage shall be correctly abolished in designated area using the proper method.

11 Harvest and post-harvest practices

Harvest is the final step in the aquaculture which is vital for maintaining quality of the products. As the aquatic products will be sold for human consumption, farmer shall therefore pay attention to the requirements in 11.1 to 11.4.

11.1 The farmer shall have a good harvest plan and rapid distribution emphasizing on freshness of the product and harvest of healthy aquatic products in order to keep premium quality. The good plan is also to avoid contamination of aquatic products during harvest and post-harvest.

11.2 The Movement Document (MD) issued by the competent authorities shall be made available to provide consumers or relevant stakeholders or processing its background information on the source of aquatic animal products for further consumption.

11.3 During the process of freshwater aquaculture grow-out period in the pond or cage, tissue sample of the aquaculture product shall be randomly checked by the authorized laboratory or well recognized institute accredited by an international standard organization at least once a year. The analyses are for the veterinary drugs and chemicals which are allowed and prohibited for use according to the official notification as well as bacteria causing the gastrointestinal disease. The prohibited veterinary drugs and chemicals shall not be found. The allowed veterinary drugs and chemicals and bacteria causing the gastrointestinal disease shall not exceed the maximum limits specified by the standard.

11.4 For good quality and safety of freshwater aquaculture product, guidelines for management method and maintenance during harvest and post-harvest process shall be as follows:

11.4.1 During the aquaculture harvesting, farmer shall not bring pets (for example, duck, chicken, cow, dog, cat, etc.) close to cultured pond or cage area. In case of using pet to protect farm's assets, farmer shall keep their defaecated waste away from cultured area and frequently clean the area.

11.4.2 Some freshwater aquaculture products may have problem with muddy taste such as in meat. The cause of muddy taste is mainly due to the accumulated consumption of blue-green algae in the pond.

11.4.3 In order to reduce the blue-green algae in the water, compost shall not be used at least two months prior to harvest; additional feed or supplementary feed shall be provided, together with water exchange. However, the caution shall be emphasized on over-feeding of supplementary feed because accumulated feed is a source of blue-green algae blooming.

11.4.4 Muddy taste in the meat shall be determined by tasting the steamed fish sample without seasoning. If the meat does not contain muddy taste, the product can be sold.

11.4.5 Prior to selling product, feeding shall be stopped one day before harvest for self-adjustment and defaecation of the aquatic animals. This way, quality and freshness of the aquatic product can be kept during transportation as well as can prolong rotting.

11.4.6 The personnel handling and relating to aquaculture animal shall be healthy and has no infectious diseases which are not accepted by the consumers. Worker(s) who has been infected shall take leave and return to work after recovery.

11.4.7 Tools, equipment, and harvesting method shall not cause negative effect to the quality of aquatic animal and post-harvest storage as well as cause contamination affecting food safety. Harvested products shall not be directly contacted on the ground.

11.4.8 Equipment used with aquatic animals e.g. media immersing and transporting, etc. shall be clean and made of strong materials withstanding corrosion; and be in good condition and ready for use. After work, all equipment shall be immediately cleaned and stored so as not to harbour the microbes.

11.4.9 Clean and chemical-free ice shall be used. Reuse of the ice is not recommended. Aquatic transport shall be designed in order to prevent heat during the transportation. Area for transferring the aquatic product shall be made of materials easy to be cleaned, preventing dust, and avoiding moisture losses caused by sunlight and wind. Transportation of products shall not be with other commodities.

11.4.10 In case of transporting harvested aquatic animals, they shall be chilled immediately after harvest to maintain freshness as much as possible. The use of ground or flake ices is recommended because smaller size of ice has larger contact surface with the product, thus can chill the product faster. Water used for cleaning aquatic animals shall be clean and not be reused. For best quality, pack the product in appropriate-size container after putting the ice at the bottom. Then the product shall be packed in alternate layers with ice to preserve the quality and freshness of the aquatic animal.

11.4.11 In case of transporting live aquatic animals, container used during transport shall be designed for heat protection. Aeration shall be used during the transportation. Area for transporting aquatic product shall be made of materials easy to be cleaned and preventing dust. During transportation, the use of ice is recommended in order to numb the aquatic animal and reduce the damages that may occur. However, the temperature shall not be too low that can cause injury to the animal. Injured, infected, or dead aquatic animals shall not be included in the transporting container. They shall be separated from the healthy animal and other species during the transportation to reduce the possibility of contamination.

12 Records keeping

To ensure that the aquaculture management system can be efficiently implemented and improved from time to time, any person or establishment engaged in commercial aquaculture production should keep records relating to measures in place to control hazards and health related problems including records on species quantities and their sources, analysis result of residues from laboratory, Fry Movement Document (FMD) and/or Movement Document (MD).nature and origin of feeds, feeding methods and quantities, fertilizers, veterinary drugs, treatment regimens and occurrence of diseases analytical results for water, soil, fish and feeds, and veterinary drugs.

These records shall be kept on the farm for at least a period of two years.

Annex A
(normative)

Requirements and inspection methods

A.1 General

Good Aquacultural Practices for freshwater aquatic animal are as given in Table A.1.

Table A.1 — Requirements and inspection methods

Item	Requirement	Inspection method	Compliance level
1. Site	1.1.1 Farm shall be registered with the relevant authority	1.1.1 Check the farm registration document(s)	Major requirement
1.1 Pond	1.1.2 Pond shall be located at least 100 m from polluted sources	1.1.2 Visual inspection for the risk of pollution	Minor requirement
	1.1.3 Availability of good water inlet and outlet system	1.1.3 Visual inspection of the system of water inlet and outlet and the design of water supply among ponds to prevent cross contamination	Major requirement
	1.1.4 Access from both outside and inside the farm to facilitate farm operation and transportation of the produce	1.1.4 Visual inspection	Major requirement
	1.1.5 Essential infrastructure shall be available	1.1.5 Visual inspection	Minor requirement
1.2 Cage	1.2.1 Farm shall be registered with the relevant authority	1.2.1 Check the farm registration document(s).	Major requirement
	1.2.2 Farm shall be located in an area of which water quality is suitable for freshwater aquatic animal culture.	1.2.2 Check water quality or record of water analysis.	Major requirement
	1.2.3 Farm shall be kept distance to polluted sources	1.2.3 Visual inspection of farm surroundings.	Major requirement
	1.2.4 Access from both outside and inside the farm to facilitate farm operation and transportation of the produce	1.2.4 Visual inspection.	Major requirement
	1.2.5 Essential infrastructure shall be available	1.2.5 Visual inspection.	Minor requirement
	1.2.6 Permit shall be granted for cage farming and	1.2.6 Check the permission document	Major requirement

Item	Requirement	Inspection method	Compliance level
	cage shall be set in the permitted area		
	1.2.7 Cages shall not obstruct the water flow and water way transportation	1.2.7 Inspection of the cage location and water flow	Major requirement
2. General management	2.1.1 Operate according to the technical requirements of relevant authorities	2.1.1 Interview farmers.	Minor requirement
2.1 Pond	2.1.2 Availability of farm location and layout	2.1.2 Check map and layout	Major requirement
	2.1.3 Effluent shall be complied with relevant laws and regulations	2.1.3 Check the result of effluent test	Major requirement
	2.1.4 Attend technical meeting or training program on farm management, use of production inputs, harvesting, and relevant laws, and regulations	2.1.4 Check evidence of the meeting or training	Major requirement
2.2 Cage	2.2.1 Operate according to the technical requirements	2.2.1 Interview farmers	Major requirement
	2.2.2 Availability of farm location and layout	2.2.2 Check map and layout	Major requirement
	2.2.3 Surface area of the site shall not exceed the permitted area granted by the relevant authority	2.2.3 Inspection of the permitted area granted by the Department of Fisheries	Major requirement
	2.2.4 Attend technical meeting or training program on farm management, use of production inputs, harvesting, and relevant laws, and regulations	2.2.4 Check evidence of the meeting or training	Major requirement
3. Inputs	3.1 Healthy and non-infectious fry shall be used	3.1 Check fry purchasing record	Major requirement
	3.2 Availability of fry movement document (FMD)	3.2 Check the copy of FMD	Major requirement
	3.3 Use feed, feed supplement and vitamins registered with the competent authority (in case such inputs are subject to registration) and valid date of expiration	3.3 Check label of feed, feed supplement and vitamins	Major requirement
	3.4 Any inputs other than 3.3 shall be free from contamination	3.4 Check the test report.	Major requirement
	3.5 In case the feed is prepared on the farm, feed ingredients shall be free from veterinary drugs and	3.5 Check the test report	Major requirement

Item	Requirement	Inspection method	Compliance level
	legally prohibited substances		
	3.6 Feed prepared on the farm shall meet hygienic requirements and be safe for aquatic animals and consumers	3.6.1 Visual inspection of feed preparation. 3.6.2 Check the record of feed preparation	Major requirement
	3.7 Feed prepared on the farm shall meet nutrient requirements of target aquatic animal	3.7.1 Inspection of the feed ingredients 3.7.2 Check the report of feed quality analysis (if any)	Minor requirement
	3.8 All inputs shall be safely and appropriately stored in good hygienic condition	3.8 Visual inspection of the input storage	Major requirement
4. Health management **4.1 Pond**	4.1.1 Pond and equipment shall be properly prepared to prevent the introduction of aquatic animal diseases	4.1.1.1 Visual inspection 4.1.1.2 Check the record of the pond and equipment preparation	Minor requirement
	4.1.2 In case where aquatic animal shows any abnormal symptom, management measure shall be taken into consideration prior to applying veterinary drugs and chemicals. Preliminary diagnosis shall be carried out, including corrective action and records	4.1.2.1 Check the record of corrective actions in case where aquatic animal shows any abnormal symptom 4.1.2.2 Check the record of farming activity on daily basis	Major requirement
	4.1.3 If sick aquatic animal is found and veterinary drugs or chemical treatment is necessary, apply only registered veterinary drugs or chemicals, and strictly follow the instruction on the label	4.1.3 Check the record of the use of veterinary drugs and chemicals including withdrawal period Check the application record of veterinary drugs and chemical	Major requirement
		Check the application record of veterinary drugs and chemical	
	4.1.5 In case of disease outbreak, farmer shall immediately inform the competent authority and appropriately manage the carcass and water discharge	4.1.5.1 Check the record of corrective actions in case of disease outbreak 4.1.5.2 Check the record of the carcass and water discharge management	Major requirement

Item	Requirement	Inspection method	Compliance level
4.2 Cage	4.2.1 Cage shall be properly and appropriately prepared and installed to prevent environmental impact and disease outbreak	4.2.1 Check the record of cage preparation and installation 4.2.2 Visual inspection of cage location	Major requirement
	4.2.2 Cage and equipment shall be periodically cleaned throughout the production process	4.2.2.1 Check the record of the cage cleaning	Major requirement
	4.2.3 The health of aquatic animal shall be regularly monitored and taken care of	4.2.3.1 Interview farmers 4.2.3.2 Check the record of health management	Major requirement
	4.2.4 In case where aquatic animal shows abnormal symptom, appropriate corrective actions shall be carried out immediately	4.2.4 Check the record of corrective actions in case where aquatic animal shows abnormal symptom	Major requirement
	4.2.5 If sick aquatic animal is found and veterinary drugs or chemical treatment is necessary, apply only registered veterinary drugs or chemicals[2], and strictly follow the instruction on the label	4.2.5 Check the record of the use of veterinary drugs and chemicals including withdrawal period	Major requirement
	4.2.6 Prohibited veterinary drugs and chemicals shall not be used	4.2.6.1 Visual inspection 4.2.6.2 Check the application record of veterinary drugs and chemicals	Major requirement
	4.2.7 In case of disease outbreak, farmer shall immediately inform the competent authority and appropriately manage the carcass	4.2.7.1 Check the record of corrective actions in case of disease outbreak 4.2.7.2 Check the record of the carcass management	Major requirement
5. Farm sanitation	5.1.1 Household discharge shall be separated from the culture pond	5.1.1 Visual inspection	Major requirement
5.1 Pond	5.1.2 Toilet shall be hygienically designed in separated area and prevent possibility of sewage contamination to culture pond	5.1.2 Visual inspection	Major requirement

Item	Requirement	Inspection method	Compliance level
	5.1.3 Availability of sanitary system for waste disposal from the culture for example, carcass	5.1.3.1 Visual inspection 5.1.3.2 Check the record of waste disposal management	Major requirement
	5.1.4 Equipment and tools shall be orderly stored, clean, in hygienic manner and proper maintenance for use	5.1.4 Visual inspection	Minor requirement
	5.1.5 Availability of good management of waste disposal to prevent fly, rodent and cockroach as well as pet digging	5.1.5 Visual inspection of the management of waste disposal	Minor requirement
5.2 Cage	5.2.1 Toilet shall be hygienically designed in separated area and prevent possibility of sewage contamination to cage location	5.2.1 Visual inspection	Major requirement
	5.2.2 Equipment and tools shall be orderly stored, clean, in hygienic manner and proper maintenance for use	5.2.2 Visual inspection	Minor requirement
	5.2.3 No littering of garbage or waste in the area of cage location. It shall be properly discarded or destroyed.	5.2.3 Visual inspection of the management of waste disposal	Minor requirement
6. Harvest and post-harvest handlings	6.1 Availability of harvesting plan	6.1 Check the harvesting plan document.	Minor requirement
	6.2 Availability of Movement Document (MD)	6.2 Check the copy of movement document	Major requirement
	6.3 Veterinary drugs or chemical residues shall not be found or exceeded the maximum residue limits	6.3 Check the test report of residues of veterinary drugs and chemicals	Major requirement
	6.4 Availability of good management and hygienic handlings of aquatic animal during harvest and post-harvest in order to obtain good quality and safe product for consumers	6.4 Check the record of management and handlings during harvest and post-harvest	Minor requirement
7. Record keeping	7. Important data shall be recorded at all stages of production and regularly updated	7. Check data recorded	Minor requirement

A.2 Judgment criteria

Judgments for inspection decision are as follows:

A.2.1 All of the “major requirement” level shall be complied.

A.2.2 All of the “minor” level shall be complied not less than 60%. The improvement up to 80% shall be fulfilled within 2 years.

Bibliography

Aquatic Health Code, World Organisation for Animal

Acknowledgment and appreciation

This African Standard was harmonized under the project titled:

Harmonization of African Standards for Agriculture and Food Products
June 2015 — August 2018

financed by the **African Development Bank (AfDB)** through the **African Trade Fund (AfTra)** Programme. ARSO acknowledges and appreciates this support on behalf of its Member States.

