

Aquaculture Facility Certification

Shrimp Hatcheries

**Best Aquaculture Practices
Certification Standards, Guidelines,
Sample Application/Audit**



Community • Environment • Animal Welfare • Food Safety • Traceability



The following questions comprise both the application form and audit for hatcheries that apply for Best Aquaculture Practices certification. They are provided to help facilities prepare for the application process and site inspection.

To apply for certification, download and return the electronic Application Form at www.bestaquaculturepractices.org.

- **Critical questions** (indicated by “C” mark) are mandatory for certification and graded as pass or fail during the inspection and review process.
- **Scored questions** (indicated by “S” mark) are assigned 0 to 3 points with the following values:
0 = Unsatisfactory, 1 = Needs major improvement, 2 = Needs minor improvement, 3 = Satisfactory.
- **Informational questions** (indicated by “I” mark) provide required data, but no score is assigned.

[illegible]

C 1.1: Are documents available to prove legal land and water use by your facility? _____ Yes _____ No

1.1.1: List the documents you will present. (Confirmed during inspection.)

C 1.2: Are documents available to prove all business and operating licenses have been acquired by your facility? _____ Yes _____ No

1.2.1: List the documents you will present. (Confirmed during inspection.)

C 1.3: Are documents available to prove compliance with applicable environmental regulations for construction and operation? _____ Yes _____ No

I 1.3.1: List the documents you will present. (Confirmed during inspection.)

C 2.1: Does your facility accommodate local inhabitants by not blocking traditional access routes to fishing grounds, mangrove areas and other public resources? (Prepare to provide area map showing property lines, fences, canals, ditches and other barriers. evaluator may interview members of local community.) _____ Yes _____ No

S 2.2: List meetings, committees, correspondence, service projects or other activities that show your facility is committed to regular interaction with the local community to avoid or resolve conflicts.

3.1: What is the minimum wage rate, including benefits, required by local and national labor laws?

C 3.2: Does your facility meet or exceed these wage and benefit requirements? _____ Yes _____ No
(Present documentation during inspection.)

S 3.4: Does your facility provide employee housing that meets local and national standards (e.g., water-tight structures, bedding elevated from floor, adequate space)? (Confirmed during inspection.) _____ Yes _____ No _____ Does Not Apply

S 3.6: Are toilets and hand-washing facilities readily available to employees? _____ Yes _____ No
(Confirmed during inspection.)

S 3.7: Are the meals provided at your facility wholesome and commensurate with local eating customs? _____ Yes _____ No _____ Does Not Apply
(Confirmed during inspection of kitchen and menus, and interviews with workers.)

S 3.8: Briefly describe the basic medical care provided by your facility, including access to or communication with medical authorities in case of emergencies or accidents. (Confirmed during inspection.)

S 3.9: Are machinery operators, including drivers and repair personnel, properly trained and licensed (if applicable) in machine operations, maintenance and safety? (Confirmed during inspection.) _____ Yes _____ No

S 3.10: Briefly describe what training in general health, safety, first aid, contamination risks and proper disposal of potentially dangerous compounds is provided to employees. (Confirmed during inspection.)

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[illegible]

C 5.1: Does your hatchery comply with all government regulations related to nauplii, larvae, postlarvae and broodstock importation? _____ Yes _____ No

S 5.2: Does your facility's broodstock program include isolation, testing for infectious veterinary diseases and subsequent destruction of infected animals? ☐ Yes ☐ No ☐ Do Not Have Broodstock Program

S 5.3: Does your facility test postlarvae for infectious veterinary diseases and destroy infected animals? (Confirmed during inspection.) _____ Yes _____ No

S 5.4: Does your facility routinely test the veterinary health of its animals as part of a general health management plan? (Confirmed during inspection.) _____ Yes _____ No

S 6.1: Are records on intake water and effluent monitoring maintained and available? ☐ Yes ☐ No
(Confirmed during inspection.)

6.2: Do effluent water quality concentrations comply with BAP water quality criteria, or if it was not possible to comply with BAP criteria because of high concentrations in the intake water, do concentrations reflect no increase between intake and discharge? (Confirmed during inspection.) _____ Yes _____ No

Note: Water quality measurements taken during certification inspection must meet BAP's initial criteria as outlined in the Guidelines for Standards – except as excluded above – and those of applicable government permits. Farms must continue compliance with these criteria to maintain certification and comply with BAP's final criteria within five years.

I 6.3: If effluent data is available for less than a full year, how long was this period? _____
(* Minimum three months data required for initial inspection.)

6.4: What were the average annual concentrations for each variable at your facility during the last calendar year? (Confirmed during inspection.)

6.4.1: pH (standard units)

6.4.2: Total suspended solids (mg/L)

6.4.3: Soluble phosphorus (mg/L)

6.4.4: Total ammonia nitrogen (mg/L)

6.4.5: 5-day biochemical oxygen demand (mg/L)

6.4.6: Dissolved oxygen (mg/L)

S 6.5: Does your facility monitor effluents for the presence of live organisms? Yes No

S 6.6: Does your hatchery have a system that neutralizes or dilutes chemical levels before discharge into natural bodies of water? Yes No

[illegible]

S 7.1: Are fuel, lubricants and disinfection, cleaning and medicinal chemicals stored and disposed of in a safe and responsible manner? (Confirmed during inspection.) _____ Yes _____ No

S 7.2: Is it true that fuels, lubricants and disinfection, cleaning and medicinal chemicals are not stored near feed, in employee housing or kitchen areas, or near harvest equipment and supplies? (Confirmed during inspection.) _____ Yes _____ No

S 7.3: Are fuel, lubricants and disinfection, cleaning and medicinal chemical storage areas marked with warning signs and are precautions taken to prevent spills, fires and explosions? (Confirmed during inspection.) _____ Yes _____ No

S 7.4: Is garbage from housing and food waste retained in water-tight receptacles with covers to protect contents from insects, rodents and other animals? (Confirmed during inspection.) _____ Yes _____ No

S 7.5: Briefly describe how garbage and other solid waste is disposed of to comply with local regulations and avoid environmental contamination (e.g., recycling, burning, composting or placing in a landfill). (Confirmed during inspection.)

S 7.6: Describe the measures taken to prevent infestation by animal and insect vectors and pests. (Confirmed during inspection.)

S 7.7: Does secondary fuel containment conform to BAP guidelines for fuel storage? (Confirmed during inspection.) _____ Yes _____ No

S 8.1: Briefly describe how domestic sewage is treated to avoid contamination of surrounding areas (e.g., sewer system, septic system, portable toilet, outhouse). (Confirmed during inspection.)

S 8.2: Is human waste/sewage disposed of responsibly to prevent entry into estuaries, water canals and ponds?

	Yes	No

C 9.1: If used, are antibiotics applied only to treat diagnosed diseases in accordance with instructions on product labels and national regulations? _____ Yes _____ No _____ Do Not Use

C 9.2: Is it true that any antibiotics banned or unapproved in the producing or importing country are not used in tank or pond additives or any other treatment that could result in residue in shrimp? (Confirmed during inspection.) _____ Yes _____ No

C 9.3: Does your hatchery maintain inventory records for all veterinary drugs and chemicals used? (Documentation required.) _____ Yes _____ No

Score	
Critical (P/F)	Score (0-3)
Subtotal	Subtotal

C Are traceability records maintained for each of the specified parameters for every production unit and every production cycle to allow tracing of shrimp back to the unit and inputs of origin? (Confirmed during inspection.) ☐ Yes ☐ No

S If lot mixing is practiced, are composite records maintained for each production lot? ☐ Yes ☐ No ☐ Do Not Mix Lots

I What internal system does your facility use to maintain traceability data as defined in the Guidelines for Standards?

Final Score	
Pass	Fail

Evaluator Comments – Attach additional sheets, if needed.



Shrimp Hatcheries BAP Standards, Guidelines

GUIDELINES — SHRIMP HATCHERIES

These Best Aquaculture Practices certification standards apply to shrimp hatcheries. The following guidelines provide perspective and clarification for the standards referenced in the Certification Application/Audit. The application and guidelines were designed to assist program applicants in assessing their facilities and developing management systems for compliance with the certification standards.

The word “shall” is used throughout these guidelines to indicate mandatory provisions. For further information, please refer to the additional resources listed.

Standard 1 — Community Property Rights and Regulatory Compliance

Hatcheries shall comply with local and national laws and environmental regulations, and provide current documentation that demonstrates legal rights for land use, water use, construction and operation.

Reasons for Standard

Certified hatcheries shall comply with applicable business-related laws and regulations for mangrove protection, effluents, operation of landfills, predator control, etc. These regulations are needed to assure that shrimp hatcheries provide pertinent information to governments and pay fees to support such programs. BAP requires compliance because it recognizes that not all governmental agencies have sufficient resources to effectively enforce laws.

To avoid strife or contention within the community or with other stakeholders, it is crucial that hatcheries have clear legal rights to land use through ownership, concession or leasehold.

Implementation

Regulations regarding the operation and resource use of hatcheries vary significantly from place to place. Among other requirements, such laws can call for:

- business licenses
- aquaculture licenses
- land deeds, leases or concession agreements
- land use taxes
- construction permits
- water use permits
- non-native species permits
- mangrove protection
- effluent permits
- predator control permits
- well operation permits
- landfill operation permits.

BAP evaluators cannot know all laws that apply to shrimp hatcheries in all nations. However, BAP will strive to maintain a current database on national and international legislation. Participating hatcheries have the responsibility to obtain all necessary documentation for siting, constructing and operating their facilities.

Assistance in determining which permits and licenses are necessary can be sought from governmental agencies responsible for agriculture, environmental protection, health and labor regulation, fisheries and aquaculture, water management, and transportation, as well as local aquaculture associations. BAP evaluators shall also become familiar with the legal requirements within the areas they service.

During the BAP inspection, the hatchery representative shall present all relevant documents to the evaluator. All documents shall be current, and the hatchery shall be in compliance with the requirements stipulated by the documents. For example, if a hatchery has an effluent discharge permit with water quality standards, those standards shall be enforced. In cases where governmental agencies have waived one or more permits, proof of those waivers shall be available.

In the event that permitting processes have not been completed, hatcheries shall provide evidence that permit applications are in process and up to date in line with government requirements.

For Additional Information

Codes of Practice for Responsible Shrimp Farming

C. E. Boyd — 1999
Global Aquaculture Alliance
St. Louis, Missouri, USA

Natural Resources Forum

Volume 15, 1991, pp. 66-72
“Aquacultural Development in Tropical Asia”
C. Bailey and M. Skladany

FAO Fisheries Report No. 572

Report of the Bangkok FAO Technical Consultation
on Policies for Sustainable Shrimp Culture
Bangkok, Thailand, December 1997
FAO — 1998
Rome, Italy

FAO Fisheries Report No. 659

Report of the Expert Consultation on Food Management
Practices and Good Legal and Institutional Arrangements
for Sustainable Shrimp Culture
Brisbane, Australia, December 2000
FAO/Government of Australia — 2001
Rome, Italy

Standard 2 – Community Community Relations

Hatcheries shall not deny local communities access to public mangrove areas, fishing grounds or other public resources.

Reasons for Standard

Shrimp hatcheries are typically located in rural areas, where individual families or communities rely on access to coastal resources to support traditional livelihoods. Some local residents benefit from employment or infrastructure improvements by shrimp hatcheries, but others may feel deprived of access to areas formerly used for fishing, hunting or gathering. Close residential neighbors may feel disturbed by continuous activity, noise and running water.

Implementation

Shrimp hatchery management should attempt to accommodate traditional uses of coastal resources through a cooperative attitude toward established local interests and environmental stewardship. Hatcheries should not block traditional access corridors to public mangrove areas and fishing grounds.

To avoid conflicts with local communities, hatcheries are encouraged to communicate with local leaders through telephone calls, written correspondence, meetings or other means.

During facility inspection, the BAP evaluator may verify compliance with this standard through examination of maps that

define public and private zones; on-site inspection of fences, canals, intake and effluent pipes and other barriers; and interviews with local people and hatchery workers. The evaluator should select the individuals for interview, rather than being provided a group of interviewees by hatchery management.

Shrimp hatcheries may require some facilities, such as pipelines, to be located on public land. Where this is the case, hatcheries shall ensure that local communities are consulted, approval is granted by pertinent authorities and adequate precautions are taken to prevent the facilities from being a hazard, nuisance or eyesore. In residential areas and especially at night, special care shall be given to minimize noise pollution, such as that caused by electric blowers, generators or other intensive activities.

For Additional Information

Ocean and Shoreline Management

Volume 11, 1988, pp. 31-44

“The Social Consequences of Tropical Shrimp Mariculture Development”

C. Bailey

Scientific American

Volume 278, Issue 6, 1998, pp. 42-49

“Aquaculture and the Environment”

C. E. Boyd and J. W. Clay

Standard 3 – Community Worker Safety and Employee Relations

Hatcheries shall comply with local and national labor laws to assure adequate worker safety, compensation and living conditions at the facility.

Reasons for Standard

Hatchery work is potentially dangerous because of the aerators, pumps, heaters and other types of machinery needed and the use of potentially hazardous materials such as chlorine. Workers are usually not highly educated, and safety instruction may not be adequate. Most shrimp hatcheries are located in tropical nations where pay scales are low and wage or other labor laws may not be consistently enforced.

Since hatcheries operate on a continuous basis, they commonly provide on-site living quarters. An effort shall be made to develop and maintain decent living conditions there.

Implementation

At a minimum, certified shrimp hatcheries shall provide legal wages, a safe working environment and adequate living conditions. However, every effort should be made to exceed these minimum requirements.

Hatchery worker employment contracts or agreements shall meet all necessary requirements under applicable labor laws. Written agreements that specify terms of employment shall be on file for each employee. Procedures for management and employees to air grievances should be in place.

BAP-certified hatcheries shall ensure their hiring practices conform to all pertinent national labor laws regarding the employment of minors. If no such laws exist, hatcheries shall conform to the criteria set forth in the International Labor Organization Conventions for minimum age (C138) and child labor (C182).

Workers should be given adequate initial training, as well as regular refresher training, on safety in all areas of hatchery operation. Workers should also be trained in the first aid of electrical shock, profuse bleeding, drowning and other possible medical emergencies. Where necessary, employees shall be provided with adequate protective clothing and gear to complete assigned tasks.

Hatchery and living quarters shall be well ventilated with adequate shower and toilet facilities and a supply of piped or stored potable water. Food services should provide wholesome meals for workers, with food storage and preparation done in a responsible manner. Trash and garbage should not accumulate in living, food preparation or dining areas (see Standard 7).

During facility inspection, the BAP evaluator will evaluate whether conditions comply with local labor laws and verify the existence of written employment contracts. The evaluator will also interview a random sample of workers to obtain their opinions about wages, safety and living conditions.

For Additional Information

Safety for Fish Farm Workers

D. C. Minchew – 1999

USDA/Cooperative State Research and Extension Service
Washington, D.C., USA

International Labor Organization, C138

Minimum Age Convention, 1973

<http://www.ilo.org/ilolex/english/convdisp2.htm>

International Labor Organization, C182

Worst Forms of Child Labour Convention, 1999

<http://www.ilo.org/ilolex/english/convdisp2.htm>

United Nations Convention on the Rights of the Child

General Assembly Resolution 44/25

November 20, 1989

<http://www.unicef.org/crc/fulltext.htm>

Standard 4 – Environment Ecosystem Protection

Hatchery construction and operations shall not result in net loss of mangroves or otherwise affect sensitive coastal ecosystems or conservation zones. Hatchery animals shall be adequately contained.

Reasons for Standard

Coastal areas can be sensitive ecological habitats as well as economically important tourism locations. Tourism areas can be despoiled by inappropriate placement of pipelines, effluents or trash disposal.

Implementation

Hatcheries shall be constructed on sites where impacts are minimized and not on sensitive or protected sites such as Ramsar Convention on Wetlands sites or sites of special scientific interest. Particular care shall be taken during construction to assure that hydrological conditions are not altered in a way that causes beach erosion or other deterioration. Erosion of hatchery earthwork shall not cause excessive sedimentation.

Hatcheries shall be constructed out of the wave action area and over compact and stable soils to guarantee permanence of the buildings and tanks. Production areas shall be built in such a way to prevent the accidental release of non-native species or infected organisms to natural bodies of water. Mangrove, dune and beach areas shall not be used as refuse dumps for hatchery trash (see Standard 7).

During initial facility inspection, the BAP evaluator will note any hatchery areas occupied by mangroves or dunes, or covered by local, national or international environmental conventions. At reinspection, the evaluator will determine if any subsequent beach or dune impact was allowable and if required mitigation was performed. Dune or beach destruction for unapproved purposes shall result in loss of certification.

For Additional Information

Codes of Practice for Responsible Shrimp Farming

C. E. Boyd – 1999

Global Aquaculture Alliance
St. Louis, Missouri, USA

Responsible Marine Aquaculture

“Mangroves and Coastal Aquaculture”

pp. 145-157

C. E. Boyd – 2002

R. R. Stickney and J. P. McVey, Editors
CABI Publishing

Wallington, Oxon, United Kingdom

Ramsar List of Wetlands of International Importance

<http://www.ramsar.org/sitelist.pdf>

Ramsar Criteria for Identifying Wetlands of International Importance

http://www.ramsar.org/key_criteria.htm

Standard 5 – Environment Veterinary Health

Hatcheries shall establish health monitoring and control procedures to minimize the risk of disease. The pathogen status of stocks shall be disclosed upon request.

Reasons for Standard

Disease epidemics have caused severe economic losses for some shrimp producers. The primary vector for the transmission of diseases among shrimp-farming regions has been inadvertent shipment of infected animals, including post-larvae with diseases transmitted vertically from broodstock.

Like all animals, shrimp are susceptible to a range of viral, bacterial, fungal and parasitic diseases. Of these, viral diseases are the most devastating, although none affect humans. By far, the most lethal shrimp virus is white spot syndrome virus. Yellow head virus, taura syndrome virus and others can also cause serious mortality as well as impacts on growth and reproduction. Certain bacterial diseases such as necrotizing hepatopancreatitis also can cause serious losses.

In the past, the shrimp industry relied on direct capture of wild postlarvae for stocking ponds. As hatchery technology developed, wild adults were captured for use as spawners. Although this practice has largely eliminated the collection of wild

postlarvae, it has raised concerns about impacts on wild shrimp populations and the potential introduction of pathogens into aquaculture facilities via wild animals. In recent years, domestication programs have come to represent a realistic alternative to wild shrimp as a source of broodstock and nauplii.

Many countries rely on imports of non-native shrimp species to support their industries. This carries the risk of escape of non-native species into the environment and the potential for serious pathogens to be introduced into farmed and wild shrimp populations. The release of non-native species into local waters can damage ecological systems and disrupt local fishing.

Implementation

Hatchery operators must ensure that the stocks supplied to their customers do not pose an excessive risk of disease. This may involve testing stocks to establish freedom from pathogens or, in cases where disease is endemic and may be transmitted by means other than infected postlarvae, testing to ensure that the prevalence of infection is below the threshold considered to cause a significant risk of disease outbreak. Where serious pathogens are endemic, diagnostic tests shall be performed on every lot of postlarvae or broodstock before shipment.

Routine testing for serious pathogens by internal or local laboratories shall be verified at least twice a year by submission of tissue samples to a national reference laboratory for shrimp diseases or other accredited specialist laboratory. In cases where these laboratories cannot verify analyses, samples should be submitted by official services to the OIE reference laboratory for the disease/pathogen in question. Hatcheries located in areas zoned for disease status as per the OIE Code and Manual shall comply with all government regulations related to such zoning.

To ensure complete transparency, hatcheries shall provide, on request, the complete known health status of the stocks they supply. The status reports shall list the presence and prevalence of pathogens identified in the stocks. Where claims of freedom from given pathogens are made, the basis for such claims shall be described.

To avoid adverse effects on wild shrimp stocks, hatcheries are encouraged to use domesticated shrimp stocks. Where available, the use of specific pathogen-free (SPF) stocks is highly recommended. SPF stocks are also normally required by government regulations when shrimp are introduced to an area where a serious pathogen is absent as per the OIE Aquatic Animal Health Code.

The introduction of pathogens from non-native species can largely be avoided through the appropriate use of health management programs that include screening of introduced stocks. In some cases, government regulations ensure that imports of live animals are done in a safe and controlled manner. Certified hatcheries shall comply with such regulations.

Hatcheries that use non-native species shall install screening or disinfection devices on their effluent water systems to prevent the release of eggs, larvae, or other life stages of non-native shrimp into local waters. Hatcheries shall also monitor effluents for the presence of live organisms, especially at the termination of larvae production runs.

Before production tanks are emptied due to disease, they shall be chlorinated to prevent disease transmission to local waters. During the transport of seedstock to farms, care shall be taken that no hatchery stocks are released into natural water systems.

During site inspection, documentation of compliance with governmental regulations related to nauplii, postlarvae and broodstock importation shall be made available to the BAP evaluator. When imported nauplii, postlarvae or broodstock were purchased from other parties, hatcheries shall provide copies of pertinent documents.

During inspection, the evaluator shall take random samples from stocks held at the hatchery and submit them to an independent, third-party laboratory for verification of health status regarding the diseases for which claims are made. The cost of such testing shall be paid by the hatchery.

For Additional Information

International Aquatic Animal Health – 2003
World Organization for Animal Health (OIE)
http://www.oie/eng/normes/FCODE/a_00015.htm

ICES Codes of Practices on the Introductions and Transfers of Marine Organisms – 2003
Working Group on Introductions and Transfers of Marine Organisms
<http://www.ices.dk>

Drugs Prohibited for Extra-Label Use in Food Animals
January 2001
<http://www.fda.gov/cvm/index/amducca/530.pdf>

Guide to Drug, Vaccine and Pesticide Use in Aquaculture
Texas A & M University System Publication B-5085
June 1994

Toward Safe and Effective Use of Chemicals in Coastal Aquaculture Publication
Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection
Report and Studies No. 65 – 1997

Standard 6 – Environment Effluent Management

Hatcheries shall monitor effluents at the frequency specified to confirm that water quality complies with BAP criteria*. Water quality measurements taken during certification

inspection shall meet both BAP criteria and those of applicable government permits. Hatcheries shall comply with BAP's final criteria within five years.

BAP Water Quality Criteria

Variable (units)	Initial Value	Final Value (after 5 years)	Collection Frequency
pH (standard units)	6.0-9.5	6.0-9.0	Monthly
Total suspended solids (mg/L)	50 or less	25 or less	Quarterly
Soluble phosphorus (mg/L)	0.5 or less	0.3 or less	Monthly
Total ammonia nitrogen (mg/L)	5 or less	3 or less	Monthly
5-day biochemical oxygen demand (mg/L)	50 or less	30 or less	Quarterly
Dissolved oxygen (mg/L)	4 or more	5 or more	Monthly

* **Limited Option:** The source water for shrimp hatcheries can have higher concentrations of water quality variables than allowed by the initial criteria. In these cases, demonstration that the concentrations of the variables do not increase (or decrease for dissolved oxygen) between the source water and hatchery effluent is an acceptable alternative to compliance with the criteria.

Reasons for Standard

Hatcheries must maintain excellent water quality to rear shrimp in delicate reproductive and larval stages. Consequently, hatchery effluents are unlikely to carry high nutrient or organic loads. Nevertheless, effluents should be routinely monitored to assure that receiving water bodies are not affected by eutrophication.

Chemicals and detergents are also routinely used for sterilization and cleaning purposes. Some of these compounds are toxic or potentially toxic.

Implementation

Hatcheries shall maintain water quality-monitoring records that prove effluent nutrient levels are maintained within BAP criteria. Effluents shall not be released at high concentrations until chemically neutralized or diluted to prevent potential negative impacts on receiving waters. Procedures shall be in

place to dilute or neutralize chemicals that may be present due to cleaning and sterilizing activities.

For Additional Information

Codes of Practice for Responsible Shrimp Farming

C. E. Boyd – 1999

Global Aquaculture Alliance

St. Louis, Missouri, USA

Global Aquaculture Advocate

Volume 3, Issue 5, 2000, pp. 61-66

"Effluent Composition and Water Quality Standards"

C. E. Boyd and D. Gautier

Global Aquaculture Advocate

Volume 3, Issue 4, 2000, pp. 26-27

"Farm Effluent During Draining for Harvest"

C. E. Boyd

Standard 7 – Environment Storage and Disposal of Hatchery Supplies

Fuel, lubricants and agricultural chemicals shall be stored and disposed of in a safe and responsible manner. Paper and plastic refuse shall be disposed of in a sanitary and responsible way.

Reasons for Standard

Hatcheries use fuel, oil and grease to power and lubricate pumps, aerators and other mechanical devices. Potentially toxic chemicals for cleaning and sterilizing water, tanks and walkways are also used routinely in hatcheries.

Fuels and some cleaning and sterilizing agents are toxic. They shall therefore be considered potential hazards to workers.

Spills or careless disposal of petroleum products and toxic chemicals can also affect aquatic organisms and other wildlife in the immediate vicinity, and result in water pollution over a wider area.

Hatcheries can generate considerable waste that can cause pollution, odors and human health hazards on the hatchery site and in surrounding areas, when not disposed of properly. Human food scraps and other organic waste can attract scavengers. Runoff from refuse piles can cause pollution and contaminate ground water.

Empty plastic bags and other containers used for feed, chemicals or for transporting postlarvae do not decompose quickly. They can be a hazard to animals that become entangled in them.

Implementation

Fuel, lubricants and chemicals shall be labeled and stored in a manner to prevent fires, explosions and spills. Used lubricants and unwanted or out-of-date chemicals shall be disposed of in a responsible manner.

Secondary containment shall be provided for individual fuel storage tanks over 2,500 liters in volume and multiple tanks with combined storage of over 5,000 liters. The containment volume should be equivalent to 110% of individual tanks or 110% of the largest tank in a multiple-tank storage system. "Flammable material" and "no smoking" signs shall be installed at fuel storage sites.

Procedures should be developed for managing spills of oil, fuel, chemicals and other products. The equipment and supplies needed for managing and cleaning up these spills shall be readily available and accessible. Workers should be trained to properly use the equipment and handle the contained waste.

All drugs and chemicals used in hatchery production shall be stored in an area with access limited to those who have been authorized and trained in handling and using the chemicals. Disposal of out-of-date and unwanted therapeutants shall be done responsibly so as not to contaminate local surroundings or endanger people or animals.

Trash, garbage and other hatchery wastes may not be dumped in wetlands or on vacant land. Such waste shall be burned, composted or put in a landfill in accordance with local laws. Composting shall be done by a procedure that does not create an odor problem or attract wild animals.

BAP encourages recycling of paper and plastic waste where it is possible. Effective management of these wastes depends upon the availability of convenient waste containers that are serviced at regular intervals.

For Additional Information

Protecting Water Quality on Alabama's Farms

Alabama Soil and Water Conservation Committee – 1995
Montgomery, Alabama, USA

USDA NRCS AL Guide Sheet No. AL 701

Spill Prevention Control and Countermeasures
Available online at <http://www.al.nrcs.usda.gov/SOsections/Engineering/BMPindex.html>

Global Aquaculture Advocate

Volume 5, Issue 4, 2002, pp. 70-71

"Sodium Bisulfite Treatments Improve Shrimp Appearance But Require Proper Disposal"

C. E. Boyd and D. Gautier

Standard 8 – Environment

Microbial Sanitation

Untreated human sewage shall not be released from hatcheries into local ecosystems without proper treatment.

Reasons for Standard

Improper treatment of human waste can lead to noxious odors and insects, and transmit human diseases among hatchery workers. The discharge of untreated waste products into open waters can also affect bathers at beaches affected by sewage runoff.

Implementation

Hatcheries shall provide a sufficient number of toilet facilities that use septic tanks or municipal sewage systems to properly treat and dispose of waste. All sewage from bathrooms, kitchens and other hygiene facilities shall be treated before release. In no case shall raw sewage be discharged into natural water bodies. Septic runoff from poorly functioning sewage systems shall also be avoided.

For Additional Information

Environmental Engineering

P. A. Vesilind, J. J. Peirce and R. F. Weiner – 1994
Butterworth-Heinemann
Boston, Massachusetts, USA

Standard 9 – Food Safety Drug and Chemical Management

Banned antibiotics, drugs and other chemical compounds shall not be used. Other therapeutic agents shall be used as directed on product labels for control of diagnosed diseases or required management, not prophylactic purposes.

Critical Points:

- Chloramphenicol and nitrofurantoin antibiotics are banned for use in food production in all countries.
- Antibiotics approved for use in shrimp-producing countries may only be used if not banned in the shrimp-importing country, and provided residues in shrimp products do not exceed limits set by importing nations.
- Methods of disease diagnosis shall be explained.
- Required records for every application of antibiotics, drugs and other chemicals shall include the date, compound used, reason(s) for use and dose.

Reasons for Standard

Some of the therapeutic agents used to treat shrimp diseases can result in residues in shrimp tissue that are a potential health hazard to humans. Governments have therefore banned certain compounds and mandated residue limits for others. Failure to comply with such regulations can have serious economic consequences to all involved in the import chain.

The antibiotics chloramphenicol and nitrofurans are banned worldwide for use in food production because of their potentially serious side effects. Chloramphenicol can cause fatal aplastic anemia, and nitrofurans are classified as carcinogens. Therefore, for worker and consumer safety, neither of these antibiotics may be used for any purpose in shrimp hatcheries.

Although a variety of other antibiotics are routinely used in terrestrial animal husbandry, few are approved for use in shrimp farming. Furthermore, the precision of advancing analytical detection methods raises the possibility that use of antibiotics during shrimp larval rearing could lead to detectable residues in the end product. Consequently, the use of any antibiotic is discouraged in shrimp hatcheries.

In addition to direct effects on target species, improper use of chemicals can harm the aquatic organisms that live in the water into which shrimp farms discharge. Moreover, continued use of antibiotics can lead to antibiotic resistance in shrimp disease organisms.

Implementation

Certified hatcheries shall not use chloramphenicol, members of the nitrofurantoin family or any other therapeutic agents specifically prohibited by international regulating authorities. Hatchery management should be familiar with pertinent antibiotic use laws and comply with the restrictions of regulating authorities for importing countries.

In lieu of antibiotics, hatcheries are encouraged to employ effective disinfection, sanitation, modular all-in/all-out facility design and probiotics. Hatcheries should develop shrimp health management plans that indicate procedures to avoid the introduction of disease, protocols to maintain water quality, and shrimp health monitoring and disease diagnosis techniques. Plans should also explain the steps to be taken when a diagnosed disease will be treated with approved chemicals.

During inspection, the evaluator shall be provided access to written records that include dosage levels and application dates for all therapeutic agents used during postlarvae production. The evaluator will check storage areas and other places for banned antibiotics, interview employees to verify practices, and sample hatchery production (or shrimp grown out from hatchery postlarvae) to be tested for the possible presence of banned antibiotics.

For Additional Information

Codes of Practice for Responsible Shrimp Farming

C. E. Boyd – 1999

Global Aquaculture Alliance

St. Louis, Missouri, USA

Guide to Drug, Vaccine, and Pesticide Use in Aquaculture

Federal Joint Subcommittee on Aquaculture – 1994

Texas Agricultural Extension Service College Station

Texas, USA

Food Safety Issues Associated With Products From Aquaculture

Report of a Joint FAO/NACA/WHO Study Group

World Health Organization – 1999

Geneva, Switzerland

Traceability

Record-Keeping Requirement

To establish product traceability, the following information shall be recorded for each rearing tank and each production lot:

- tank identification number
- stocking date
- species
- quantity of larvae stocked
- source of broodstock (wild, domesticated, SPF)
- source of nauplii (see below)
- antibiotic and drug use
- manufacturer and lot number for each feed used
- harvest date
- harvest quantity
- receiving farm or purchaser.

Reasons for Requirement

Product traceability is a crucial component of the BAP Aquaculture Facility Certification Program. It interconnects links in the shrimp production chain and allows each processed lot to be traced back to the pond and inputs of origin. Results of food quality and safety analyses by accredited laboratories can also be included. Traceability ultimately assures the purchaser that all steps in the production process were in compliance with environmental, social and food safety standards.

Implementation

Hatcheries shall classify their sources of nauplii as follows:

- Wild spawners: Nauplii obtained from wild females that were mature, mated and ready to spawn at time of capture.
- Maturation of wild animals: Nauplii obtained from wild-caught parents that matured, mated and spawned in captivity.

- Maturation of domesticated animals: Nauplii obtained from domesticated animals that matured, mated and spawned in captivity. Domesticated animals are defined as shrimp that have completed at least one full life cycle in captivity.

Hatcheries can maintain paper records of the required data in notebooks or files (see sample form on page 15). If possible, the information should also be transferred to computer database files, with the original files kept to allow verification of the electronic data.

Where the facility claims inputs such as feed or juveniles from other BAP-certified facilities, segregation of the BAP inputs and outputs, and accompanying records, are required. In addition, some buyers request that chain of custody data be added to the BAP online traceability database via the Internet. Participation in the online system is optional. On-site audits include chain of custody verification of records and product segregation.

The record-keeping process requires a high degree of care and organization. At large hatcheries, managers or area supervisors could collect initial data for those tanks for which they are responsible. A single clerk could then be given the task of collecting the data from area supervisors and transferring it to a computer database. Hatchery management shall of course review the effort at intervals to verify it satisfies BAP requirements.

Adequate record keeping is only meaningful when combined with procedures that maintain lot separation. Hatcheries should not mix tanks or batches of postlarval seed during production or transport to farms. However, in the event that the contents of two or more rearing tanks are combined, full records shall be retained for the component tanks so correct composite records are assigned to the final numbered lot.

Sample Hatchery Product Traceability Form

Hatchery Name		Tank Number
POSTLARVAE	FEED	
Stocking Date	Feed Type 1	
Species	Manufacturer	
Stocking Quantity	Lot Number(s)	
Broodstock Source	“No Banned Chemical Use” Statement Available? Y N	
Nauplii Source	Feed Type 2	
THERAPEUTIC DRUG USE	Manufacturer	
Compound 1	Lot Number(s)	
Disease Treated	“No Banned Chemical Use” Statement Available? Y N	
Application Rate	Feed Type 3	
Application Period	Manufacturer	
Compound 2	Lot Number(s)	
Disease Treated	“No Banned Chemical Use” Statement Available? Y N	
Application Rate		
Application Period		
HARVEST	Harvest Purchaser Name/ Address	
Harvest Date		
Harvest Quantity (kg)		