JIFSAN Good Aquacultural Practices Program

HACCP Application in Shrimp Hatchery Operations

By Michael Schwarz
HACCP Application in shrimp Hatchery Operations

Hatchery-related Critical Control Points (CCPs) include brood stock acquisition, influent water, brood stock feeds, and live feeds.

Brood stock acquisition (CCP) are used to identify when shrimp may contain Listed Specific Pathogens (LSPs). A Certificate of Compliance (COC) assures that at the time of inspection, the product tested is found to be in compliance with stipulated requirements. A COC for Specific Pathogen Free (SPF) certification is required for each shipment of brood stock received. A Critical Limit (CL) is a maximum or minimum level that is established for monitoring of each CCP. A CL in brood stock receipt is the presence of an appropriate COC. A Corrective Action (CA) is an action that must be taken when monitoring of a CCP indicates a CL has been exceeded. With regard to brood stock receipt, without a COC, the CA is either rejection of the shipment, or placement of the brood stock into quarantine.

A second brood stock acquisition (CCP) is when shrimp may contain LSPs. During brood stock quarantine, brood stock should be tested for LSPs. In addition, a sentinel program whereby individual animals are isolated under stress should be implemented. These sentinel animals should subsequently be tested for LSPs. Brood stock quarantine monitoring tests brood stock for LSPs. Critical Limit is satisfied when there are no detectible LSPs on shrimp. If LSP is positive, then you must destroy the quarantined animals and disinfect the quarantine facility. Implementation of a sentinel program includes monitoring brood stock for LSPs.

Influent water for the hatchery is considered a CCP because this water may contain LSPs. No detectible LSPs should be in the water. Influent water should be appropriately sterilized, dosages monitored, and repeated if dosages are not achieved. Conduct periodic testing of water for detectible LSP. If LSPs are detected, disinfection of incoming water with: (100 ppm sodium hypochlorite for 10 minutes); UV (90,000 uw/cm2 for 60 minutes); or ozone (0.5 ug/ml for 10 minutes). Monitor chlorine levels, UV bulb, ozone concentration, and contact times. Repeat if dosages are not achieved.

After implementation of the sentinel program, if monitoring of shrimp for LSPs is positive, review entire water treatment process.

Brood stock feed is a CCP because feed ingredients may contain LSPs. COCs are required for all ingredients possibly containing LSPs. Periodic testing of feed supplies for LSPs should be conducted, as well as periodic reviews of records and COCs from suppliers. Review the COC for every shipment. If there is no COC, reject the shipment. Test the feed periodically for LSPs, and review the records of the supplier on a regular basis. If LSPs are detected in the feed, disinfect the live feeds production facility. Verify certificate of compliance (COC) from suppliers to maintain LSP-free feed products.

Hatchery-Related Standard Operating Procedures (SOPs)

Standard Operating Procedures (SOPs) are written practices and procedures designed to enhance production and product quality and safety. SOPs for the hatchery are identified for the control of human and animal disease vectors as well as for facility/equipment disinfection.

Example of LSPs

- Taura syndrome (TSV)
- White Spot disease (WSV) (WSSV)
- Yellow Head disease (YHV)
- Infectious Hypodermal and Haematopoietic Necrosis (IHHN)
Control of Human Disease Vectors (SOP)
Humans may transfer LSPs. SOPs for control of human disease vectors include limiting personnel access, appropriate entry and exit disinfection, employee training and record keeping, and maintenance of facility access and disinfection records.

Control of Animal Disease Vectors (SOP)
Animals may also transfer LSPs. Appropriate SOPs for control of animal disease vectors include fencing, animal excluder devices, employee training programs, maintenance of fencing and animal excluder inspections.

Disinfection of Facilities And Equipment (SOP)
Disinfection of facilities and equipment are hatchery SOPs because facilities and equipment may transfer LSPs. These SOPs include tank and equipment disinfection, and maintenance of employee training records and disinfection records. Chlorinate (100 ppm sodium hypochlorite for 10 minutes) and dry hatchery and live feeds production tanks between production runs. Sterilize all equipment in dips (100 ppm sodium hypochlorite for 10 minutes). Maintain and test concentrations. Maintain employee training programs and records thereof. Maintain records of all disinfection treatments.

References

### Verification records: Brood stock acquisition

<table>
<thead>
<tr>
<th>Verification</th>
<th>Record</th>
</tr>
</thead>
<tbody>
<tr>
<td>No LSP from brood stock supplier</td>
<td>Facility SPF certification</td>
</tr>
<tr>
<td>Review of shrimp receipt and shipping records</td>
<td>SPF records for each shipment</td>
</tr>
<tr>
<td>Periodic brood stock supplier site visit</td>
<td>Record of site visit</td>
</tr>
<tr>
<td>Periodic review of protocols from supplier</td>
<td>Facility protocol records</td>
</tr>
<tr>
<td>Testing of shrimp for LSPs</td>
<td>Analytical test records</td>
</tr>
<tr>
<td>Sentinel system</td>
<td>Sentinel testing records</td>
</tr>
</tbody>
</table>

### Verification records: Hatchery shrimp feed

<table>
<thead>
<tr>
<th>Verification</th>
<th>Record</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detectible LSP-free feed history</td>
<td>COC forms from shipments</td>
</tr>
<tr>
<td>Periodic site visits</td>
<td>Site visit records</td>
</tr>
<tr>
<td>Periodic review of feed shipment receipt records</td>
<td>Record of site visit</td>
</tr>
<tr>
<td>Periodic review of protocols from supplier</td>
<td>COC forms from all shipments</td>
</tr>
<tr>
<td>Periodic testing of feeds for detectible LSPs</td>
<td>Analytical test records</td>
</tr>
<tr>
<td>Sentinel system</td>
<td>Sentinel testing records</td>
</tr>
</tbody>
</table>

### Verification records: Hatchery water supply

<table>
<thead>
<tr>
<th>Verification</th>
<th>Record</th>
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</thead>
<tbody>
<tr>
<td>Verification of disinfection records</td>
<td>Treatment dosage from each batch</td>
</tr>
<tr>
<td>Check calibration records</td>
<td>Records for all equipment used</td>
</tr>
<tr>
<td>Periodic testing of feeds for detectible LSPs</td>
<td>Analytical test records</td>
</tr>
<tr>
<td>Sentinel system</td>
<td>Sentinel testing records</td>
</tr>
</tbody>
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Operational flow diagram

Brood stock quarantine

Brood stock

Maturation/reproduction

Nauplii

Larval culture

Postlarvae

Nursery

Juveniles to production

Outsourced brood stock (CCP)
Influent water (CCP)
Brood stock feed (CCP)
Human and animal vectors (SOP)
Facilities and equipment (SOP)

Influent water (CCP)
Brood stock feed (CCP)
Human and animal vectors (SOP)
Facilities and equipment (SOP)

Influent water (CCP)
Live and frozen/prepared feeds (CCP)
Human and animal vectors (SOP)
Facilities and equipment (SOP)

Influent water (CCP)
Live and frozen/prepared feeds (CCP)
Human and animal vectors (SOP)
Facilities and equipment (SOP)

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