

## PRODUCE GROW-OUT FISH

**UNIT CODE:** AQ/OS/AT/CR/04/6/B

### UNIT DESCRIPTION

This unit specifies the competencies required to produce grow out fish. It involves conducting fish grow-out food safety risk assessment, developing fish grow-out food safety risk management plan, developing fish stocking and harvesting program, preparing grow-out culture units, stocking grow-out culture units, managing fish feeding, managing fish stock health, controlling weeds, predators and intrusive animals, harvesting fish stock, maintaining grow-out culture units, integrating fish farming with livestock and poultry and monitoring and evaluating effectiveness of food safety management system of the fish grow-out.

<b>ELEMENT</b> These describe the key outcomes which make up workplace function.	<b>PERFORMANCE CRITERIA</b> These are assessable statements which specify the required level of performance for each of the elements.  <i><b>Bold and italicized terms are elaborated in the Range</b></i>
1. Conduct Fish Grow-out Food safety Risk Assessment	1.1 Food safety <i><b>Hazards</b></i> in the fish grow-out are identified and documented. 1.2 Possible <i><b>sources</b></i> of physical, chemical and microbial contamination in the fish grow-out are identified based on the <i><b>hazards</b></i> 1.3 Level of risk in the fish grow-out is assessed and established as per manual of standard operating procedures.
2. Develop Fish Grow-out Food Safety Risk Management Plan	2.1 <i><b>Preventive measures</b></i> for fish grow-out hazards are established as per identified source of contamination and manual of standard operating procedures. 2.2 <i><b>Corrective measures</b></i> for fish grow-out hazards are established as per identified source of contamination and manual of standard operating procedures. 2.3 Standard operating procedures for correcting and preventing fish grow-out safety risks are developed based on the identified risks. 2.4 Fish grow-out food safety status is evaluated based on statutory requirements and standards 2.5 Risk is communicated as per policies for internal and external communication

	2.6 Approval and certification of fish grow-out food safety status is sought from relevant certification bodies based on <i>statutory requirements and standards</i>
3. Develop fish stocking and harvesting program	<p>3.1 <b>Stocking plan</b> is prepared as per the capacity of the culture units to be stocked</p> <p>3.2 Sources of quality fingerlings identified from government certified hatcheries</p> <p>3.3 Number of required fingerlings is calculated based on number of ponds and stocking densities</p> <p>3.4 Stocking order of ponds is determined based on projected market trends</p> <p>3.5 Harvest schedule of ponds determined based on stocking date and prevailing market demand</p>
4. Prepare grow-out culture units	<p>4.1 <b>PPEs</b> are identified and gathered as per task requirement</p> <p>4.2 Safety precautions are adhered to in line with OSHA</p> <p>4.3 <b>Tools, equipment and materials</b> are assembled in line with task requirement</p> <p>4.4 <b>Grow-out culture unit</b> is drained to dryness</p> <p>4.5 Grow-out culture unit is cleaned, and repairs carried out based on identified faults</p> <p>4.6 Ponds are limed as per the measured pH levels and soil texture</p> <p>4.7 Indoor culture units are disinfected using permitted disinfectants as per aquaculture code of practice</p> <p>4.8 Grow-out culture unit is filled with <b>water fit for aquaculture</b> to required depth.</p> <p>4.9 Grow-out culture unit is fertilized uniformly as per the recommended fertilization rates</p>
5. Stock grow-out culture units	<p>5.1 Fingerlings are sourced from government authenticated hatcheries</p> <p>5.2 Fingerlings are transported to the farm under controlled temperatures and aeration.</p> <p>5.3 Fingerlings are acclimatized based on culture unit temperatures</p> <p>5.4 Fingerlings are gently released in to culture units as per the stocking plan</p> <p>5.5 Stocked ponds are monitored for fingerling stress and mortalities through direct observations</p>
6. Manage fish feeding	<p>6.1 Fish feeding schedule is developed based on the cultured fish species and weight.</p> <p>6.2 Fish are fed as per the feeding schedule using appropriate method</p> <p>6.3 Fish feeding is monitored and appropriate actions taken based on prevailing weather conditions and fish behavior</p>

	<p>6.4 Feeding ration adjustments are calculated based on results from periodic fish sampling and weight measurements</p> <p>6.5 Feeds are handled and stored according to manual of standard operating procedures and manufacturer's instructions.</p> <p>6.6 Feed and feeding records are maintained according to work place requirements</p> <p>6.7 Fertilization of the culture units is carried out in accordance with secchi depth measurements</p> <p>6.8 Water quality parameters are monitored and remedial measures undertaken in accordance with target species optimum ranges</p>
7. Manage fish stock health	<p>7.1 Fish are checked for signs of stress and disease based on physical appearance and behavioral changes</p> <p>7.2 Remedial measures for stressed and diseased fish are undertaken as per Food and Agriculture Organization (FAO) Technical Guidelines for Responsible Fisheries- Aquaculture</p> <p>7.3 Water quality parameters are monitored and remedial measures undertaken in accordance with target species optimum ranges</p> <p>7.4 Biosecurity measures are put in place to prevent disease outbreaks</p>
8. Control weeds, predators and intrusive animals	<p>8.1 <b><i>Fish predators and intrusive animals</i></b> are identified</p> <p>8.2 <b><i>Pond weeds</i></b> are identified and removed while observing good aquaculture practices</p> <p>8.3 <b><i>Control measures</i></b> for predators and intrusive animals are put in place</p>
9. Harvest fish stock	<p>9.1 <b><i>Harvesting plan</i></b> is prepared as per the identified market demand</p> <p>9.2 <b><i>Harvesting tools, equipment and food grade materials</i></b> are assembled in line with task requirement</p> <p>9.3 Harvesting of fish is carried out using appropriate nets and techniques while observing good hygienic practices for fish handling.</p> <p>9.4 Harvested fish is sorted according to size and species while observing good hygienic practices for fish handling.</p>
10. Maintain grow-out culture units	<p>10.1 <b><i>Maintenance tools, equipment and materials</i></b> are assembled as per the task requirements</p> <p>10.2 Grass on pond dykes is cleared periodically to ground level</p> <p>10.3 Surrounding vegetation is cleared as per best farm management practices</p>

	<p>10.4 Pipes and drainage blockages are cleared to allow free flow of water</p> <p>10.5 Damaged components are identified and repaired</p>
<p>11. Integrate fish farming with livestock and poultry</p>	<p>11.1 Selected livestock moved into the housing structures at recommended densities</p> <p>11.2 Livestock raised according to best management practices</p> <p>11.3 Fish and livestock rearing activities are coordinated according to farm planning</p>
<p>12. Monitor and evaluate effectiveness of food safety management system of the fish grow-out</p>	<p>12.1 Performance of hazard control measures put in place are monitored regularly to ensure they are within control as per HACCP plan.</p> <p>12.2 Approval and certification of fish grow-out is maintained as per relevant statutory requirements and standards</p>

### RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
<p>1. Hazards may include but not limited to:</p>	<ul style="list-style-type: none"> <li>• Physical</li> <li>• Chemical <ul style="list-style-type: none"> <li>○ Heavy metals</li> </ul> </li> <li>• Microbial <ul style="list-style-type: none"> <li>○ Sick fish</li> <li>○ Antibiotic residues</li> <li>○ Bio-accumulation</li> <li>○ Parasites</li> <li>○ Viruses</li> <li>○ Bacteria</li> </ul> </li> </ul>

<p>2. Sources of hazards may include but not limited to:</p>	<ul style="list-style-type: none"> <li>• Poor feeding</li> <li>• Poor feed quality</li> <li>• Poor water quality</li> <li>• Human carriers</li> <li>• Cleaning agents</li> <li>• Pesticides</li> <li>• Industrial/ agricultural wastes</li> </ul>
<p>3. Preventive measures may include but not limited to:</p>	<ul style="list-style-type: none"> <li>• Good water quality</li> <li>• Sanitary measures</li> <li>• Proper use of antibiotics</li> <li>• Disease management</li> <li>• Parasite control</li> <li>• Use of quality feed</li> <li>• Good hygienic practices</li> <li>• Biosecurity measures</li> <li>• Probiotics</li> </ul>
<p>4. Corrective measures may include but not limited to:</p>	<ul style="list-style-type: none"> <li>• Disposal of contaminated fish</li> <li>• Fish treatment</li> <li>• Water flow management</li> <li>• Sterilization of the fish grow-out</li> </ul>
<p>5. Statutory requirements and standards may include but not limited to:</p>	<ul style="list-style-type: none"> <li>• Compliance to standards and regulations</li> <li>• Kenya Fisheries Service</li> <li>• County Government</li> <li>• The Fisheries Management and Development Act No.35 of 2016.</li> <li>• The Codex Alimentarius Food Hygiene Basic Texts;</li> <li>• The Food Drugs and Chemical Substances Act Cap. 254 of the Laws of the Kenya;</li> <li>• The Pest Control Products Act, Cap. 346 of the Laws of Kenya;</li> <li>• The Public Health Act, Cap. 242 of the Laws of Kenya;</li> <li>• The Environmental Management and Co-ordination Act, 1999.</li> </ul>
<p>6. Stocking plan may include but not limited to:</p>	<ul style="list-style-type: none"> <li>• Species of fish, stocking density, source of fingerlings, stocking schedule</li> </ul>
<p>7. PPEs include may include but not limited to</p>	<ul style="list-style-type: none"> <li>• Safety goggles, gum boots, helmets, gloves, dust coats, first aid kits, industrial mouth piece</li> </ul>

<p>8. Tools, equipment and materials may include but not limited to:</p>	<ul style="list-style-type: none"> <li>• Measuring tape</li> <li>• Weighing scale</li> <li>• Wheelbarrow</li> <li>• pH meter</li> <li>• Jembes</li> <li>• Spades</li> <li>• Rakes</li> <li>• Lime</li> <li>• Fertilizer</li> <li>• Tamper</li> <li>• Ropes</li> <li>• Liner repair kit</li> </ul>
<p>9. Grow-out culture unit may include but not limited to</p>	<ul style="list-style-type: none"> <li>• Earthen ponds</li> <li>• Concrete tanks</li> <li>• Plastic tanks</li> <li>• Fiberglass</li> <li>• Raceways</li> </ul>
<p>10. Water fit for aquaculture may include but not limited to</p>	<ul style="list-style-type: none"> <li>• Fish species specific recommended level of chlorine</li> <li>• Fish species specific Recommended pH range</li> <li>• Fish species specific Recommended Ammonia</li> <li>• Fish species specific recommended turbidity level</li> <li>• Free of infective pathogens</li> </ul>
<p>11. Fish predators and intrusive animals may include but not limited to:</p>	<ul style="list-style-type: none"> <li>• Birds, mammals, reptiles, amphibians, invertebrates, man</li> </ul>
<p>12. Pond weeds may include but not limited to</p>	<ul style="list-style-type: none"> <li>• Submerged vegetation</li> <li>• Emergent vegetation</li> <li>• Floating vegetation</li> </ul>
<p>13. Control measures may include but not limited to:</p>	<ul style="list-style-type: none"> <li>• Clearing grass, trimming vegetation, traps and scarecrows, cover net, twines, screens, fencing</li> </ul>
<p>14. Harvesting plan may include but not limited to:</p>	<ul style="list-style-type: none"> <li>• Quantities to harvest</li> <li>• Time of harvest</li> <li>• Size to harvest</li> <li>• Culture unit to harvest</li> <li>• Partial or complete</li> </ul>

15. Harvesting tools, equipment and materials may include but not limited to:	<ul style="list-style-type: none"> <li>• Seine net, scoop net, buckets, laundry baskets, weighing scale, perforators</li> </ul>
16. Maintenance tools, equipment and materials may include but not limited to:	<ul style="list-style-type: none"> <li>• Slashers, machetes, jembes, spades, wheelbarrow, rakes, gunny bags</li> </ul>

## REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

### Required Skills

The individual needs to demonstrate the following skills:

- Food safety risk assessment and communication
- Training skills
- Use of tools and equipment
- Basic plumbing
- Pond construction
- Measuring
- Fish handling
- Record keeping
- Fish feeding
- Predator control
- Fish harvesting
- Communication
- Basic first aid
- Numeracy

### Required Knowledge

The individual needs to demonstrate knowledge of:

- Food safety Standards
- Hazard Analysis Critical Control Points (HACCP)
- Food Safety Hazards in Aquaculture
- Good aquaculture practices
- Good hygiene practices
- Safety precautions
- Principles of food hygiene
- National legislations and regulations
- Types of tools, equipment and PPEs
- Fish disease
- Basic fish biology

- Fish feeds and feeding methods
- Types and characteristics of fertilizers
- Water quality parameters
- Fish predators and intrusive animals
- Aquatic weeds
- Animal husbandry

## EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

<p>1. Critical Aspects of Competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 Developed fish grow-out food safety risk management plan</li> <li>1.2 Prepared stocking plan</li> <li>1.3 Drained grow-out culture unit to dryness</li> <li>1.4 Fertilized fish pond using the recommended rates</li> <li>1.5 Calculated number of fingerlings required</li> <li>1.6 Stocked ponds with minimal mortalities</li> <li>1.7 Calculated accurate feed rations based on sampled weights</li> <li>1.8 Maintained accurate feed and feeding records</li> <li>1.9 Positively diagnosed fish for signs of stress and disease, and took remedial measures</li> <li>1.10 Put in place effective measures for control of weeds, predators and intrusive animals</li> <li>1.11 Harvested fish using appropriate techniques</li> <li>1.12 Maintained a clean environment within and around the production area</li> <li>1.13 Integrated livestock maintained at recommended densities in relation to pond sizes</li> </ul>
<p>2. Resource Implications</p>	<p>The following resources must be provided:</p> <ul style="list-style-type: none"> <li>2.1 Workplace or assessment location</li> <li>2.2 PPEs</li> <li>2.3 Tools, materials and equipment</li> <li>2.4 Writing materials</li> <li>2.5 Calculator</li> </ul>
<p>3. Methods of Assessment</p>	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> <li>3.1 Observation</li> <li>3.2 Ora questioning</li> </ul>



	<p>3.3 Projects</p> <p>3.4 Written tests</p> <p>3.5 Portfolio of Evidence</p> <p>3.6 Interview</p> <p>3.7 Third party report</p>
4. Context of Assessment	<p>Competency may be assessed:</p> <p>4. 1On-the-job</p> <p>4. 2Off-the –job</p> <p>4. 3During Industrial attachment</p>
5. Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>

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