



National Unit specification: general information

Unit title: Aquaculture: Fish Husbandry

Unit code: H03C 11

Superclass: SJ

Publication date: January 2012

Source: Scottish Qualifications Authority

Version: 02

Summary

The purpose of this Unit is to develop candidates' knowledge and understanding of the basic principles of good husbandry necessary for the farming of any fin fish species. Candidates will gain a basic level of understanding and competence in fin fish husbandry that includes reference to the legal control of pests and predators that can be detrimental to an aquaculture enterprise. Candidates will be able to set up a holding Unit to suit a stock of fin fish, feed the stock and monitor their performance over a defined time period. The importance of maintaining optimum conditions in the rearing environment also includes candidates carrying out legal predator and pest prevention and control techniques.

The Unit is suitable for candidates who are either new entrants or those already working in aquaculture. Candidates must have access to a fin fish farm to achieve the practical competences.

This is a mandatory Unit in the NPA in Fish Husbandry (SCQF level 5) and is also available as a freestanding Unit.

Outcomes

- 1 Describe Standard Operating Procedures (SOP) for routine fin fish husbandry practices.
- 2 Prepare a fin fish holding Unit to receive fin fish.
- 3 Feed stock according to a daily feed schedule.
- 4 Maintain the environment in the rearing Unit to provide optimum conditions for fin fish survival and growth.

General information (cont)

Recommended entry

Entry is at the discretion of the centre. It would be beneficial if candidates had an appreciation of the concept of intensification before embarking on this Unit.

Credit points and level

1 National Unit credit at SCQF level 5: (6 SCQF credit points at SCQF level 5*)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

Core Skills

Achievement of this Unit gives automatic certification of the following Core Skills component:

- ◆ Critical Thinking at SCQF level 4

There are also opportunities to develop aspects of Core Skills which are highlighted in the Support Notes of this Unit specification.

National Unit specification: statement of standards

Unit title: Aquaculture: Fish Husbandry (SCQF level 5)

Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

All activities must be carried out according to current legislation and Standard Operating Procedures (SOP).

Outcome 1

Describe Standard Operating Procedures (SOP) for routine fin fish husbandry practices

Performance Criteria

- (a) Describe the routine Standard Operating Procedures for preparing holding Units to receive fin fish.
- (b) Describe fin fish feeding methods.
- (c) Identify the main factors that influence fin fish growth.
- (d) Describe the routine practices employed to maintain fin fish welfare during husbandry operations.
- (e) Describe the routine practices employed to maintain optimum conditions in the rearing environment.
- (f) Describe techniques that can be used to prepare fin fish for humane harvesting.
- (g) Describe pest and predator activity and control methods.

Outcome 2

Prepare a fin fish holding Unit to receive fin fish

Performance Criteria

- (a) Clean the holding Unit according to Standard Operating Procedures (SOP) that maintain fin fish welfare.
- (b) Assemble holding Unit components according to SOP ensuring appropriate conditions for the incoming stock.
- (c) Check the regulation of water flow rates is appropriate to the size of fin fish stock and the establishment of a satisfactory water flow pattern.

Outcome 3

Feed stock according to a daily feed schedule

Performance Criteria

- (a) Identify the correct feed type and ration size for the stock to be fed and environmental conditions.
- (b) Measure the daily feed ration for fin fish stocks accurately.
- (c) Feed food to the fin fish stock according to SOP for the feeding method employed.
- (d) Observe the feeding response including quantity of feed consumed and record details in the farm record.

National Unit specification: statement of standards (cont)

Unit title: Aquaculture: Fish Husbandry (SCQF level 5)

Outcome 4

Maintain the environment in the rearing Unit to provide optimum conditions for fin fish survival and growth.

Performance Criteria

- (a) Remove and dispose of dead stock according to SOP and in compliance with current legislation.
- (b) Assess and record the number of dead stock removed in the appropriate farm record.
- (c) Remove solid wastes according to SOP and as appropriate to the nature of the holding Units and class of stock.
- (d) Check the incoming water supply according to the SOP.
- (e) Monitor and maintain predator protection according to the SOP for the system employed and in compliance with current legislation.

National Unit specification: statement of standards (cont)

Unit title: Aquaculture: Fish Husbandry (SCQF level 5)

Evidence Requirements for this Unit

Written and/or oral recorded and performance evidence is required to demonstrate that candidates have achieved all Outcomes and Performance Criteria.

Candidates must have access to a fin fish farm to achieve the practical competences. All activities must be carried out in accordance with current legislation.

Outcome 1 — Written and/or oral recorded oral evidence is required that demonstrates that the candidate can:

- ◆ describe the SOP for preparing two types of holding Unit to receive fin fish, including reference to fin fish size.
- ◆ describe two methods used to feed fin fish.
- ◆ identify two of the main factors that can influence fin fish growth.
- ◆ describe a minimum of two routine practices employed to maintain fin fish welfare during husbandry operations.
- ◆ describe two of the SOP to maintain optimum conditions within holding Units.
- ◆ describe two techniques that can be used to prepare fin fish for humane harvest.
- ◆ describe a minimum of two visual signs of predator activity.
- ◆ describe a minimum of two legal pest and predator control methods.

The assessment will be carried out under closed-book conditions.

Outcome 2 — Performance evidence is required:

The candidate must be able to perform the following tasks on a minimum of two separate occasions for two different holding Units

- ◆ clean holding unit according to the SOP.
- ◆ correctly assemble holding Unit components, according to SOP ensuring appropriate conditions for the incoming stock.
- ◆ ensure the water flow in the holding Unit is established correctly in line with SOP.

Outcome 3 — Written and/or oral recorded evidence and performance evidence is required

The candidate must be able to perform the following tasks on a minimum of three separate occasions for three different stocks of fin fish in supervised, open-book conditions:

- ◆ Identify correct feed type and ration size using an appropriate feed guide.
- ◆ Accurately measure a daily feed ration for fin fish stocks.
- ◆ Feed a stock of fin fish according to SOP.
- ◆ Monitor and record the feeding response.
- ◆ Accurately observe and record the amount of feed consumed.

National Unit specification: statement of standards (cont)

Unit title: Aquaculture: Fish Husbandry (SCQF level 5)

Outcome 4 — Written and/or oral recorded evidence and performance evidence is required.

The candidate must be able to perform the following tasks on a minimum of three separate occasions in supervised, open-book conditions:

- ◆ Remove and dispose of dead stock according to SOP and in compliance with current legislation.
- ◆ Accurately assess and record the dead stock in the appropriate farm record.
- ◆ Safely remove waste from holding Units according to SOP as appropriate to the nature of the holding Units.
- ◆ Check the incoming water supply according to the SOP.
- ◆ Monitor and maintain the predator prevention system according to SOP and in compliance with current legislation.

National Unit specification: support notes

Unit title: Aquaculture: Fish Husbandry (SCQF level 5)

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

This is a mandatory Unit in the NPA in Fish Husbandry (SCQF level 5) and is also available as a free-standing Unit.

The Unit is aligned to the following LANTRA Sector Skills Council's National Occupational Standard (NOS):

- ◆ Aqu 1 Prepare holding Units to receive fish
- ◆ Aqu 3 Gather fish
- ◆ Aqu 4 Grade fish
- ◆ Aqu 6 Prepare to and feed fish
- ◆ Aqu 7 Collect information of fish growth and development
- ◆ Aqu 11 Carry out routine maintenance and repairs on aquaculture facilities
- ◆ Aqu 12 Monitor the aquatic production environment
- ◆ Aqu 13 Maintain environmental conditions within holding Units
- ◆ Aqu 14 Treat health problems in fish
- ◆ Aqu 15 Spawn fish and fertilise fish eggs
- ◆ Aqu 16 Establish and maintain green egg incubation
- ◆ Aqu 17 Prepare to and maintain fish eggs in a hatchery
- ◆ Aqu 18 Care for juvenile fish
- ◆ Aqu 19 Prepare for the transport of live fish
- ◆ Aqu 20 Transport live fish
- ◆ Aqu 37 Work safely in an aquatic environment
- ◆ CU 46 Control vertebrate pests and predators using traps
- ◆ CU 47 Control vertebrate pests and predators by shooting

Candidates should have access to a fin fish farm to achieve the practical competences. This Unit could be delivered in the context of any farmed fin fish, although the husbandry practices are most typical of a salmonid farm.

It would be advantageous if the candidate has an appreciation of the concept of intensification before embarking on this Unit. It is recommended that candidates are familiarised with farm design and operation, with particular emphasis on water distribution, prior to conducting any of the husbandry tasks. Candidates must appreciate the importance of maintaining a sufficient supply of dissolved oxygen to farmed stocks at all times.

National Unit specification: support notes (cont)

Unit title: Aquaculture: Fish Husbandry (SCQF level 5)

Outcome 1 — The candidate should develop knowledge of routine fin fish husbandry practices such as preparing holding Units, feeding fin fish and monitoring and maintaining the rearing environment. The basic preparation of holding Units will be very similar, but there may be differences between sites. Candidates should describe how holding Units are prepared according to the standard operating procedures employed at the site. Candidates should also be aware of the need to adjust routine activities to accommodate a range of size classes of fin fish stocks.

Candidates should develop knowledge of the feeding methods available (hand, demand, automatic). This should also include developing the candidates awareness of some of the main factors that can affect growth and calculations that can be utilised to assess growth, such as; maintenance rationing, compensatory growth, food conversion ratio, specific growth rate and condition factor.

Candidates should develop knowledge of the practices necessary to ensure high standards of fin fish welfare are maintained during routine fin fish husbandry operations such as grading, netting, transportation and handling. These practices include: stocking fin fish at a density level that allows them to express normal behaviour, ensuring the security and integrity of holding Units to prevent stock escapes and predator activity, adjusting water flows and oxygen supply appropriate to the fin fish stocks, fin fish conditioning regimes appropriate to the husbandry operations and SOPs and monitoring the health status of fin fish stocks appropriate to the site health plan.

An awareness of current legislation and Industry Codes of Practice in relation to fin fish welfare, containment and pest and predator control should also be emphasised.

The fin fish harvesting and slaughter techniques described include reference to humane methods that ensure fin fish welfare standards are maintained whilst keeping stress to a minimum. The harvesting and slaughter techniques currently available should include procedures for individual fish and larger scale harvests. Candidates must be aware of the relationship between good husbandry and handling practices, and flesh quality including colour scoring and calculations for chemical treatment withdrawal periods using degree days and how this relates to product quality criteria and current legislation. The requirements for accurate records to be maintained for all harvesting activities and the importance of those records for the routine stock management of the farm should be emphasised.

The importance of maintaining optimum conditions for farmed fin fish and how this relates to low stress, good welfare and low disease risk should be emphasised. This should include reference to signs of pest and predator activity and legal control methods that can be employed to reduce the impact of pests and predators.

The economic impact of pest and predator activity, and the potential threat to human health should also be emphasised. Candidates should be made aware of the environmental requirements of the fin fish being farmed, and why routine monitoring is necessary to ensure the quality of the rearing environment is maintained.

National Unit specification: support notes (cont)

Unit title: Aquaculture: Fish Husbandry (SCQF level 5)

Outcome 2 — Prior to performing the required tasks, candidates should have the preparation of different types of holding Unit demonstrated to them. The preparation should follow the SOP for that activity and should include disinfection, checks on the condition of component parts (pipes, screens, nets) and the security of the whole system once assembled. Candidates should complete this task for a range of size classes of stock.

The importance of setting appropriate water flow rates and flow patterns for the size of the incoming stock whilst ensuring sufficient incoming oxygen should be emphasised.

Outcome 3 — Candidates should be introduced to the concept of feed rationing and taught to read and interpret a daily feed schedule or computerised feeding system. An awareness of a fin fish's normal feeding response in relation to the different feeding methods available should be developed through regular on-farm experience. The skill to regulate the rate of feed input to suit the appetite of the fin fish should evolve through regular feeding practise on a fin fish farm holding a range of size classes of stock.

The importance of being able to accurately assess the feed consumption of stock and how this relates to the economic success of the farm should be emphasised. This should also include reference to the need for accurate and regularly updated feed records.

Outcome 4 — Candidates should be involved in routine monitoring of the rearing environment and removal of dead stock and waste according to the site SOPs. The importance of efficient removal and disposal of mortalities in the reduction of disease risk on the farm should be emphasised. Candidates should be made aware of the importance of recording mortality data and how it can be used to assess the stock (mortality rates, patterns).

The importance of carrying out all routine fin fish husbandry tasks in line with current health and safety legislation should be emphasised including reference to SOPs and the requirements for appropriate personal protective equipment (PPE).

The candidates should receive demonstration on how inlet flows are regulated according to SOPs. It is recommended that this is done under a range of water conditions with a range of size classes of stock, to ensure candidates are fully aware of the importance of routinely monitoring the rearing environment.

Candidates should be involved in the routine monitoring of the site predator prevention systems. This should involve an awareness of the signs of pest and predator activity and the problems that can occur if preventative measures, including equipment, are not routinely monitored and maintained.

The requirements for accurate records to be maintained for all routine monitoring activities and the importance of such records for the day to day management of the farm should be emphasised.

National Unit specification: support notes (cont)

Unit title: Aquaculture: Fish Husbandry (SCQF level 5)

Guidance on learning and teaching approaches for this Unit

This Unit lends itself to a range of teaching and learning approaches that give consideration to the Curriculum for Excellence capacities and Equalities legislation, through reasonable adjustment for all candidates. Some formal teaching may be required to introduce the various fin fish feeding methods available, factors that can influence growth, calculations for growth and feed rates and the causes and effects of stress and how it relates to the environmental conditions in the rearing environment.

There is scope for candidate centred learning based on workbooks, web based resources and interactive ICT based learning objects presented within a virtual learning environment (VLE).

Interactive exercises and regular formative assessment, incorporating online multiple-choice is recommended, in order to develop the candidates understanding of factors influencing growth and stress (cause and effect).

The candidate should be given the opportunity to become familiar with basic farm calculations in relation to feed rates and growth calculations (SGR, FCR, Condition Factor) before becoming involved in those activities as part of the routine farm procedures.

The main delivery of this Unit should be based on a commercial scale fin fish farm. Practical tasks should be demonstrated before candidates are encouraged to become involved with regular husbandry routines which will allow their skills and experience to develop over an extended period. This will enable the candidate to observe and experience the seasonal changes in fin fish behaviour and appetite and improve their husbandry skills.

It would be advantageous to have learning packages for a range of species. Although a number of fin fish species may share the same basic concepts in relation to handling and husbandry, there are major differences (marine environment, cage Units) in scale, size of fish, equipment and techniques required to carry out handling operations.

Guidance on approaches to assessment for this Unit

Outcome 1 could be assessed using restricted response questioning or oral examination.

Outcome 2 requires the observation of practical activity with the results recorded on checklists to satisfy the Performance Criteria.

Outcomes 3 and 4 require the observation of practical activity with the results recorded on checklists to satisfy the Performance Criteria. Additional knowledge evidence is required to satisfy the requirements of these Outcomes. This can be provided orally or written. Where the evidence is given orally, it is recommended that there should also be written evidence in the form of farm records or a diary. Candidates could maintain their own ongoing log of routine husbandry activities, containing the associated records and calculations. This could be stored in a candidate portfolio, either paper based or e-portfolio.

Centres must be satisfied that the evidence submitted is the work of individual candidates.

National Unit specification: support notes (cont)

Unit title: Aquaculture: Fish Husbandry (SCQF level 5)

Assessor observation checklists and other assessment records should be maintained and kept up to date to keep track of candidate progress and to provide evidence for internal and external verification purposes.

Opportunities for the use of e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003)*, *SQA Guidelines on e-assessment for Schools (BD2625, June 2005)*.

Opportunities for developing Core Skills

In this Unit candidates will develop skills for farming of fin fish species in line with current health and safety legislation including reference to Standard Operating Procedures (SOPs).

Candidates will:

- ◆ describe the various feeding methods and the main factors that affect growth.
- ◆ explain the importance of maintaining optimum conditions for farmed fin fish and how conditions relate to low stress, good welfare and low disease risk.
- ◆ explain the economic impact of pest and predator activity, and the potential threat to human health.
- ◆ prepare different types of holding Units following standard operating procedures (sops)
- ◆ set appropriate water flow rates and flow patterns for the size of the incoming stock and ensure sufficient incoming oxygen.
- ◆ read and interpret a daily feed schedule, or computerised feeding system.
- ◆ observe the fin fish's normal feeding response to help inform the rate of feed that suits the appetite of the fish.
- ◆ maintain accurate feed records.
- ◆ carry out routine monitoring of the rearing environment including removal of dead stock, waste and predator prevention systems.
- ◆ maintain an accurate record of all routine monitoring activities.

As candidates are doing this Unit they will be developing aspects of the Core Skills of *Communication* and *Problem Solving*

This Unit has the Problem Solving component of Critical Thinking embedded in it. This means that when candidates achieve the Unit, their Core Skills profile will also be updated to show they have achieved Critical Thinking at SCQF level 4.

National Unit specification: support notes (cont)

Unit title: Aquaculture: Fish Husbandry (SCQF level 5)

Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website www.sqa.org.uk/assessmentarrangements

History of changes to Unit

Version	Description of change	Date
02	Core Skills Component Critical Thinking at SCQF level 4 embedded.	06/01/12

© Scottish Qualifications Authority 2011, 2012

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. Please contact the Business Development and Customer Support team, telephone 0303 333 0330.