National Unit specification: general information

Unit title: Aquaculture: Fish Nutrition and Feeding

Unit code: H03A 11

Superclass: SJ

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Version: 02

Summary

The purpose of this Unit is to provide candidates with the knowledge and competences necessary for the feeding of farmed fin fish, and will give an understanding of the differences in feed requirements at particular life stages. Candidates will describe the methods used to produce feed types and will include reference to production technology, quality control techniques and specialist feeds. An understanding of the various feeding techniques available will allow candidates to select appropriate feeding techniques to suit alternative situations. Candidates will become competent in calculating feed rations and feeding fin fish, which will include monitoring feed consumption and feeding behaviour. Candidates must have access to a fin fish farm to achieve the practical competences.

The Unit is suitable for candidates who are either new entrants or those already working in aquaculture.

This is a mandatory Unit in the NPA in Fish Health and Nutrition (SCQF Level 5) and is also available as a freestanding Unit.

Outcomes

1 Describe the nutritional requirements of farmed fin fish.
2 Describe the methods of feed production for farmed fin fish.
3 Describe feeding techniques and strategies for farmed fin fish.
4 Conduct farmed fin fish feeding operations.

General information (cont)

Recommended entry

Entry is at the discretion of the centre.

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 Nutrition and Feeding (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 recognised Standard Operating Procedures (SOP).

Outcome 1

Describe the nutritional requirements of farmed fin fish.

Performance Criteria

(a) Describe the role of macro and micro nutrients.
(b) Describe the specific nutritional requirements for different life stages of farmed fin fish.

Outcome 2

Describe the methods of feed production for farmed fin fish.

Performance Criteria

(a) Describe the sourcing and origin of raw materials required for the production of fin fish feed.
(b) Describe feed quality criteria for commercially available farmed fin fish feeds.
(c) Describe the fin fish feed production process accurately.

Outcome 3

Describe feeding techniques and strategies for farmed fin fish.

Performance Criteria

(a) Describe the advantages of hand feeding over other feeding methods.
(b) Describe automated feeding techniques with reference to commercially available feeding technology.
(c) Describe fin fish feeding strategies employed to ensure growth and maintain welfare of farmed fin fish.

National Unit specification: statement of standards (cont)

Unit title: Aquaculture: Fish Nutrition and Feeding (SCQF level 5)

Outcome 4

Conduct farmed fin fish feeding operations.

Performance Criteria

(a) Calculate the correct daily feed ration to reflect both the feeding strategy employed and environmental conditions.
(b) Carry out the feeding operation to recognised procedures for the feeding method employed.
(c) Maintain accurate fin fish feeding records.

Evidence Requirements for this Unit

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.

Evidence for Outcomes 1, 2 and 3 will be produced in closed-book conditions.

Outcome 1 — Written and/or recorded oral evidence

The candidate must:

- describe the role of macronutrients including protein, lipids and carbohydrates in farmed fin fish nutrition.
- describe the role of micronutrients including vitamins, pigment and minerals in farmed fin fish nutrition.
- describe the specific nutritional requirements for a minimum of three different life stages of farmed fin fish.

Outcome 2 — Written and/or recorded oral evidence

The candidate must:

- describe the sourcing and origin of a minimum of two raw materials used for the production of fin fish feed.
- describe feed quality criteria to include quality control techniques and guidelines used for commercially available farmed fin fish feeds.
- describe the production process of a minimum of two types of commercially available farmed fin fish feeds accurately.

National Unit specification: statement of standards (cont)

Unit title: Aquaculture: Fish Nutrition and Feeding (SCQF level 5)

Outcome 3 — Written and/or recorded oral evidence

The candidate must:

- describe two advantages of hand feeding farmed fin fish over other feeding methods.
- describe a minimum of two automated methods of feeding farmed fin fish with reference to appropriate technology used.
- describe a minimum of two feeding strategies employed to ensure growth and maintain welfare of farmed fin fish.

Outcome 4 — Written and/or recorded oral evidence and performance evidence

The candidate must:

- perform a minimum of ten accurate daily feed calculations appropriate to the stock, feeding strategy and environmental conditions.
- feed a minimum of ten stocks of farmed fin fish using appropriate methods for the given site.
- maintain accurate fin fish feeding records including reference to the quantity of feed consumed and observation of feeding behaviour.

Evidence will be produced in open-book conditions.

National Unit specification: support notes

Unit title: Aquaculture: Fish Nutrition and Feeding (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

The Unit is a mandatory Unit in the NPA Fish Health and Nutrition at SCQF level 5, but is also available for candidates who wish to study the Unit as a standalone Unit.

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

- Aqu 6 Prepare to and feed fish
- Aqu 18 Care for juvenile fish
- Aqu 37 Work safely in an aquatic environment

The candidate should develop an understanding of underpinning concepts, including metabolism, digestion and nutritional requirements. The candidate should develop knowledge of the types of feed suitable for all production stages for a wide range of farmed fin fish species. This could include Atlantic salmon, rainbow trout, carp and marine species such as turbot, halibut, sea bass and sea bream. The changes in the basic nutritional requirements and feeding behaviour associated with each stage of development should be discussed following the introduction of key nutritional concepts including macro and micronutrients. The candidate should develop a basic understanding of the role of the major nutrients supplied in fin fish diets with particular emphasis on the factors determining the efficiency of protein utilisation and its relevance to economically viable fin fish growth. The value of fish oil as a suitable energy source for carnivorous fin fish and carbohydrates performing a similar function for omnivorous fin fish should be included. The range of feeds and commonly used feed ingredients supplying each of the major nutrients should be identified and their nutritional quality described.

The candidate should become aware of the influence of the physical nature of each feed type on the practical aspects of feeding including feed storage, pollution of the rearing environment, palatability and presentation of the feed to fin fish. The physical quality criteria relevant to dry feeds should be discussed.

The candidate should develop knowledge of the main stages of the production process for the feed types prescribed. The importance of selecting feed ingredients of known nutritional quality to ensure the provision of all requirements should be included. The sourcing of materials to meet sustainability requirements should be investigated. Specialist feeds such as medicated feeds should be discussed.

The candidate should develop a basic understanding of feeding strategies including the difference between feeding for optimum Feed Conversion Ratio (FCR), maximum growth rate, maintenance and harvest. The use of different (lipid level and pigmented diets) diets to achieve customer specifications should also be considered.

The relative merits of hand and automated feeding methods should be discussed and should include the control of feed spread, feeding rate and frequency, reliability and cost. The suitability of alternative feeding methods should be considered for different feed types and farming systems.

Candidates should ensure that all work is carried out in line with current health and safety legislation and is conducted according to SOP using appropriate personal protective equipment (PPE), where required.

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. Tutor led knowledge development can be used effectively in the early stages.

The candidate could visit a modern dry feeds production plant to gain an appreciation of state of the art dry feed manufacturing technology for salmonid hatchery and on-growing feeds.

The candidate should be encouraged to read manufacturers' feed charts to calculate daily rations. The influence of environmental conditions and feeding strategy on feeding practices should be discussed prior to the candidate receiving on-farm training. The importance of observation and recording of the feed response should be emphasised.

Guidance on approaches to assessment for this Unit

Outcomes 1, 2 and 3 could be assessed using a combination of short and extended response questions.

Outcome 4 requires the observation of practical activity with the results recorded on checklists to satisfy the Performance Criteria and submission of a candidate portfolio of evidence. Evidence could be gathered on an ongoing basis through the observation of candidates performing routine operations.

Time should be allowed for any necessary re-assessment.

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

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.

National Unit Specification: support notes (cont)

Unit title Aquaculture: Fish Nutrition and Feeding (SCQF level 5)

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 in providing a wide range of farmed fin fish species with appropriate feed during all production stages to ensure maximum growth, maintenance and harvest.

Candidates will:

- identify basic nutritional requirements and feeding behaviour associated with each stage of fin fish development.
- identify the role of major nutrients in fin fish diets and commonly used feed ingredients supplying each of the major nutrients and their nutritional quality.
- identify the source of raw ingredients and the role of sustainability in fin fish feed manufacture.
- identify the range and influence of each feed type on the practical aspects of feeding including feed storage, pollution of the rearing environment, palatability and presentation of the feed to fin fish.
- identify the main stages of the production process for the feed types prescribed including medicated feeds.
- identify the merits of hand and automated feeding methods including the control of feed spread, feeding rate and frequency, reliability and cost.
- carry out feeding operations by calculating daily feed rations appropriate to the feeding strategy and environmental conditions while adhering to current health and safety legislation.
- maintain accurate fin fish feeding records.

This means that as candidates are doing this Unit they will be developing aspects of the Core Skills of *Problem Solving*, *Communication* and *Numeracy*.

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 Nutrition and Feeding (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