Higher National Unit specification

General information for centres

Unit title: Fish Production Management

Unit code: F4S6 34

Unit purpose: This Unit will provide candidates with a fundamental knowledge and understanding of the conditions required to manage and produce fish efficiently whilst meeting appropriate welfare standards.

On completion of the Unit the candidate should be able to:

1 Explain the design features of fish ongrowing units.
2 Explain the principles of feed management.
3 Evaluate fish production efficiency.

Credit points and level: 2 HN credits at SCQF level 7: (16 SCQF credit points at SCQF level 7*)

**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.*

Recommended prior knowledge and skills: While entry to this Unit will be at the discretion of the centre, it may be beneficial if candidates are working towards the following HN units: *Fish Science: Freshwater Fish, Water Resources for Aquaculture and Fisheries* and *Fish Health and Disease*.

Core Skills: There are opportunities to develop the Core Skills of *Problem Solving* at SCQF level 6, *IT* and *Working with Others* at SCQF level 5 and the Core Skills components of Written Communication and Using Number at SCQF level 5 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Context for delivery: If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

General information for centres (cont)

Assessment: It is recommended that Outcome 1 and the feed delivery systems aspect of Outcome 2 are assessed using case studies and associated reports produced in open-book conditions.

The remaining aspects of Outcome 2 could be assessed in conjunction with Outcome 3 as an extended project.

Outcome 3 could be assessed by a combination of practical work carried out in supervised conditions and an extended project carried out in open-book conditions.

Higher National Unit specification: statement of standards

Unit title: Fish Production Management

Unit code: F4S6 34

The sections of the Unit stating the Outcomes, Knowledge and/or Skills, and Evidence Requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Explain the design features of fish ongrowing units

Knowledge and/or Skills

- Fish ongrowing units
- Production environment controls
- Site characteristics

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can, for three ongrowing units, including at least one freshwater and at least one marine:

- describe the design of the units used for fish production in terms of construction materials, production capacity, specification, and size and stage of fish
- explain how water input and water output are controlled to provide a suitable production environment
- explain how choice and design of the units is affected by water source, water availability, land availability, potential predation and exposure at each site

All assessment evidence must include labelled diagrams and illustrations. The evidence should be produced in open-book conditions and guaranteed to be the candidate's own work.

Assessment Guidelines

This Outcome could be assessed by case studies developed from visits to fish farms and associated reports.

Higher National Unit specification: statement of standards (cont)

Unit title: Fish Production Management

Outcome 2

Explain the principles of feed management

Knowledge and/or Skills

- Composition of fish feed
- Purpose of specific fish feeds
- Feed delivery systems
- Feeding strategies
- Feeding efficiency
- Daily feed requirements
- Forward projection of feed requirements

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- explain the composition of one commercially available fish feed in terms of the protein, fat and oil, carbohydrate, vitamin, mineral and additive components required for efficient growth and good health
- explain the specific feed requirements of one given herbivorous fish species and one given carnivorous fish species
- explain the specific feed requirements at first feeding, juvenile, ongrowing to market and broodstock stages for one given fish species
- describe three different feed delivery systems in terms of design characteristics, energy inputs and maintenance requirements
- explain how feeding to guidelines, feeding to satiation, under-feeding and over-feeding strategies are related to growth, feeding efficiency, fish welfare, and the environment
- calculate the daily feed requirements for a given stock of fish using given feed tables
- determine the projected feed requirements for a two month period for a given stock of fish in terms of quantity and type of feed

All assessment evidence should be produced in the form of a project report produced in open-book conditions and guaranteed to be the candidate's own work.

Assessment Guidelines

The description of the feed delivery systems could be assessed in conjunction with the assessment for Outcome 1, details of which are given at the end of Outcome 1.

The other aspects of this Outcome could be assessed in conjunction with Outcome 3, details of which are given at the end of Outcome 3.

Higher National Unit specification: statement of standards (cont)

Unit title: Fish Production Management

Outcome 3

Evaluate fish production efficiency

Knowledge and/or Skills

- Fish stock sampling methods
- Data recording
- Fish stock sampling operations
- Fish survival and growth
- Feed conversion efficiency
- Overall production performance
- Management strategies for production efficiency

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- explain two different methods of sampling a stock of fish in order to determine growth and feed conversion rate.
- maintain a daily record of feeding and survival for a given stock of fish.
- sample a stock of fish on two occasions over a two month period using industry accepted practice in relation to stock handling/welfare, preparation and use of equipment, environmental considerations and sampling methods. Data recording should be from samples large enough to yield statistically valid results.
- evaluate the growth of a given stock of fish from the results of the sampling operations.
- evaluate the survival rate of the given stock of fish.
- evaluate the performance of the feed conversion efficiency of the given stock of fish.
- evaluate the overall production performance of the given stock of fish.
- explain management strategies regarding the feeding, stocking and long term performance to achieve efficient production of the given stock of fish.

The daily recording and the sampling should be carried out under supervised conditions using performance evidence supported by the candidate's records of feeding, survival and weighing.

All other assessment evidence should be produced in the form of a project report produced in open-book conditions and guaranteed to be the candidate's own work.

Assessment Guidelines

This Outcome could be assessed by a combination of practical work and an extended project which could also incorporate all of the evidence for Outcome 2 apart from the description of three feed delivery systems.

Administrative Information

Unit code: F4S6 34

Unit title: Fish Production Management

Superclass category: SJ

Original date of publication: August 2008

Version: 01

History of changes:

Version	Description of change	Date

Source: SQA

SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of Higher National qualifications.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. Please contact the Customer Contact Centre for further details, telephone 0845 279 1000.

Higher National Unit specification: support notes

Unit title: Fish Production Management

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 80 hours.

Guidance on the content and context for this Unit

This Unit is intended for candidates who are working in or seeking a career in the aquaculture industry or for candidates working or seeking a career in the freshwater fisheries management industry.

The teaching and learning of this Unit should be delivered in this context.

Health and safety procedures should always be adhered to especially in the practical components of this Unit.

Additional information relating to each Outcome is given below:

1 This Outcome covers the design and function of ongrowing units used in the production of fish. The Unit is primarily concerned with the growing of fish once they have left the hatchery. This Outcome should provide a general overview of all types of ongrowing units used for a variety of species and locations and should include systems for both freshwater and marine environments. The Outcome should cover general design features of ongrowing units and how they achieve the environmental and welfare conditions required to achieve efficient fish production. This should include information on water sources, supply and treatment of water within the production environment, predator control systems, moorings, nets and screens where applicable.

2 This Outcome covers the principles of feed management required to achieve efficient fish growth in cultured conditions. The Outcome should discuss the variety of feeds and feeding methods used to ongrow fish at different stages of their life cycle. The composition of various feeds and how the composition affects growth and feeding efficiency will be covered. The feeding methods and delivery systems will be covered to provide information on efficiency both in terms of growth but also in reducing environmental impacts. Calculation of feed requirements and feeding strategies will be covered to gain an understanding of how optimum growth and efficient food conversions are achieved.

3 This Outcome covers the monitoring and sampling of fish in order to determine the specific growth rate and performance of stock to allow an assessment to be made of the overall efficiency of production. Methods of calculating fish growth and feed conversion efficiency to allow efficient production to be gauged against industry standards will be covered. Knowledge of factors that affect and determine efficiency of production will be discussed, to allow the determination of proactive and corrective stock management actions required to achieve efficient production. Understanding the importance of factors that lead to efficient production is important not only for financial reasons but also for fish welfare and environmental reasons. This Outcome covers the practical aspects of the actual fish sampling operations required to obtain the required data and information to be used to evaluate fish production efficiency on an actual stock of fish. The sampling operations should be carried out to accepted industry welfare standards.

Higher National Unit specification: support notes (cont)

Unit title: Fish Production Management

Guidance on the delivery and assessment of this Unit

This Unit is likely to be part of a Group Award designed to provide candidates with the ability to work in the aquaculture and fisheries management industries. It could also be a stand alone Unit for those wishing to improve their knowledge and understanding of fish rearing.

Candidates will have to be able to monitor a population of fish in order to determine the efficiency of production. In order to gain this information, candidates will have to monitor the feeding and growth of a population over a sufficient length of time that realistic figures will be obtained. The candidates will be involved in the practical sampling techniques required in order to obtain information which can then be used to calculate the growth and feeding efficiency.

In order to cover the variety of ongrowing units, feeding systems, and other aspects of fish farm production design, photographs and the use of internet sites as well as visits to fish farms could be used. This should broaden the knowledge of all candidates to appreciate the range of methods used in culturing a range of species.

There are two theory assessments and one practical assessment.

The first Outcome could be assessed by the production of case study reports investigating a variety of different ongrowing units. The reports may also cover information gained on site visits where more detailed information on the design features of the system and ongrowing units may be described.

Part of the second Outcome could also be assessed by including additional information on feeding systems and feeding methods in the reports produced for Outcome one.

Outcomes two and three should be assessed by a project and report where a given population is monitored for a suitable time period so that sufficient information can be collected to monitor and calculate growth and feeding efficiency. The report would include determination of feeding rates and forecast of food usage for a given population, and should indicate recommendations for the population in order to maintain efficient production and welfare standards. The practical aspects of fish sampling should be assessed by observation of the sampling procedure carried out on a given fish population. If direct observation by the assessor is not possible, video evidence accompanied by witness testimony would be acceptable.

Opportunities for developing Core Skills

This Unit provides the opportunity to develop Written Communication skills at SCQF level 5 in the form of reports. The reports would also allow the candidates to use *IT* skills at SCQF level 5 in investigating various aquaculture systems. The second report allows the candidate to develop Using Number skills at SCQF level 5 in the various calculations of fish growth and feeding efficiency. *IT* skills at SCQF level 5 should also be developed as the candidate would be encouraged to store information on growth and feeding on computer. Outcome 3 will provide opportunities for the development of *Problem Solving* skills at SCQF level 6 and *Working with Others* at SCQF level 5.

Open learning

If this Unit is delivered by open or distance learning methods, additional resources will be required for candidate support, assessment and quality assurance.

Candidates with disabilities and/or additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* **(www.sqa.org.uk)**.

General information for candidates

Unit title: Fish Production Management

This Unit is worth 2 HN credits at SCQF level 7. This means that it is an important part of the course concerned with investigating the actual methods, management and monitoring of fish farm production.

Prior Knowledge: Although no prior knowledge of fish farming is necessary before starting this Unit, any previous experience of fish farming would be very beneficial and would help in both the understanding and practical aspects of this Unit.

How you will learn: If you have no previous experience of fish farming, the opportunities to visit different types of fish farm systems will help to contextualise your learning. You will be required to collect your own data from actual farmed populations of fish as part of the analysis and practical aspects of this Unit so you will have access to fish farm facilities as part of your learning. Further research of fish farm systems which you are not familiar with or have not had the opportunity to visit may be carried out by accessing internet sites to help you achieve the following Outcomes:

1 Explain the design features of fish ongrowing units.
2 Explain the principles of feed management.
3 Evaluate fish production efficiency.

Assessments: In order to successfully complete this Unit, you will need to achieve a satisfactory level of performance in all Outcomes.

You will be expected to carry out a project and produce a report describing different types of ongrowing systems used in commercial fish farming of both freshwater and marine environments. You will also be investigating the different types of feeding systems commonly used in commercial fish farms.

As part of the assessment you will have to carry out the practical sampling of populations of fish on a fish farm to get information on sizes of the fish. This will have to be carried out to a high standard of welfare in order to demonstrate that you are not harming the fish being sampled and not unduly stressing the fish population.

From the information you gain from the sampling exercises you will have to demonstrate that you can analyse the data to obtain important management information on the growth, survival, and feeding efficiency of a fish farm population. You will also have to demonstrate that you can use the information to make management decisions which will allow fish farm stock to be grown to the highest production efficiencies without compromising welfare or environmental standards.

The production of a report on ongrowing and feeding systems should include illustrations and photos, in a suitable electronic format. The analyses of the production efficiency of a stock of farmed fish should also lead to a report which will demonstrate numeracy skills and be produced in an electronic format, demonstrating ICT skills.

Core Skills: The learning and assessment activities will present opportunities for you to develop the Core Skills of *Problem Solving* at SCQF level 6, *IT* and *Working with Others* at SCQF level 5 and the Core Skills components of Written Communication and Using Number at SCQF level 5 although there is no automatic certification of Core Skills or Core Skills components.