



Higher National Unit specification

General information for centres

Unit title: Fish Production Technology

Unit code: F4S7 34

Unit purpose: This Unit is designed to enable candidates to gain knowledge and understanding of fish farm equipment and technology which is used for the efficient production of fish.

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

- 1 Evaluate production equipment in given fish farm situations.
- 2 Propose and evaluate technological solutions for the intensification of fish production.
- 3 Explain the function and operation of recirculation systems.

Credit points and level: 1 HN credit at SCQF level 7: (8 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 Hatchery Management (Salmonid)* and *Fish Production Management*.

Core Skills: There are opportunities to develop the Core Skill of *IT* at SCQF level 5 and the Core Skills component of Written Communication (*Communication*) 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.

Assessment: It is recommended that candidates carry out case studies and complete associated reports developed from investigations at the workplace or visits to fish farms.

Higher National Unit specification: statement of standards

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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

Evaluate production equipment in given fish farm situations

Knowledge and/or Skills

- ◆ Operation and function of fish production equipment
- ◆ Routine maintenance and servicing of fish production equipment
- ◆ Efficiency of fish production equipment

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can, for a given fish farm:

- ◆ explain the operation and function of one piece of equipment for: — water management, fish handling, fish production and fish transport
- ◆ explain the routine maintenance and servicing required for one piece of equipment for: — water management, fish handling, fish production and fish transport
- ◆ evaluate the efficiency of one piece of equipment for: — water management, fish handling, fish production and fish transport

The evidence for this Outcome should be produced in open-book conditions and guaranteed to be the candidate's own work.

Assessment Guidelines

This Outcome could be assessed by a case study and associated report developed from investigations at the workplace and/or visits to a fish farm.

Higher National Unit specification: statement of standards (cont)

Unit title: Fish Production Technology

Outcome 2

Propose and evaluate technological solutions for the intensification of fish production

Knowledge and/or Skills

- ◆ Technological innovations in fish production equipment
- ◆ Innovations in fish production methods
- ◆ Cost effectiveness of alternative fish production equipment and methods

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can, for a given fish farm:

- ◆ evaluate the practical application of four named items of equipment and/or methods of technology used to assist in the intensification of production
- ◆ evaluate the cost effectiveness of four named items of equipment and/or methods of technology used to assist in the intensification of production

The evidence for this Outcome should be produced in open-book conditions and guaranteed to be the candidate's own work.

Assessment Guidelines

This Outcome could be assessed by a case study and associated report developed from investigations at the workplace or visits to a fish farm.

Higher National Unit specification: statement of standards (cont)

Unit title: Fish Production Technology

Outcome 3

Explain the function and operation of recirculation systems

Knowledge and/or Skills

- ◆ Design of recirculation systems
- ◆ Water quality monitoring in recirculation systems
- ◆ Water quality control in recirculation systems

Evidence Requirements

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

- ◆ describe the design of one given fish production recirculation system
- ◆ explain three advantages and three disadvantages of one given recirculation system
- ◆ describe two techniques employed to monitor water quality to maintain conditions for optimum fish production in one given recirculation system
- ◆ explain how water quality is controlled by filtration methods in one given recirculation system
- ◆ explain how carbon dioxide and oxygen levels are controlled to meet fish requirements in one given recirculation system
- ◆ explain how sterilisation techniques and equipment are used to control pathogens in one given recirculation system
- ◆ explain how two water parameters not mentioned above are controlled to achieve optimum fish production in one given recirculation system

The evidence for this Outcome should be produced in open-book conditions and guaranteed to be the candidate's own work.

Assessment Guidelines

This Outcome could be assessed by a case study and associated report based on a fish production recirculation system which is in the workplace or has been investigated as part of a site visit to a fish farm.

Administrative Information

Unit code: F4S7 34

Unit title: Fish Production Technology

Superclass category: SJ

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Higher National Unit specification: support notes

Unit title: Fish Production Technology

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 Unit is intended for candidates who are working in, or seeking a career in, the aquaculture industry.

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

Additional information relating to each Outcome is given below:

- 1 This Outcome provides an introduction to the range of equipment which is currently being used in the commercial finfish aquaculture industry. The range of equipment is extremely wide and varies depending on the fish farm set up. There is clearly a limit on how much equipment can be described, but it is important that the candidate gains an understanding of how the industry has become more efficient in terms of labour and production costs due to the use of modern equipment and practices. It is also important that the candidate is aware that this efficiency of production has been achieved without compromising fish welfare or the environment which is usually an important design feature of some of the equipment. Equipment can be categorised into water management, fish handling, fish production and fish transportation. Those candidates already working in the industry are likely to be familiar with much of the modern technology but might not be aware of the advances that commercial aquaculture has made. Candidates based in a college environment should be given site visits to various fish farms where specific pieces of equipment can be described by the site manager or supervisor.
- 2 This Outcome is a logical continuation from Outcome 1 and specifically examines in more detail how the equipment brings about efficiency of production. The efficiency may relate to increased production of available water resources, efficiency in terms of manpower, efficiency of cost of production or all three. It is recommended that candidates examine specific items of equipment more fully.
- 3 This Outcome concentrates on the specific use of fish recirculation systems as an aspect of fish production technology. Although recirculation systems have been used for fish production for some time their use is expanding as availability of suitable water resources declines and the requirements to control effluent from fish farms becomes greater. This Outcome should describe the various types of recirculation systems based on partial or total re-use of water. It should describe how ammonia; nitrates; nitrites; oxygen; carbon dioxide and pH levels are monitored and controlled by a variety of technology. Methods of filtration and removal of waste solids and the control of pathogens should be included. The advantages and disadvantages of recirculation and why it is not suitable for all types of fish production should be discussed.

Higher National Unit specification: support notes (cont)

Unit title: Fish Production Technology

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 industry. It could also be a stand alone Unit for those wishing to improve their knowledge and understanding of fish production technology.

Where the Unit forms part of a Group Award it should be delivered alongside the Units *Fish Production Management* or *Fish Hatchery Management* or both.

This Unit is best carried out by site visits to commercial fish farms. Where possible it would be useful to visit a hatchery set up, an on-growing set up, and a recirculation site.

Outcomes 1 and 2 could be assessed by investigative reports into various items of equipment. The candidate should be encouraged to include labelled photographs or diagrams in the report.

Outcome 2 could be assessed by a written report based on an actual recirculation system in the workplace or investigated during a site visit.

Opportunities for developing Core Skills

This Unit provides the opportunity to develop Core Skills and Core Skills components as follows:

- ◆ *IT* at SCQF level 5 in the production of written reports which could include digital images. Also, the candidate might explore the internet to investigate various fish farm manufacturers' sites to research items of equipment.
- ◆ Written Communication at SCQF level 5 in the form of written reports.

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 Technology

This Unit is worth 1HN credit at SCQF level 7.

The Unit looks at commercial fish farm equipment which has allowed the fish farming industry to become more efficient in its production. Although much of the equipment is important in terms of labour savings, other items of equipment have become important in processing input water and farm effluent in order to meet environmental requirements and improve the sustainability of the industry.

Prior Knowledge: It is recommended that you have some prior knowledge or experience of fish farms either through employment or from studying other Units in the HNC Fish Farming award. This will give you the knowledge which will allow you to evaluate various items of equipment.

How you will learn: There will be opportunities for site visits to fish farms to investigate various items of equipment. Researching the internet or visits to fish farm exhibitions could also provide useful information to help you achieve the three component Outcomes of the Unit:

- 1 Evaluate production equipment in given fish farm situations.
- 2 Propose and evaluate technological solutions for the intensification of fish production.
- 3 Explain the function and operation of recirculation systems.

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

You will be required to research various items of equipment which have played an important part in allowing fish farms to become more efficient. You will be required to produce reports describing various items of fish farm equipment and explaining how they have brought about efficiencies.

You will be required to explore and construct a report specifically on the use of recirculation systems in aquaculture. Recirculation systems are being used more extensively by the industry and it is important that you have a good understanding of the functioning and design of recirculation systems.

Core Skills: The learning and assessment activities will present opportunities for you to develop the Core Skill of IT at SCQF level 5 and the Core Skills component of Written Communication at SCQF level 5, although there is no automatic certification of Core Skills or Core Skills components.