National Unit Specification: general information

UNIT Aquaculture: Salmonid Ova Production (SCQF level 5)

CODE F6TH 11

SUMMARY

Candidates undertaking this Unit will be able to describe how ova are produced from salmonid broodstock in a commercial hatchery with reference to hatchery equipment and husbandry techniques. In addition, candidates will develop an ability to evaluate broodstock ripeness, strip ova and produce viable ova with minimal stress to the fish.

OUTCOMES

1 Describe a salmonid broodstock and ova incubation facility.
2 Describe salmonid broodstock husbandry and ova production techniques.
3 Describe salmonid ova and alevin husbandry techniques.
4 Produce viable ova and alevins from salmonid broodstock.

RECOMMENDED ENTRY

Entry is at the discretion of the centre.

CREDIT VALUE

1 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.*

Administrative Information

Superclass: SJ

Publication date: May 2009

Source: Scottish Qualifications Authority

Version: 01

National Unit Specification: general information (cont)

UNIT Aquaculture: Salmonid Ova Production (SCQF level 5)

CORE SKILLS

There is no automatic certification of Core Skills in this Unit.

There are opportunities for Core Skill development; these are highlighted in the Support Notes of this Unit Specification.

National Unit Specification: statement of standards

UNIT Aquaculture: Salmonid Ova Production (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.

OUTCOME 1

Describe a salmonid broodstock and ova incubation facility.

Performance Criteria

(a) Broodstock holding facilities and handling equipment are described accurately.
(b) The structure and operation of ova incubation equipment is described accurately.

OUTCOME 2

Describe salmonid broodstock husbandry and ova production techniques.

Performance Criteria

(a) The preparation of broodstock for spawning is described accurately.
(b) The assessment of broodstock ripeness is described accurately.
(c) Broodstock stripping techniques are described accurately.
(d) Preparation of ova for incubation is described accurately.
(e) Ova counting techniques are described accurately.
(f) Ova incubation techniques are described accurately.

OUTCOME 3

Describe salmonid ova and alevin husbandry techniques.

Performance Criteria

(a) The environmental requirements of ova during incubation are described accurately.
(b) The techniques for the removal of non-viable ova are described accurately.
(c) The prophylactic treatment of ova to protect them from fungal infection is described accurately.
(d) The environmental requirements of alevins are described accurately.

National Unit Specification: statement of standards (cont)

UNIT Aquaculture: Salmonid Ova Production (SCQF level 5)

OUTCOME 4

Produce viable ova and alevins from salmonid broodstock.

Performance Criteria

(a) Broodstock ripeness is assessed according to recognised procedures and with minimum stress to the fish.
(b) Sexual products are removed from ripe broodstock using recognised procedures and with minimum stress to the fish.
(c) Ova are fertilised and prepared for incubation according to recognised procedures.
(d) Ova are counted according to recognised procedures and the numbers of ova laid down for incubation is recorded.
(e) The environmental conditions in the incubation Unit are established from fertilised ova through to swim up fry.

EVIDENCE REQUIREMENTS FOR THIS UNIT

Evidence is required to demonstrate that candidates have achieved all Outcomes and Performance Criteria.

Outcomes 1–3 — Written and/or recorded oral evidence

The candidate must, for one salmonid ova production system, describe:

- Broodstock holding facilities
- Broodstock handling equipment
- The structure and operation of one incubation system
- The preparation of broodstock for spawning
- The assessment of broodstock ripeness
- Accepted broodstock stripping techniques
- Fertilisation and water hardening procedures
- One ova counting technique
- One ova incubation method
- Three environmental requirements of ova during incubation in relation to embryonic development
- Two techniques used to remove non-viable ova
- One prophylactic treatment of ova to protect them from fungal infection
- Three environmental requirements of alevins

National Unit Specification: statement of standards (cont)

UNIT Aquaculture: Salmonid Ova Production (SCQF level 5)

EVIDENCE REQUIREMENTS CONTINUED

Outcome 4 — Performance evidence, supported by assessor observation checklists

The candidate must:

- assess broodstock ripeness with minimal stress to one male and one female fish
- remove milt and ova from ripe broodstock with minimal stress to one male and one female fish
- fertilise, count and prepare one batch of ova for incubation according to recognised procedures
- establish the water temperature, water flow rates and light requirements for one batch of stock from fertilised ova through to swim up fry

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

National Unit Specification: support notes

UNIT Aquaculture: Salmonid Ova Production (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 an optional Unit within the NPA in Aquaculture at SCQF level 5, but it can also be used as a free-standing Unit.

This Unit is aligned to National Occupational Standard (NOS) Unit CU54, Produce Eyed Fish Eggs (Lantra — Sector Skills Council).

The candidate should develop a knowledge of trout and salmon hatchery operations from broodstock preparation to the production of fry. The main emphasis throughout should be on the most commercially significant species, Atlantic salmon and rainbow trout, but reference could be made to other species including the Arctic char, brook trout and brown trout for comparative purposes.

In Outcome 1, the candidate should be introduced to the principal components of a salmonid hatchery system. This should include the various types of incubation equipment in common use (horitzontal flow and vertical stack), holding Units, egg picking equipment and environmental control systems. The difference in the environmental requirements of salmon and trout could be discussed and could include reference to the implications to equipment design and husbandry practices for each species.

In Outcomes 2 and 3, the candidate should develop a basic understanding of the influence of broodstock and ova husbandry on the success of a salmonid hatchery. This could include the following aspects: selection of productive genetic strains, holding conditions, stock density and nutritional requirements. Factors that can influence fecundity and ova quality could be discussed and the control of sexual maturation by photoperiod and sex reversal could be included. Candidates should be able to recognise the visual signs of sexual maturation. The procedures for assessing the ripeness of individuals in a population of salmonid broodstock should be discussed, emphasising the importance of careful handling to minimise fish stress. Comprehensive instructions in broodstock stripping technique should be given. The internal anatomy of a fully ripe female salmonid could be described to illustrate the proximity of sensitive organs to the front of the ovary. The candidate should aware of the importance of applying limited pressure during stripping and the use of anaesthetics when working with large broodstock.

The treatment of the sexual products post-stripping should be discussed and could include the elimination of water from ova prior to milt addition, water hardening, ova counting methods and laying down in the incubation Unit. The candidate should develop a knowledge of the structure of a salmonid ova. The physiological changes occurring following fertilisation should be discussed and the normal ova development sequence outlined, emphasising the tender stage when handling could be detrimental. Reference could be made to the use of degree days to predict ova development and the manipulation of development rates practised by some hatcheries through control of the water temperature.

National Unit Specification: support notes

UNIT Aquaculture: Salmonid Ova Production (SCQF level 5)

Information about the environmental requirements of both the developing ova and alevin stages could include water temperature, water flow rates, oxygen requirement and light conditions. The provision of micro-habitat substrates in incubation Units to optimise conditions for alevin development could be discussed. The elimination of non-viable ova by hand and by automated egg shocking techniques should be discussed with reference to ova structure. The candidate should be aware of the routines necessary to maintain hygiene in the incubation Units, including egg picking and prophylactic flush treatments to combat fungal infection. Techniques employed in trout hatcheries to produce all female and triploid stock could be discussed.

For Outcome 4, there should be access to sexually mature fish on a salmon or trout hatchery in order to practise ova production operations. The routine egg production could be planned by the candidate and careful handling and stripping of broodstock should be practised at all times.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

Access to a salmonid hatchery is essential to enable the candidate to practice husbandry techniques. Classroom based sessions covering the physiology of sexual maturation, broodstock husbandry, ova structures and production together with hatchery production techniques should precede practical instruction on a fully equipped salmon or trout hatchery. The candidate should develop skills over an extended period and this should lead to practical competence in hatchery routines and operations.

OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

There are opportunities to develop a range of Core Skills, including *Communication, IT, Problem Solving* and *Working with Others*.

Outcomes 1–3 have opportunities for written and/or oral *Communication* and *IT*

The practical work in Outcome 4 gives numerous opportunities for *Problem Solving* and *Working with Others* since most activities will involve group work.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1–3 could be assessed using an integrated open-book approach such as a portfolio of evidence.

Outcome 4 requires the observation of practical activity with the results recorded on checklists to satisfy the Performance Criteria. Evidence could be gathered on an ongoing basis through the observation of candidates performing routine hatchery maintenance operations and assessment of the condition of the hatchery facility and fish stocks.

Time should be allowed for any necessary re-assessment.

National Unit Specification: support notes (cont)

UNIT Aquaculture: Salmonid Ova Production (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 e-checklists. 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)*.

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**