National Unit specification: general information

Unit title: Pen Farmed Fin-fish Containment (SCQF level 5)

Unit code: H8NK 45

Superclass: SJ

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Summary

This Unit has been designed to develop the competences and knowledge required of a pen farming operative, specifically with regard to fish containment, and can be delivered in a marine or freshwater context.

Initially, learners will develop their knowledge of fish containment failures that have been suffered by pen farming companies, their causes and potential corrective measures. An understanding of pen farming health and safety requirements and the site specific responsibilities of farm operatives will be instilled from the outset.

Thereafter, learners will develop their knowledge and competence in all practical aspects of fish containment including: pen preparation, net maintenance, conducting routine husbandry operations without compromising fish containment and remediating in response to observed pen farming equipment failure or wear and tear.

Outcomes

1 Describe the common causes of fish stock containment failure.
2 Prepare a pen to receive and retain fish stocks.
3 Ensure reliable fish containment at each stage of the production cycle.
4 Identify the failure and wear of pen farming equipment and remediate.

Recommended entry

While entry is at the discretion of the centre, learners would benefit from having attained the Core Skill of *Numeracy* at SCQF level 4 or equivalent.

Credit points and level

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

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Core Skills

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

Complete Core Skill None

Core Skill 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.

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.

Equality and inclusion

This Unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learner should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website **www.sqa.org.uk/assessment** arrangements.

National Unit specification: statement of standards

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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 the common causes of fish stock containment failure

Performance Criteria

(a) The common causes of fish stock containment failure are described accurately with reference to appropriate experiences from the aquaculture industry.
(b) The preventative or remedial measures for each common cause of failure are appropriate, and described accurately.
(c) The risks to health and safety that pen farming operations can pose are identified correctly.
(d) The description of the farm operative's specific safety responsibilities is accurate, and consistent with company Standard Operating Procedures (SOPs).

Outcome 2

Prepare a pen to receive and retain fish stocks.

Performance Criteria

(a) The volume of a pen net is calculated and recorded accurately to inform fish stocking plans and forwarded to the appropriate manager.
(b) The new net and packaging is checked on receipt, and any damage reported immediately to the appropriate manager.
(c) The net is fitted securely to the collar using company approved materials and following company SOPs.
(d) The water line is secured with an attachment using company approved materials and following company SOPs.
(e) All pen components are correctly installed according to the pen manufacturer's specification and company SOPs.

Outcome 3

Ensure reliable fish containment at each stage of the production cycle.

Performance Criteria

(a) Net cleaning is completed according to the equipment manufacturer's guide lines and company SOPs, effectively resolving any operational problems during cleaning.
(b) Nets are changed and new nets secured, ensuring that fish stock containment is not compromised and the stress to fish stocks minimised.
(c) Measures taken to ensure that fish containment is not compromised during husbandry operations and the stress to fish stocks minimised are appropriate and conform to company SOPs.

National Unit specification: statement of standards (cont)

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Outcome 4

Identify the failure and wear of pen farming equipment and remediate.

Performance Criteria

(a) Failures in mooring systems are identified accurately and remediated, reporting any issues out with the operative's authority to the appropriate manager.
(b) Net repairs are conducted securely using company approved equipment and materials and conforming to company SOPs.
(c) Attachments that have become worn or are inadequate are repaired securely, reporting any issues out with the operative's authority to the appropriate manager.
(d) Components of the pen farming system prone to fouling by abrasive organisms are checked and cleaned.

National Unit specification: statement of standards (cont)

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Evidence Requirements for this Unit

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

Written or oral assessment evidence can be gathered to satisfy Outcome 1.

Performance evidence can be gathered for Outcomes 2−4.

A mixed approach to the assessment of practical competence is possible. However, the overall strategy to be adopted regarding the assessment of performance should be agreed and planned with the learner's employer at the outset, as the assessment process may depend on time commitment from company supervisors and managers.

Any additional evidence required that needs to be documented to satisfy some of the criteria within Outcomes 2-4 is specified below.

Outcome 1

Under open-book conditions, the learner briefly describes the three common failures in fish stock containment when pen farming, and the causes, for one of the following two environments, marine or freshwater.

For each cause of failure, either one preventative or one remedial measure must be briefly described in principle. The examples provided should relate to the industry as a whole as opposed to being company specific.

The main risks associated with pen farming should be identified. A range of possible risks should be provided from which the learner has to select those appropriate to pen farming, and correlate them to the marine and/or freshwater environment correctly.

All of the farm operative's specific responsibilities to act safely should be described for all of the farm sites that they will be working on.

Outcome 2

Performance evidence should be gathered to demonstrate that:

Pen net volumes are calculated for three different net sizes, include one circular and one square net, recorded in cubic metres and the information forwarded.

Two new nets are checked on receipt and any damage to either reported.

Two nets of different specifications are secured to pen collars.

Pen components are installed according to manufacturer's instructions for one type of pen design.

National Unit specification: statement of standards (cont)

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Outcome 3

Performance evidence should be gathered to demonstrate that:

Two nets have been cleaned, and nets changed for three different types of farm operation.

Harvesting, bath treatment and grading operations have been undertaken without compromising containment and with minimal stress to fish stocks on six net lifting occasions covering a minimum of two different operations.

Outcome 4

Performance evidence should be gathered to demonstrate that:

Three net repairs have been conducted securely during routine net repair operations. If real net repair opportunities do not present themselves within the programme, simulation is permissible using old nets or net panels.

Two attachments are repaired, including one waterline tie and one loop on net and associated top line fixings, ensuring adequate height of net above waterline to secure fish stock.

Circular or square pen components are cleaned on three occasions.

Three different types of failure in mooring systems are identified, namely, chain/shackle, grid buoys (alignment/buoyancy) and attachment to pens. Digital images depicting failures in mooring systems can be identified if real opportunities are unavailable on site.

National Unit specification: support notes

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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 seeks to address future compliance requirements for the salmon and trout farming sectors within Scotland when the Scottish Technical Standards (STS) for fish containment become compulsory. However, the Unit is not fish species specific, and could be used to support the development of operatives' pen farming a range of alternative fin fish species that may emerge if the aquaculture industry diversifies. In addition, the Unit is sufficiently generic to have value within aquaculture industries overseas.

The Unit has been developed for delivery within a programme of work based learning, providing opportunities for gathering naturally occurring assessment evidence, allowing learners to develop and demonstrate their competence with regard to fish containment, within a commercial pen farming environment. Thereafter, ongoing adherence by all operatives to company Standard Operating Procedures (SOPs) embedded within the Unit will enable their company to remain compliant with fish containment regulation. (See guidance on approaches to assessment for further information on compliance with the Scottish Technical Standards for fish containment).

The learner does not require any prerequisites beyond basic level *Numeracy* skills (SCQF level 4) to undertake the Unit, although they must be employed on a pen farm. It is advisable, in the case of new entrants, to commence the Unit within a structured induction programme. In order for experienced operatives to be able to demonstrate their existing knowledge and competence, the Accreditation of Prior Learning (APL) could be developed and made available to 'fast track' selected learners.

The content of the Unit should include:

Overview of the containment issue

An overview of the containment issue and the importance of addressing it adequately in order to safeguard the interests of other water users and present aquaculture in a positive light as an environmentally responsible industry. Up to date industry data should be presented to learners to exemplify containment failures over time, along with a description of the impact on the community, environment and the company and industry reputation in the aftermath. This is in order to engender responsible attitudes within new recruits towards the containment issue, and to provide experienced operatives a reminder.

National Unit specification: support notes (cont)

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Health and Safety

The general principles of health and safety underpinning pen farming operations must be understood and should include:

- Guidelines for the laying of moorings
- Net storage guidelines
- Walkway and handrail integrity
- Recorded periodic pen checks
- Navigation markers

Raising awareness of the specific risks associated with pen farming activities will ensure that the safety practices embedded within company SOPs are well understood and immediately applied by learners, transforming them in to responsible and trusted operatives, swiftly.

The general principles of pen farming health and safety that apply to all pen farms, must be differentiated from site specific safety procedures integral to company SOPs by tutors and supervisors and be reflected consistently in the learning materials.

STS compliance of pen farming equipment and technology

Although the selection and implementation of STS compliant equipment that suits the site conditions and the specific requirements of the farm operation remains a management responsibility, operatives need an understanding of the technology used by pen farming companies.

Learners must also be aware of the new Scottish Technical Standards (STS) for equipment that equipment manufacturers, will need to comply with, including:

- Mooring equipment, including the weight of anchors and other metal components and the gauge of mooring lines.
- Buoys, particularly their volume, determining their buoyancy.
- Net specifications to ensure adequate net strength. Learners must appreciate that once nets are in use, regular testing must be undertaken to ensure that a minimum strength of 60% of the original value, is maintained.

Moorings

Pen configurations and mooring systems should be understood in principle. Most importantly learners must know what the indications of ‘deviations from the normal operational state’ look like, so as they remain observant during daily routines. This can be exemplified by:

- a lack of alignment of mooring buoys within the pen configuration, indicative of movement or slippage, and,
- submerged buoys, indicative of physical damage to the buoy.

Once observed, any deviations from the norm can then be remediated or immediately reported, ensuring that they do not become a cause of later containment failure.

National Unit specification: support notes (cont)

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Pens and nets

Learners should be familiarised with both circular and square pen designs, irrespective of which type of system they are working on. The design, main components, materials and internal fittings of each pen type should be introduced.

The following specific content could be included:

- Net specifications and design features that combat abrasion in parts of the cage prone to wear.
- Attachment of new nets, net changing, securing the water line, net lifting and handling and net testing.
- The importance of maintaining clean nets in order to ensure optimal growing conditions for the farmed stock should be fully understood as a justification for comprehensive net cleaning regimes.
- Product specific training should be provided in the use of specific cleaning devices such as the commonly deployed 'Idema' system.
- Net volume calculations should be practiced for square and circular net designs. Some learners may need numeracy Core Skills development and support in preparation for this task. It is advised that both pocket calculator and spreadsheet methods of calculation are applied to build confidence.
- An awareness of mesh size selection should be developed, taking in to account the influence of cleaner fish.

Pen farming operations

Learners should be encouraged to consider all routine husbandry operations that can potentially compromise containment and be fully aware of the potential causes of containment failure, specific to their pen farm operation.

The routine operations include harvesting, disease treatment, net changing and grading.

Learners should be fully aware of preventative measures that should be taken during routine husbandry operations to reduce the risk of containment failure and to minimise the stress on the fish stocks, including safe and secure mooring of vessels to pens.

Guidance on learning and teaching approaches for this Unit

A flexible, blended, work based delivery mode is recommended for this Unit. A stable teaching team should be established at the outset, led by a college tutor responsible for coordination, overseeing the individual learner's progress with the Unit, and providing learners and the teaching team with guidance. The site supervisor has a vital role to play in day to day re-enforcement of learning and may also be formally instructing and providing witness testimonies to support assessment.

Formal lectures and presentations can be provided by college tutors, aquaculture company specialists or trainers from support companies supplying equipment, supported by well structured self study under the guidance of the college tutor. In addition, a well managed assessment process is essential to the team effort (See Guidance on assessment below).

National Unit specification: support notes (cont)

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Much of the learning will be experiential, arising as part of daily work activities and driven by the pen farming production cycle. Experiential learning should be preceded by a combination of face to face teaching and practical training, complemented by guided self study that is underpinned by well designed learning resources.

The development of learning resources that can be presented in paper based or digital formats within a Virtual Learning Environment (VLE) is recommended. The known needs and 'preferred learning style' of the target audience should determine the' blend' of learning and teaching approaches deployed.

The Unit is designed to be delivered to:

- new recruits as a part of an induction programme
- experienced operatives through the Accreditation of Prior Learning (APL)

Learners undertaking APL can sit knowledge based assessments immediately or as soon as they and their supervisor feel ready. Any Performance Criteria not satisfied could be highlighted and a specific programme of guided self study devised so as remediation can follow swiftly and the learner can re-enter for assessment. Learners will need to be instructed in the development of portfolios for presenting performance evidence for APL.

For new recruits undertaking the full programme, the key elements of the 'blend' of recommended learning and teaching approaches are elaborated below:

1 Face to face delivery by a tutor:

An induction to the Unit is recommended followed by the delivery of Outcome 1, face to face. The induction should establish the learner's expectations commitment towards teaching and learning approaches, and an awareness of available support.

The diagnosis of the learner's Core Skill levels and preferred learning styles is recommended within the induction phase. This information could be confidential to the learner, their tutor and supervisor for guidance purposes.

Subsequently, a knowledge and awareness of containment issues and health and safety can be developed through power point presentations and 'question and answer' techniques, complemented by guided self study.

2 Practical instruction:

Most practical training will be undertaken by company site supervisors and other managers and should be delivered prior to each new task being undertaken by the learner. It is recommended that all instructors are trained in instruction techniques.

Equipment specific training may be available and delivered by equipment manufactures to ensure that STS compliant equipment is used correctly according to manufacturer's instructions. The quality of this training delivery should be evaluated and quality assured by company managers

National Unit specification: support notes (cont)

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3 Experiential learning:

This will follow practical training and will lead to the development of skills, efficiency, and, over time, the ability to adapt and respond to unfamiliar circumstances. Good active supervision with regular constructive feedback on performance is most important during periods of experimental learning, particularly in the early stages immediately following practical instruction. Supervisors should be encouraged to re-enforce and consolidate previous learning before, during and after tasks through 'question and answer'.

The use of pens that have been mocked up to simulate common faults is recommended, providing learners the opportunity to practice fault finding and remediation, and can overcome a dearth of naturally occurring opportunities.

4 Guided self-study supported by learning resources:

The development of interactive paper based learning resources, liberally interspersed with formative assessment to support the development of underpinning knowledge is recommended. Learning resources can be mapped to the specific assessment requirements, facilitating the development of guided self study following episodes of APL.

The development of specific digital interactive learning resources is highly recommended for key high priority topics. This could include the use of instructional video clips to demonstrate the Scottish Technical Standards (STS) prior to practical instruction, and for reference when learners periodically evaluate their own performance when updating their portfolios.

Video clips can be complemented by other interactive resources such as 'drag and drop' multiple choice with immediate automated feedback. The use of e portfolios could be implemented to support learning by encouraging diarising and self evaluation. This could seamlessly link to evidence gathering processes for the summative assessment of practical competence. (See Opportunities for the use of 'e' assessment below).

Guidance on approaches to assessment for this Unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferrable to work or further and higher education.

The standards embedded within the Unit have been derived from the work undertaken by the 'Scottish Government Containment Committee' responsible for the Scottish Technical Standards (STS) relating to pen farming, which will become compulsory in the future. The Unit has not been directly informed by the underpinning knowledge for the SVQs or other aquaculture qualifications. Therefore, although there is likely to be a strong correlation, as the SVQ has not been updated recently, this Unit will represent the industry requirements for containment more accurately and comprehensively, at the operative level.

The Unit has been designed so as any future changes in the STS can be accommodated as it is monitored and evolves, without the need for extensive revision. Company Standard Operating Procedures (SOPs) referred to throughout the Unit, can, and should be revised in order to comply with any future evolution of the STS, thereby allowing the training and assessment of pen farming operatives within aquaculture companies to remain compliant without changing Unit delivery significantly.

Through the application of effective Quality Assurance (QA), company SOPs should be verified for compliance with the STS and therefore the Unit, as a pre-requisite to on farm delivery. This will provide the bedrock to a consistent STS compliant assessment process and will require good team work between trainers, Internal Verifiers, Assessors and External Verifier. Regular standard setting and review meetings will be essential.

To comply with industry requirements one of the following approaches to assessment is recommended:

- Witness testimonies provided by a fish husbandry operative or site supervisor with a minimum of two years experience of pen farming operations, compliant with company SOPs relating to pen farming, and who is familiar with the operative's work and performance where referred to within Performance Criteria.

  A qualified assessor with pen farming experience can determine whether the witness testimony evidence meets the Performance Criteria and has the authority to determine whether the evidence submitted is sufficient to demonstrate that the standards within the Unit have been met.

- Alternatively, a qualified assessor with a minimum of 2 years experience of pen farming can directly assess the learner through the observation of the learner whilst performing tasks.

In addition, in order to ensure that the learners work is authenticated, all knowledge based assessments should be invigilated, whether undertaken in the place of work, a learning centre or college environment. Recognised procedures for invigilation should be adopted in all cases. Performance evidence will be authenticated through the procedures outlined above.

Outcome 1

A series of structured open-book tasks could be undertaken, recording the output in a portfolio.

Statistical data covering a 3 to 5 year period could be provided on the aquaculture sector relevant to the learner. Through simple data interpretation the three commonest causes of containment failure could be determined and described by the learner. An analysis of the track record of the learner's company could be included within the exercise.

The causes of failure determined above could be tabulated against a brief written description of appropriate preventative or remedial actions. The use of digital images and technical diagrams could be encouraged to illustrate descriptions.

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The risks that relate to pen farming in both marine and freshwater environments could be selected from a well constructed multiple choice exercise. (See opportunities for e-assessment)

The three main safety responsibilities for the specific site that the learner is working on should be described and could be presented as a list of do's and don'ts, using digital images to describe mandatory safety equipment and its maintenance.

Outcomes 2, 3 and 4

Assessment evidence can be 'naturally occurring', formalising the evidence gathered immediately following routine operations. This allows ongoing performance feedback to be provided to the learner, until standards have been satisfied.

For Outcome 4, the cage components cleaned could include mortality removal systems and/or cameras.

Evidence of the accurate calculation of net volumes can be based on the site's actual pen configurations, or on 'nominal' pens.

Opportunities for 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 learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at **www.sqa.org.uk/e-assessment**.

Outcome 1

The assessment of pen farming risk awareness could be undertaken through multiple choice presented within a Virtual Learning Environment (VLE). The exercise would be designed to meet two main requirements:

- Differentiating risks that are associated with pen farming from those that are not.
- Co relating risks to the appropriate aquatic environment, marine or freshwater.

Outcome 2–4

The use of 'e' portfolios would support performance evidence gathering for these Outcomes, including the illustration of key points with digital images.

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The ‘e’ portfolio based system could be further enhanced through establishing self-evaluation of learner performance. Learners could enter the VLE and evaluate their performance in relation to the company SOPs referred to within the Performance Criteria. Subsequently their supervisor and witness testimony provider could enter and provide their own evaluation and provide feedback on any areas for remediation. Sophisticated on line portfolio systems are available offering this level of functionality.

National Unit specification: support notes (cont)

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Opportunities for developing Core Skills

There may be opportunities to develop the following Core Skills (at SCQF level 5):

Numeracy:

The calculation of pen volumes will require learners to undertake arithmetic relating to volume calculations for square, cylindrical and conical volumes.

Information and Communication Technology (ICT):

The potential application of spread sheets and e portfolios would develop the learner's competence and confidence in ICT applications.

Working with Others:

The learner will have daily opportunities to develop their team work as most pen farming operations depend on others, and require responsible attitudes to be adopted.

Problem Solving:

Some routine operational issues, and others that are less routine, will require learners to either remediate under their own initiative, applying what they have learnt to date, or to escalate the issue to their line manager.

Communication:

Learners will need to develop their communication through various means. Responding to instruction from supervisors, reporting observed operational failures or deviations from the norm.

This Unit has the Critical Thinking component of Problem Solving 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.

History of changes to Unit

Version	Description of change	Date
02	Core Skills Component Critical Thinking at SCQF level 4 embedded.	02/04/2015

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General information for learners

Unit title: Pen Farmed Fin-fish Containment (SCQF level 5)

This Unit has been designed to provide a standalone qualification in the containment of pen farmed finfish at the husbandry (operative) level, and been designed for delivery to aquaculture employees. It can support the induction of recent recruits and the CPD of experienced operatives who wish to demonstrate their knowledge and competence previously gained 'on the job', and compliance with the Scottish Technical Standards governing the containment of pen farmed fish.

Initially learners will develop an awareness of the general causes and potential impact of containment failure, engendering responsible attitudes towards their work in general and the containment of fish stocks in particular. Subsequently, specific pen farming operations that can lead to containment failure if neglected or undertaken carelessly, such as net cleaning, net repair, net changes and the maintenance of moorings provide the main focus. Formal learning will be continually re-enforced by on farm experience working to Standard Operating Procedures consistent with the Unit assessment requirements ensuring compliance with Scottish Technical Standards, as well as gathering evidence towards Unit assessment

The Unit will be delivered through a combination of formal elements taught on farm or in a college or learning centre, self-study with tutor or mentor support and work based training and learning. The assessment of performance will be undertaken through witness testimonies provided by company supervisors and managers, under the guidance of a college based assessor. Knowledge will be assessed through open-book assessments, whereby learners will be encouraged to refer to information about the company's aquaculture practices and procedures as well as information provided about the industry within short courses or learning resources.

Although un-certificated, there will be opportunities to develop Core Skills in numeracy, working with others, problem solving, ICT and communication throughout the Unit. The learner's employability and awareness of sustainability will be improved, particularly regarding the responsible exploitation of Scotland's aquatic resources.