Higher National Unit Specification

General information for centres

Unit title: Livestock Breeding

Unit code: F2E6 34

Unit purpose: This Unit will equip candidates with a fundamental knowledge and understanding of the principles of livestock breeding. The Unit may be suitable for candidates who are studying for a Group Award in an area related to agriculture, food or the rural economy.

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

1 Describe the structure and functioning of the reproductive systems of livestock.
2 Explain the management of fertility and breeding.
3 Explain the principles and practice of livestock improvement.

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: Though there are no formal prior knowledge requirements for this Unit it would be an advantage for candidates to have studied biology at SCQF level 5 or 6.

Core Skills: There are opportunities to develop the Core Skills of *Communication* at SCQF level 5 and *Numeracy* at SCQF level 6 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: All Outcomes may be assessed by closed-book, restricted response assessment. The questions could be a combination of multiple choice, short answers, drawing or labelling diagrams and restricted responses.

Higher National Unit specification: statement of standards

Unit title: Livestock Breeding

Unit code: F2E6 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

Describe the structure and functioning of the reproductive systems of livestock

Knowledge and/or Skills

- Anatomy of the male and female reproductive tracts
- Hormonal control of reproduction
- Gamete physiology
- Fertilisation, gestation and parturition

Evidence Requirements

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

- describe the anatomy of the male reproductive tract correctly identifying four out of six of the: testis, epididymis, vas deferens, accessory glands, urethra and penis
- describe the anatomy of the female reproductive tract correctly identifying four out of six of the: ovary, oviduct, uterus, cervix, vagina and vulva
- describe the synthesis, and secretion of the main reproductive hormones correctly describing at least four of: follicle stimulating hormone, luteinising hormone, oestrogen, progesterone, prostaglandin, testosterone
- describe the main reproductive pathways controlling at least two of: oestrus, ovulation, spermatogenesis and parturition
- describe the process of folliculogenesis in terms of recruitment and maturation of follicles
- describe the process of spermatogenesis in terms of the production of spermatozoa
- describe fertilisation in terms of penetration of the zona pellucida by spermatozoa and attainment of the diploid chromosomal complement
- describe the process of gestation in terms of implantation, placentation and foetal growth and development
- describe the process of parturition in terms of foetal presentation and delivery.

Assessment Guidelines

This Outcome may be assessed by closed-book, restricted response assessment. The questions could be a combination of multiple choice, short answers, drawing or labelling diagrams and restricted responses.

Higher National Unit specification: statement of standards (cont)

Unit title: Livestock Breeding

Outcome 2

Explain the management of fertility and breeding

Knowledge and/or Skills

- Management at mating
- Process of synchronisation of oestrus
- Semen collection and evaluation processes
- Artificial insemination techniques
- Multiple Ovulation and Embryo Transfer (MOET) techniques
- Pregnancy and foetal number diagnosis

Evidence Requirements

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

- describe the process of assessing the fitness and readiness of males for breeding through physical examination.
- explain the principles of good management practice during mating. This must include: male to female ratios, recognition and detection of oestrus, recording of matings.
- explain the process by which groups of animals can be synchronised in oestrus using progesterone and prostaglandin based products.
- describe the processes involved in the collection of semen. This must include use of teaser female and artificial vagina.
- describe the processes involved in the evaluation of semen. This must include evaluation of motility, concentration and morphology.
- describe artificial insemination techniques used in the main livestock species. This must include semen handling and freezing, cervical, intrauterine and laparoscopic insemination.
- describe the process of MOET. This must include superovulation, embryo collection, evaluation and transplantation.
- explain the use of pregnancy diagnosis and foetal number determination in livestock husbandry by use of ultrasound.

Assessment Guidelines

This Outcome may be assessed by closed-book, restricted response assessment. The questions could be a combination of multiple choice, short answers, drawing or labelling diagrams and restricted responses.

Higher National Unit specification: statement of standards (cont)

Unit title: Livestock Breeding

Outcome 3

Explain the principles and practice of livestock improvement

Knowledge and/or Skills

- Mendelian genetics
- Population genetics
- Breeding strategies
- Factors affecting the rate of genetic improvement
- Industry breed improvement schemes

Evidence Requirements

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

- explain the basic principles of Mendelian genetics in terms of the inheritance of one simple trait.
- explain the basic principles of Population genetics in terms of the inheritance of one complex trait
- describe the main breeding strategies employed in livestock improvement. This must include crossbreeding, breed substitution, within breed selection
- explain the factors affecting the rate of genetic improvement. This must include selection intensity, heritability and generation interval
- describe the main industry breed improvement scheme currently available to one of the following: dairy, beef, or sheep breeders

Assessment Guidelines

This Outcome may be assessed by closed-book, restricted response assessment. The questions could be a combination of multiple choice, short answers, drawing or labelling diagrams and restricted responses.

Administrative Information

Unit code: F2E6 34

Unit title: Livestock Breeding

Superclass category: SH

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: Livestock Breeding

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 will develop a basic understanding of the underlying science controlling the reproductive physiology and genetics concerned with livestock breeding. Through this knowledge candidates will be able to demonstrate the ability to better manage and control the breeding process of livestock.

Outcome 1 gives candidates a sound overall knowledge of the basic anatomy and physiology of the reproductive process in farm livestock**.** More specifically they will learn about anatomy of the male and female reproductive tracts, hormonal control of reproduction, gamete physiology and fertilisation, gestation and parturition.

Knowledge gained in Outcome 1 will be applied in Outcome 2 to enable candidates to understand the basis on which they can improve the fertility of farm livestock. This Outcome will explore management at mating, the process of synchronisation of oestrus, semen collection and evaluation processes, artificial insemination techniques, Multiple Ovulation and Embryo Transfer (MOET) techniques, and pregnancy and foetal number diagnosis.

Outcome 3 will give candidates a sound knowledge of the genetic principles underlying livestock improvement programmes and an awareness of current livestock improvement industry schemes, by exploring Mendelian genetics, population genetics, breeding strategies, the factors affecting the rate of genetic improvement and industry breed improvement schemes.

Guidance on the delivery and assessment of this Unit

The delivery of this Unit could take the form of a mixture of lectures, tutorials, practical lessons and farm visits. Practical lessons could include the examination of reproductive tracts and demonstrations of reproductive technologies such as pregnancy diagnosis, semen collection and oestrus synchronisation. Where appropriate, study of genetic improvement programmes could be undertaken by visiting farms in order to enhance the appreciation and evaluation of these programmes with actual livestock breeders. Visits to any farms allow for a greater understanding of applying the theory into practice, since the practical application can be seen.

Opportunities for developing Core Skills

There are opportunities to develop the Core Skills of *Communication* at SCQF level 5 and *Numeracy* at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

There are opportunities to develop the Core Skill of *Numeracy* in Outcome 3. Having learned about genetic principles and explored Mendelian genetics, population genetics, and breeding strategies, candidates will be required to calculate means and standard deviations in making basic genetic evaluations.

Unit title: Livestock Breeding

Communication may be developed across all Outcomes, as candidates are asked to deal with complex subjects such as reproductive pathways of animals in Outcome 1 and assessing the fitness and readiness of animals for breeding in Outcome 2.

Open learning

The Unit could be delivered by blended learning with Outcome 1, 2 and 3 delivered via distance learning in addition to some practical lessons and farm visits.

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: Livestock Breeding

This Unit will enable you to develop a fundamental knowledge and understanding of the breeding of sheep, cattle and pigs, by developing a basic understanding in the underlying science controlling the reproductive physiology and genetics concerned with breeding livestock. Through this knowledge your ability to better manage and control the breeding process will be demonstrated.

On completion of this Unit you will be able to:

1 Describe the structure and functioning of the reproductive systems of livestock.
2 Explain the management of fertility and breeding.
3 Explain the principles and practice of livestock improvement.

In Outcome 1 you will gain a sound overall knowledge of the basic anatomy and physiology of the reproductive process in farm livestock**.** More specifically you will learn about anatomy of the male and female reproductive tracts, hormonal control of reproduction, gamete physiology and fertilisation, gestation and parturition.

In Outcome 2 you will apply knowledge gained in Outcome 1 to help understand the basis on which you can improve the fertility of farm livestock. You will explore topics such as management at mating, the process of synchronisation of oestrus, semen collection and evaluation processes, artificial insemination techniques, Multiple Ovulation and Embryo Transfer (MOET) techniques and pregnancy and foetal number diagnosis.

In Outcome 3 you will gain a sound knowledge of the genetic principles underlying livestock improvement programmes and an awareness of current livestock improvement industry schemes, by exploring Mendelian genetics, population genetics, breeding strategies, the factors affecting the rate of genetic improvement and industry breed improvement schemes.

Your learning in the Unit may take the form of a mixture of lectures, tutorials, practical examples and farm visits.

During the course of the Unit, there are opportunities to develop the Core Skills of *Numeracy* at SCQF level 6, as you will be required to calculate means and standard deviations in making basic genetic evaluations in Outcome 3, and *Communication* at SCQF level 5, across all Outcomes.