



Higher National Unit specification

General information for centres

Unit title: Livestock Physiology

Unit code: F21K 34

Unit purpose: This Unit aims to equip candidates with a fundamental knowledge and understanding of the principles of livestock physiology, specifically of those animals likely to be utilised as farm livestock, such as cattle, sheep, poultry and pigs. It is taught in the general context of agricultural livestock species of economic importance to the land-based sector.

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

- 1 Describe the origin, structure and function of the main vertebrate organ systems.
- 2 Explain the principles of cellular metabolism in terms of the physiology of energy balance.
- 3 Describe the control mechanisms that integrate functions in vertebrates.
- 4 Explain the physiology of the animal defence against infectious disease.

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 advantageous for candidates to have studied biological based subjects at SCQF level 6 or equivalent. It would also be beneficial for candidates to be undertaking or have achieved the SCQF level 7 Higher National Units:

DJ1K 34 *Cell Biology: Theory and Practice*
DH2J 34 *Biochemistry: Theory and Practice* or equivalent Units of study.

Core Skills: There are opportunities to develop the component 'Critical Thinking' of the Core Skill of Problem Solving, and the components 'Oral Communication' or 'Written Communication' of the Core Skill of Communication, all at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Context for delivery: This Unit is included in the framework of the Group Awards, HND Applied Bioscience and HND Agricultural Science. It is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes. This Unit is appropriate for any land-based, biological or environmental Group Award.

General information for centres (cont)

Assessment: In assessing theory an integrated approach could be utilised for Outcomes 1, 2 and 3 using a holistic end-of-Unit assessment with evidence being provided on a sample basis as detailed in the Evidence Requirements.

The assessment task for Outcome 4 would ideally be intimated early in the term, giving ample time for candidates to summarise their knowledge and prepare an assessment plan.

Higher National Unit specification: statement of standards

Unit title: Livestock Physiology

Unit code: F21K 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 origin, structure and function of the main vertebrate organ systems

Knowledge and/or Skills

- ◆ Origin of animal tissues — embryogenesis and post-embryonic development
- ◆ Vertebrate digestive system
- ◆ Vertebrate respiratory system
- ◆ Vertebrate circulatory system
- ◆ Vertebrate excretory system

Evidence Requirements

Evidence for this Outcome will be generated via sampling, and evidence generated will relate specifically to animals used as farm livestock. Three of the five Knowledge and Skills items will be sampled per assessment occasion.

Candidates will need to provide evidence demonstrating their knowledge and understanding of the origin, structure and function of the main vertebrate organ systems

Where an item is sampled, a candidate's response can be judged satisfactory where the evidence shows that the candidate can:

- ◆ describe the origin of animal tissues in terms of embryogenesis and post-embryonic development
- ◆ describe a minimum of three distinguishing features between the basic functioning of three typical vertebrate digestive systems
- ◆ distinguish the basic functioning of two typical vertebrate respiratory systems
- ◆ describe the functioning of two vertebrate circulatory systems
- ◆ describe the functioning of the vertebrate excretory system

This assessment will be unseen and conducted in closed-book, supervised conditions.

Assessment Guidelines

It is suggested that assessment of this Outcome takes place within a single holistic assessment covering Outcomes 1, 2 and 3, perhaps consisting of a combination of short answers, drawing or labelling diagrams and restricted responses. The assessment duration may be approximately 90 minutes, to be taken under supervised, closed-book conditions.

Higher National Unit specification: statement of standards (cont)

Unit title: Livestock Physiology

Outcome 2

Explain the principles of cellular metabolism in terms of the physiology of energy balance

Knowledge and/or Skills

- ◆ Oxidative pathways for energy transformation
- ◆ Synthetic pathways for energy transformation
- ◆ Main organic substrates and their interrelationships

Evidence Requirements

Evidence for this Outcome will be generated via sampling, and evidence generated will relate specifically to animals used as farm livestock. Two of the three Knowledge and Skills items will be sampled per assessment occasion.

Candidates will need to provide evidence demonstrating their knowledge and understanding of the principles of cellular metabolism in terms of the physiology of metabolic energy balance.

Where an item is sampled, a candidate's response can be judged satisfactory where the evidence shows that the candidate can:

- ◆ explain the transformation of energy through pathways for organic substrate oxidation
- ◆ explain the transformation of energy through pathways for the synthesis of cell constituents
- ◆ explain the interrelationships of the main organic substrates (sugars/carbohydrates, fats and proteins)

This assessment will be unseen and conducted in closed-book, supervised conditions.

Assessment Guidelines

It is suggested that assessment of this Outcome takes place within a single holistic assessment covering Outcomes 1, 2 and 3, perhaps consisting of a combination of short answers, drawing or labelling diagrams and restricted responses. The assessment duration may be approximately 90 minutes, to be taken under supervised, closed-book conditions.

Higher National Unit specification: statement of standards (cont)

Unit title: Livestock Physiology

Outcome 3

Describe the control mechanisms that integrate functions in vertebrates

Knowledge and/or Skills

- ◆ Uptake, transport and excretion of gases
- ◆ Uptake and transport of nutrients
- ◆ Transport and excretion of metabolic wastes
- ◆ Neural control system
- ◆ Endocrine control system
- ◆ Homeostatic responses to climatic variation

Evidence Requirements

Evidence for this Outcome will be generated via sampling, and evidence generated will relate specifically to animals used as farm livestock. Three of the six Knowledge and Skills items will be sampled per assessment occasion.

Candidates will need to provide evidence demonstrating their knowledge and understanding of the control mechanisms that integrate functions in vertebrates.

Where an item is sampled, a candidate's response can be judged satisfactory where the evidence shows that the candidate can:

- ◆ describe the uptake, transport and excretion of gases
- ◆ describe the uptake and transport of nutrients
- ◆ describe the transport and excretion of metabolic wastes
- ◆ describe the functioning of the neural control system
- ◆ describe the functioning of the endocrine control system
- ◆ describe examples of homeostatic responses to climatic variation

This assessment will be unseen and conducted in closed-book, supervised conditions.

Assessment Guidelines

It is suggested that assessment of this Outcome takes place within a single holistic assessment covering Outcomes 1, 2 and 3, perhaps consisting of a combination of short answers, drawing or labelling diagrams and restricted responses. The assessment duration may be approximately 90 minutes, to be taken under supervised, closed-book conditions.

Outcome 4

Explain the physiology of the animal defence against infectious disease

Knowledge and/or Skills

- ◆ Non specific resistance
- ◆ Humoral resistance in vertebrates

Higher National Unit specification: statement of standards (cont)

Unit title: Livestock Physiology

- ◆ Cell mediated resistance in vertebrates
- ◆ Antigen-antibody interactions
- ◆ Beneficial and harmful consequences of the immune response

Evidence Requirements

Evidence generated will relate specifically to animals which are used as farm livestock. Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- ◆ explain how the animal body is constructed to include physical, chemical and biological mechanisms which defend it against infectious disease
- ◆ explain the functioning of the humoral resistance system
- ◆ explain two functions of cell-mediated resistance
- ◆ describe five examples of antigen-antibody reactions
- ◆ explain an example which shows that the immune response may have harmful consequences as well as the normal beneficial consequences

Assessment Guidelines

A suggested method of assessment for this Outcome is the use of an in-class essay or presentation, prepared by the candidate in their own study time using several sources. The nature of the assessment and essay title would be given early in the teaching time to give ample time for candidates to research and summarise their knowledge and prepare an assessment plan.

Administrative Information

Unit code: F21K 34

Unit title: Livestock Physiology

Superclass category: SB

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Version	Description of change	Date

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Higher National Unit specification: support notes

Unit title: Livestock Physiology

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 studying for a Group Award in such subjects as Applied Bioscience, Agricultural Science or Applied Animal Science. Many of these candidates will take up a post from the wide variety of employment opportunities in applied biological science or the livestock science industry. Their learning in this Unit should equip them with knowledge and understanding about the basic physiology of higher animals, specifically those animals likely to be utilised as farm livestock, such as cattle, sheep, poultry, pigs, etc. This basic knowledge about the physiology, development and functioning of livestock will serve as a foundation to further learning about topics such as livestock nutrition, livestock health, husbandry and disease control. Thus it is intended that the Outcomes will be taught within the general context of important agricultural livestock species in the UK.

Outcome 1 is designed to give the candidate a sound overall grasp of the origin, structure and functioning of the main vertebrate organ systems as found in farm livestock.

Outcome 2 extends the candidate's knowledge of the activities in animal cells involved in the utilisation of food substrates. It explains the ability of these organic substrates to be converted into each other, their transformation by oxidative pathways into usable forms of energy and the utilisation of this energy along with the substrates in the synthesis of cell constituents.

Outcome 3 gives candidates a sound knowledge and enables them to describe the basic physiology of the control mechanisms that integrate vertebrate functions. Thus in particular the physiology of nutrition, respiration, excretion, sensitivity and homeostasis in mammals is described.

Outcome 4 is intended to explain the overall integrated functioning of mammalian defences against infectious disease including constitutive and inducible elements, covering:

- ◆ constitutive or non-specific resistances: physical, chemical and biological mechanisms of the body surfaces; phagocytosis; mechanisms in the circulatory system and also the basic physiology of inflammation
- ◆ the primary and secondary immune response
- ◆ functioning of the humoral resistance system including five examples of antibody-antigen reactions ie neutralisation, agglutination, precipitation, opsonisation/enhancing phagocytosis, complement activation and the basic idea of the complement cascade
- ◆ the basic functioning of cell-mediated resistance: its recognition of only protein antigen which is bound to the surface of antigen presenting cells; T lymphocyte activation, clonal proliferation and lymphokine production; interaction with the humoral system and activity of cytotoxic T cells
- ◆ overall consequences of the immune response including an example which is harmful to the animal body as well as those that are beneficial

Higher National Unit specification: support notes (cont)

Unit title: Livestock Physiology

Guidance on the delivery and assessment of this Unit

This Unit is intended for candidates who are studying for a Group Award in such subjects as Agricultural Science, Applied Animal Science or Applied Bioscience. Many of these candidates will take up a post from a wide variety of employment opportunities in applied biological science or the livestock science industry and it will equip them with basic knowledge and understanding about the physiology of higher animals, specifically those likely to be utilised as farm livestock.

This SQA level 7 Unit it is intended to be delivered during the first year programme of a science Course or Group Award at a point where the candidate will have some basic knowledge about the nature and functioning of biological molecules, cells and organisms. Independent study will be encouraged, for example in the candidate's reading, summarising and planning for the prepared essay which may be used as the instrument of assessment for Outcome 4.

Assessment of Outcomes 1, 2 and 3 is by the production of appropriate evidence, which should be generated by a sampled, holistic approach to assessment.

Opportunities for developing Core Skills

There are opportunities to develop the component Core Skills component 'Critical Thinking' of the Core Skill of Problem Solving, and the components 'Oral Communication' or 'Written Communication' of the Core Skill Communication, all at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

The use of a prepared essay, as is the suggested instrument for assessing Outcome 4, would provide significant opportunities for candidates to 'convey complex ideas in a well-structured and coherent form'. Independent study will be encouraged, for example in the candidate's reading, summarising and planning for the prepared essay which may be used as the instrument of assessment for Outcome 4.

Open learning

This Unit could be delivered by distance learning. However it would require planning by the centre to ensure the sufficiency and authenticity of candidate evidence.

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 Physiology

This is a single credit Unit at SCQF level 7 designed to equip you with basic knowledge and understanding of the physiology of animals, especially animals utilised as farm livestock. This knowledge base concerning the development, physiology and functioning of animals will serve as a foundation to more specialised learning in subsequent years of study, about animal nutrition, reproduction, health, husbandry and approaches to disease control. This Unit may be particularly useful if you are undertaking a biological science-related qualification.

On completion of this Unit you will be able to:

- 1 Describe the origin, structure and function of the main vertebrate organ systems.
- 2 Explain the principles of cellular metabolism in terms of the physiology of energy balance.
- 3 Explain the control mechanisms that integrate functions in vertebrates.
- 4 Explain the physiology of the animal defence against infectious disease.

To pass the Unit you must achieve a satisfactory level of performance in each Outcome, a brief description of which follows below:

Outcome 1

You will learn about the origin of animal tissues ie their embryogenesis and post-embryonic development enabling you to be able to describe and distinguish between the basic functioning of typical vertebrate digestive systems (eg pig, ruminant and avian) and respiratory systems (eg mammalian and avian). You will also learn about the functioning of vertebrate circulatory and excretory systems.

Outcome 2

Here you will study the biochemistry and physiology of the oxidative and synthetic processes in animals and then be able to explain the transformation of food energy into available energy through the pathways for organic substrate oxidation. You will also learn how this energy is utilised in pathways enabling the synthesis of the molecular constituents of cells. This Outcome will also provide you with knowledge of the interrelationships and conversion through physiological pathways, of the main organic substrates used by animals.

Outcome 3

This Outcome will provide you with knowledge of the uptake, transport and excretion of gases; the uptake and transport of nutrients and the transport and excretion of metabolic wastes in a typical animal system. You will also learn about the functioning of the neural control mechanism, the endocrine control mechanism and homeostatic responses to climatic variation.

General information for candidates (cont)

Unit title: Livestock Physiology

Outcome 4

You will learn how the animal body is constructed to include various physical, chemical and biological mechanisms, which defend it against the impact of most infectious agents. You will need to be able to explain the functioning of both the humoral and cell-mediated mechanisms in resistance to infectious disease and to describe examples of antigen-antibody reactions and explain how they act in defence against disease. As well as understanding the benefits of the immune response, you will learn about the potentially harmful consequences of the immune response.

An integrated approach could be utilised for Outcomes 1, 2 and 3 using a holistic end-of-Unit assessment with evidence being provided on a sample basis as detailed in the Evidence Requirements.

The assessment task for Outcome 4 will ideally be intimated early in the term, giving ample time for you to summarise your knowledge and prepare an assessment plan.