Unit 10: Anatomy and Physiology

Unit code: K/503/1682

QCF level: 4

Credit value: 15

Aim

This unit aims to develop learner understanding of physical support and movement in animals, body transport systems, the acquisition of materials and removal of waste, and animal reproduction.

Unit abstract

In this unit learners will develop understanding of the structure, function and maintenance of the animal body.

They will develop understanding of how animal bodies are supported physically and achieve movement, using bones and muscles. Learners will examine the different systems within the animal body and how they contribute to metabolism and waste excretion to maintain health. Learners will also research how new animals are produced through study of reproductive anatomy and physiology.

The unit helps learners to apply understanding of environmental requirements, effective monitoring of animal health and successful animal management.

Learning outcomes

On successful completion of this unit a learner will:

1. Understand how animals achieve physiological support and movement
2. Understand body transport systems
3. Understand how animals obtain raw materials for metabolism and excrete waste
4. Understand animal reproductive processes.
Unit content

1  **Understand how animals achieve physiological support and movement**

*Support:* functions and types of bones; types, structure and composition of bone tissue; ossification and bone growth; bone homeostasis; hydrostatic skeleton, exoskeleton, endoskeleton, axial skeleton, appendicular skeleton; types of joint (fibrous, cartilaginous, synovial), characteristics of synovial joints, movements at synovial joints

*Movement:* functions and general characteristics of muscle tissue; types, structure and composition of muscle tissue (skeletal, smooth, cardiac); muscle nerve supply; muscle contraction in different muscle types (e.g., initiation, sliding filament theory, excitation-contraction coupling, role of calcium); adaptations to different types of movement (e.g., swimming, flying, hopping)

2  **Understand body transport systems**

*Blood:* composition and functions of blood; blood plasma; structure and functions of erythrocytes; Bohr effect; structure and functions of leucocytes e.g., neutrophils, eosinophils, basophils, lymphocytes, monocytes, macrophages; platelets; haemostasis

*Cardiovascular system:* structure and functions of the heart; origin and conduction of the heartbeat; cardiac cycle; structure and functions of blood vessels; circulatory physiology (blood flow, peripheral resistance, blood pressure, capillary exchange); circulatory pathways (pulmonary circulation, systemic circulation, coronary circulation)

*Lymphatic system:* lymphatic vessels; formation and transport of lymph; structure, location and functions of lymph nodes; lymphoid tissues/organs

3  **Understand how animals obtain raw materials for metabolism and excrete waste**

*Metabolism and waste:* catabolism and anabolism; effect of accumulation of waste products

*Respiratory system:* structure and function of the respiratory tract; ventilation of lungs; gaseous exchange; transport of respiratory gases (plasma, haemoglobin); features of respiratory surfaces

*Digestive system:* structure and functions of the organs of the digestive tract; phases of digestion and absorption; digestive enzymes; neural and hormonal control of digestion

*Urinary system:* basic layout of the urinary system; structure and functions of the kidney; roles of ADH and aldosterone; urine formation; pH regulation

*Liver:* structure of the liver and biliary tract; functions of the liver (e.g., bile production, synthesis, detoxification, storage, metabolism)
4 **Understand the reproductive processes by which new individuals are produced**

*Reproductive system*: structure and functions of the male and female reproductive systems; reproductive cycles; hormonal control; spermatogenesis and oogenesis

*Reproductive stages as appropriate*: sexual maturity and modes of reproduction (e.g. heterosexual, hermaphroditic, parthenogenetic); fertilisation; implantation/egg and shell production; embryonic development to parturition/hatching
## Learning outcomes and assessment criteria

<table>
<thead>
<tr>
<th>Learning outcomes</th>
<th>Assessment criteria for pass</th>
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<tbody>
<tr>
<td><strong>On successful completion of this unit a learner will:</strong></td>
<td><strong>The learner can:</strong></td>
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<tr>
<td><strong>LO1</strong> Understand how animals achieve physiological support and movement</td>
<td>1.1 explain the structure and function of different types of bone and muscle</td>
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<td>1.2 explain the general structure of the skeleton</td>
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<td>1.3 examine the characteristics of the different types of joint and movements</td>
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<td>1.4 explain how the contraction of skeletal muscle is brought about</td>
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<td><strong>LO2</strong> Understand body transport systems</td>
<td>2.1 discuss the composition and functions of blood</td>
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<td>2.2 explain the structure of the cardiovascular system</td>
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<td>2.3 explain how the cardiovascular system functions to transport materials around the body</td>
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<td>2.4 explain the structure and functions of the lymphatic system</td>
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<td><strong>LO3</strong> Understand how animals obtain raw materials for metabolism and excrete waste</td>
<td>3.1 examine the structure of the respiratory, digestive and urinary systems</td>
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<td>3.2 explain the movement of respiratory gases into, around and out of the body</td>
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<td>3.3 explain how the digestive system functions and is controlled</td>
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<td>3.4 explain how the kidney functions to produce urine and maintain homeostasis</td>
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<tr>
<td><strong>LO4</strong> Understand animal reproductive processes</td>
<td>4.1 explain the structure and functions of the male and female reproductive systems</td>
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<td>4.2 examine the hormonal control of reproduction</td>
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<td>4.3 explain how fertilisation occurs and the subsequent development of offspring</td>
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Guidance

Links

This unit links to, and is underpinned by, Unit 7: Biological Principles.

There are also links with core units Unit 3: Animal Health and Welfare and Unit 4: Animal Nutrition and specialist units Unit 11: Animal Behaviour, Unit 19: Production Animal Management, Unit 23: Animal Adaptations and Unit 29: Plan and Manage Breeding Programmes for Animals.

These links may enable for an integrated approach to the delivery and assessment of these units.

Essential requirements

Learners will need access to library facilities with scientific textbooks suitable for level 3 and above and access to the internet.

Access to use of laboratory facilities is needed to enable learners to carry out practical investigations.

Employer engagement and vocational contexts

A working understanding of animal anatomy and physiology is essential in a variety of fields within animal management, including veterinary work, agriculture, veterinary pathology laboratories and animal grooming. Employers could be invited to discuss their work to put the unit into a vocational context for learners.

Veterinary surgeries, veterinary laboratories and clinical laboratories would give learners useful experience of putting theory into practice, especially if they are able to follow clinical cases through. The learning experience would be greatly enhanced if learners could examine healthy and unhealthy specimens from a range of animals and organs.