T Level Technical Qualification in Animal Care and Management (Level 3)

Theory Exam – Animal Science Core Pathway

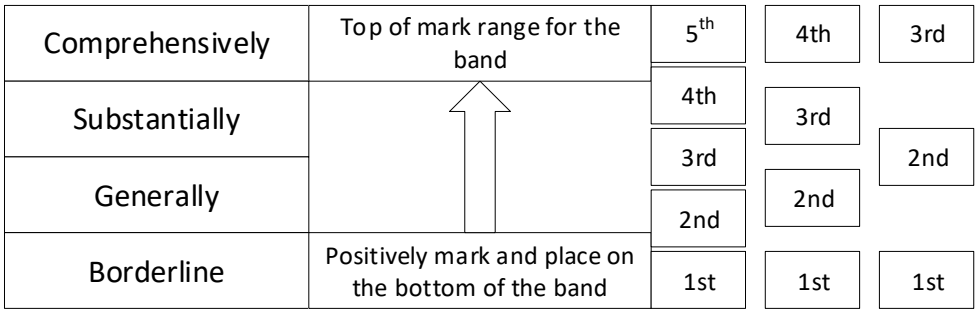
Sample mark scheme

May 2024 Version 1.0

Marker guidance

Unless otherwise stated in the marker guidance for a specific question, the following conventions apply:

- All marking, from start to finish must be consistent and in line with the mark scheme guidance. Continue to refer to the mark scheme throughout marking.
- For questions that ask for a specific number of points, accept the first answers given up to the number requested e.g., State three… only accept the first three answers listed, and disregard any additional answers provided.
- For questions requiring continuous prose answers, mark positively – all correct answers should receive the appropriate mark according to the mark scheme. Any wrong (**but neutral**) answers should be ignored, and no marks should be lost.
- In some circumstances, it is appropriate to disallow a candidate answer that initially appears to give the correct answer as given in the mark scheme, if it is undermined by the fact that it goes on to actively **contradict** its intention. Sometimes the minimal wording used in the mark scheme allows a match that in reality is trivial and it is clear the candidate is referring to the wrong knowledge/understanding. Only the part of the response to which the contradiction applies should be disallowed, not the whole response. Material that is irrelevant/neutral but not contradictory should be ignored and positive marking applied as above.
- Use the full range of marks for a question as described by the mark scheme – e.g., for a 2-mark question, 0, 1 or 2 marks will always be available to award (never just 0 or 2). For levels marking, the full range of marks should be used freely as described by the mark scheme including 0 and full marks.
- Always award whole marks; half marks cannot be awarded.
- Allow phonetic misspellings as long as the meaning is clear, i.e., not so similar to another relevant but wrong term that you have to guess which was intended.
- Only allow 'it' as reference to the question topic if it is clear what 'it' refers to.
- Mark crossed out work UNLESS it has been replaced by another response.
- Where judgement is required, apply the guidance. Where the guidance does not sufficiently support for a particular candidate response/interpretation, contact your Team Lead.
- Accept alternative wording that reflects that given in the mark scheme.
- Contact your Team Lead if any additional correct answers arise which need to be added to the mark scheme.
- For level of response mark schemes:
  Note: indicative content has been provided to help orient the marking, providing a sense of the intentions of the question and expected parameters of the response. It is not exhaustive, and candidates do not need to cover all points referenced. Candidates may provide good quality responses while taking an approach which legitimately focuses either on breadth or depth given the time constraints. While the best responses are more likely to go to some depth across a broader range, there will be acceptable variation. Any pointers in the question towards coverage e.g. '…a range of…' should be kept in mind and balanced, through professional judgement, as to how much this affects the overall quality of the response when applying the marking instructions.
    - First, read the full candidate response and decide which band descriptor best fits the overall level of quality of the response, in the context of the indicative content.
    - Then, to decide on a mark within the band, consider the ***degree to which*** **the response fits the criteria**, as indicated by the diagram below:



The table below provides further detail on the descriptors used within each of the mark bands and what is expected at each level. Use the descriptors below alongside the mark scheme to support accurate and consistent judgment of candidate's response and allocation of marks.

AO2	**AO3**
Basic	
Limited understanding that is relevant to the context or question. Limited accuracy in interpretation through lack of application of relevant knowledge and understanding.	Limited accuracy in analysis through lack of application of relevant knowledge and understanding. Unsupported evaluation through lack of application of knowledge and understanding. Unsupported judgement through lack of application of knowledge and understanding.
Good	
Some understanding that is relevant to the context or question. Some accuracy in interpretation through the application of some relevant knowledge and understanding.	Some accuracy in analysis through the application of some relevant knowledge and understanding. Partially supported evaluation through the application of some relevant knowledge and understanding. Partially supported judgement through the application of some relevant knowledge and understanding.
Thorough	
A range of accurate understanding that is relevant to the context or question. Accurate interpretation through the application of relevant knowledge and understanding.	Accurate analysis through the application of relevant knowledge and understanding. Supported evaluation through the application of relevant knowledge and understanding. Supported judgement through the application of relevant knowledge and understanding.
Comprehensive	
A range of detailed and accurate understanding that is fully relevant to the context or question. Detailed and accurate interpretation through the application of relevant knowledge and understanding.	Detailed and accurate analysis through the application of relevant knowledge and understanding. Detailed and substantiated evaluation through the application of relevant knowledge and understanding. Detailed and substantiated judgement through the application of relevant knowledge and understanding.

This exam has been split into **two** sections.

Below details the types of questions and marks available for each section. Please allow time for each section accordingly.

Section A is made up of **44** marks and includes **13** short answer and medium answer questions.
Section B is made up of **36** marks and includes **3** extended response questions.

Assessment Objectives	Mark allocation
AO1a Demonstrate knowledge The ability to demonstrate recall of relevant knowledge in response to straightforward questioning.	**10%**
AO1b Demonstrate understanding The ability to explain principles and concepts beyond recall of definitions, but in a general way – i.e., out of a particular context in response to straight forward questioning.	**15%**
AO2 Apply knowledge and understanding to different situations and contexts Using and applying knowledge and understanding, taking the understanding of generalities and applying them to specific situations. Questions are likely to ask for application in relation to a straightforward situation.	**45%**
AO3a Analyse information & issues Complex thinking that distinguishes patterns & relationships, breaking material into constituent parts, and determining how the parts are related to one another and holistically, inferring underlying assumptions / conditions /relevance / causation.	**30%**
AO3b Evaluation information & issues The ability to make judgements about the value, for some purpose, of own or others' work / ideas / solutions / methods using internal or external criteria or standards relevant for the occupational area. These criteria may include e.g., quality, accuracy, effectiveness, efficiency, coherence, consistency, and may be quantitative or qualitative.	

Section A

Q1	Name **one** legislation or regulation regarding waste disposal that businesses in the animal science sector must comply with. (1 mark)	
Mark Scheme	• Controlled Waste (England and Wales) Regulations (2012) (1) • The Waste (England and Wales) Regulations (2011) (1) • The Environmental Protection Act (1990) (1) • The Animal By-Products (Enforcement) (England) Regulations (2013) (1) • Clean Air Act (1993) (1)	**Marking guidance** Award **1 mark** for a correct answer, up to a maximum of **1 mark.** Accept answers that don't include '(England and Wales)'. Accept answers that don't include the date of the Act. Credit any other appropriate response.
Total marks	1	
AO	AO1a	
Qual spec reference	2.1 Waste management principles in the animal science sector	

Q2	State **two** control measures which minimise the risks associated with lone working. (2 marks)	
Mark Scheme	• Always carry a mobile phone/radio (1) • Always make sure someone knows the location of work (1) • Always make sure someone knows an approximate time of return (1) • Agree on specific times for the employee to contact the employer throughout the shift (1)	**Marking guidance** Award **1 mark** for each correct answer, up to a maximum of **2 marks.** Credit any other appropriate response.
Total marks	2	
AO	AO1a	
Qual spec reference	1.1 Hazards, risks and control measures associated with working in the animal science sector.	

Q3	Identify **two** components of blood. (2 marks)	
Mark Scheme	• Plasma (1) • Erythrocytes/ red blood cells (1) • Leukocytes/ white blood cells (1) • Platelets (1)	**Marking guidance** Award **1 mark** for each correct answer, up to maximum of **2 marks.**
Total marks	2	
AO	AO1a	
Qual spec reference	5.3 The structure and function of the circulatory system in relation to animal physiology.	

Q4	a) State the function of ribosomes. (1 mark) b) State the function of lysosomes. (1 mark)	
Mark Scheme	a) Making proteins (1) b) Cell digestion/recycling of cell components (1)	**Marking guidance** a) Award **1 mark** for a correct answer, up to maximum of **1 mark.** b) Award **1 mark** for a correct answer, up to maximum of **1 mark.** Credit any other appropriate response with alternative wording that reflects what is given in the mark scheme.
Total marks	2	
AO	AO1a	
Qual spec reference	6.1 The structure and function of biological cells	

Q5	a) Identify **one** of the divisions of the autonomic nervous system. (1 mark) b) Explain how the autonomic nervous system responds to a threat. (2 marks)	
Mark Scheme	a) • Sympathetic (1) • parasympathetic (1) b) • An impulse is sent to the adrenal gland to release adrenaline (1) which activates the fight or flight response/which increases heart and respiratory rate/which increase blood flow to the muscles (1)	**Marking guidance** a) Award **1 mark** for stating a correct division of the ANS. Credit any other appropriate response. b) Award **1 mark** for a basic explanation, and award **1 further mark** for a developed explanation, up to a maximum of **2 marks** Credit any other appropriate response.
Total marks	3	
AO	AO1a - 1 AO1b - 2	
Qual spec reference	5.6 The structure and function of the nervous system in relation to animal physiology	

Q6	Give **two** examples of the implications to animal welfare, if there are disruptions to the supply chain demands of a veterinary practice. (2 marks)	
Mark Scheme	• Animals' health may be impacted due to inability to source their prescribed food (1) • Pain/suffering due to lack of supply of medication/postponement of surgical procedures (1) • Increased risk of preventable diseases due to lost supply of vaccines (1) • Delayed diagnosis of illness due to inability to source diagnostic supplies (1) • Animals requiring more invasive procedures due to inability to maintain servicing of diagnostic equipment (1)	**Marking guidance** Award **1 mark** for each correct example, up to a maximum of **2 marks.** Credit any other appropriate response.
Total marks	2	
AO	AO1b	
Qual spec reference	4.1 Principles of supply chains in the animal science sector	

Q7	Explain **two** differences between fast and slow twitch muscle fibres in skeletal muscles. (4 marks)	
Mark Scheme	• Fast twitch muscle fibres are white in colour (1) whereas slow twitch muscle fibres are red in colour (1) • Fast twitch muscle fibres have a low level of myoglobin (1) whereas slow twitch muscle fibres have a higher level of myoglobin. (1) • Fast twitch muscle fibres are used for short bursts of energy (sprint) (1) whereas slow twitch muscle fibres are used for longer periods of exertion (endurance). (1) • Fast twitch muscle fibres respire anaerobically/work more efficiently with low oxygen levels, (1) whereas slow twitch muscle fibres respire aerobically/work more efficiently with high oxygen levels. (1) • Fast twitch muscle fibres result in a build-up of lactic acid (1) whereas slow twitch muscle fibres produce carbon dioxide. (1) • Fast twitch muscle fibres have a smaller capillary network (1) whereas slow twitch muscle fibres have a larger capillary network (1)	**Marking guidance** Award **1 mark** for an explanation of a characteristic, and award **1 further mark** for the explanation of the differing characteristic to a maximum of **2 marks** Award a maximum of **4 marks** for two differences fully explained. Full marks for each difference can only be awarded where the second point expands upon, and is related to, the first point. Credit any other appropriate response.
Total marks	4	
AO	AO1b	
Qual spec reference	6.1 The structure and function of biological cells	

Q8	Explain **two** functions of the integumentary system in amphibians. (4 marks)	
Mark Scheme	• Facilitates the movement of oxygen and carbon dioxide across the amphibian's surface (1) to allow the amphibian to breathe/respire (1) • Allows the amphibian to blend into its environment (1) which enables them to evade predators (1) • Forms a physical barrier as part of the primary defence mechanism (1) to protect against infection by pathogens (1) • Forms a moist layer of mucus that maintains the integrity of the skin (1) which prevents dehydration of the amphibian (1)	**Marking guidance** Award **2 marks** for each correct explanation up to a maximum of **4 marks.** Award **1 mark** for a basic explanation, and award **1 further mark** for a developed explanation, to a maximum of **2 marks** Award a maximum of **4 marks** for two functions fully explained.
Total marks	4	
AO	AO1b	
Qual spec reference	5.9 The structure and function of the integumentary system in relation to animal physiology 5.2 The structure and function of the respiratory system in relation to animal physiology	

Q9	A business stores the food for the animals it keeps in large paper sacks. There is currently a rat infestation in its food store and some of the storage bags have been damaged. Explain **one** action the business could take to maintain biosecurity in its food store. (2 marks)	
Mark Scheme	• Any contaminated food should be appropriately disposed of to ensure that there is no further contamination (1) and to prevent ingestion by the animals the business keeps (1) • The point of entry for the rats should be located so that it can be sealed (1) to stop further infestation into the storage area (1) • The storage area should be fully cleaned and disinfected to reduce the risk of contamination to stored food (1) and to prevent rats being attracted to the storage area (1) • Any new or non-contaminated animal feed should be moved into metal storage containers as these will be less accessible to vermin (1) to reduce the risk of rats being able to access the food in the future (1)	**Marking guidance** Award **1 mark** for a basic explanation, and award **1 further mark** for a developed explanation, to a maximum of **2 marks**. Credit any other appropriate response.
Total marks	2	
AO	AO2	
Qual spec reference	3.1 Biosecurity controls measures in the animal science sector to prevent the spread of disease.	

Q10	A business needs to dispose of swabs that have been contaminated with animal bodily fluids. Explain **two** actions to safely dispose of the swabs. (4 marks)	
Mark Scheme	• The swabs must be placed in clearly identifiable yellow incineration/hazardous waste bags to ensure that all staff are aware of the contents (1) so that the waste is not accidently mixed with other types of waste (1) • Waste bags must be incinerated at high temperatures to destroy pathogens (1) to reduce the risk of any diseases being transferred (1) • Staff should wear appropriate PPE to protect the handler from potential infection (1) to prevent onward transmission of any pathogens that might be on the swabs (1) • Waste must be securely sealed using a secure knot/plastic tie/double bagged to prevent contents from spilling (1) which could contaminate the waste storage areas (1) • A licensed carrier should be used to collect the waste to guarantee safe disposal (1) and to ensure that the business complies with current legislation (1)	**Marking guidance** Award **1 mark** for a basic explanation, and award **1 further mark** for a developed explanation, to a maximum of **2 marks**. Award a maximum of **4 marks** for two actions fully explained. Credit any other appropriate response.
Total marks	4	
AO	AO2	
Qual spec reference	2.1 Waste management principles in the animal science sector.	

Q11	A juvenile dog has been brought into a rescue kennel. The dog has been fed an inappropriate diet prior to arriving at the kennel and is underweight due to malnutrition but is otherwise healthy. Explain **three** ways that the dog's nutrient requirement would differ from an adult dog of healthy weight. (6 marks)	
Mark Scheme	• Higher levels of carbohydrates are needed as an energy source (1) as a juvenile dog would be more active and have more energy (1) • Higher levels of fats/lipids are needed as a source of essential fatty acids (1) to improve the body condition score and put weight on the dog (1) • More water is needed as a source of hydration (1) as the juvenile dog will be very active and needs to replenish water loss from high activity levels. (1) • A low amount of fibre is needed to ensure correct function of the large intestine (1) and to prevent diarrhoea that can cause further weight loss. (1) • The correct calcium to phosphorus ratio is required for development of the skeletal system (1) to prevent skeletal abnormalities as the juvenile dog grows. (1) • A higher amount of protein is needed for muscles development (1) to improve the body condition score of the dog (1)	**Marking guidance** Award **1 mark** for a basic explanation, and award **1 further mark** for a developed explanation, to a maximum of **2 marks**. Award a maximum of **6 marks** for three nutrients fully explained. Credit any other appropriate response.
Total marks	6	
AO	AO2	
Qual spec reference	7.1 Types and sources of nutrients for animals 7.2 Causes, signs and treatment of nutritional deficiencies and disorders in animals	

Q12	A geriatric cat has sustained superficial wounds to one of its forelimbs. Explain **three** ways the animal's life stage would affect wound healing. (6 marks)	
Mark Scheme	• The fibrin fibres can be less efficient at forming a criss-cross pattern (1) which slows down the trapping of red blood cells (1) • The elastic fibres of the blood vessel wall will have lost their elasticity (1) which would increase time needed for clots to form (1). • The narrowing (vasoconstriction) of the diameter of the blood vessel lumen could be less efficient (1) which would increase the volume of blood loss (1). • The release of histamine from damaged cells can be less efficient (1), which decreases the amount of phagocytes coming to help heal the wound. (1) • The inflammatory process is inhibited and lengthened (1) which increases the risk of infection (1) • Collagen fibres are less elastic which affects the rate that fresh connective tissue is produced (1) which delays wound healing/scar formation (1)	**Marking guidance** Award **1 mark** for a basic explanation, and award **1 further mark** for a developed explanation, to a maximum of **2 marks**. Award a maximum of **6 marks** for three ways fully explained. Credit any other appropriate response.
Total marks	6	
AO	AO2	
Qual spec reference	6.2 Immunity and life stages	

Q13	A pet shop is found to have two species of wild caught snakes that have been caught outside of the UK and imported illegally. Explain how this illegal trading can threaten biosecurity within the shop. (6 marks)		
Mark Scheme	**Band**	**Marks**	**Descriptor**
	3	**5-6**	Demonstrates thorough application of knowledge and understanding of factors influencing biosecurity. Reasoning for how smuggling and the illegal pet trade influence biosecurity is highly detailed and relevant.
	2	**3-4**	Demonstrates good application of knowledge and understanding of factors influencing biosecurity. Reasoning for how smuggling and the illegal pet trade influence biosecurity is mostly detailed and relevant.
	1	**1-2**	Demonstrates basic application of knowledge and understanding of factors influencing biosecurity. Reasoning for how smuggling and the illegal pet trade influence biosecurity has limited detail and relevance.

		0	**No relevant material**	
	Indicative content • Illegally imported wild caught snakes have an unknown health and hereditary health history and as a result may be carrying diseases or parasites that currently do not affect captive or wild species in the UK. These diseases/parasites could potentially spread to other reptiles in the shop. • Illegally caught snakes may come from areas where specific diseases, including zoonotic disease are endemic, increasing the likelihood of these conditions entering the pet shop and leading to potential zoonotic spread to staff or customers. • Illegally caught snakes may not travel in isolation. Transport may be cramped with high-stocking densities and poor hygiene practices, where the risk of direct transmission of disease is high. This results in a higher risk that the snakes entering the pet shop are incubating a disease. • Suboptimal transport arrangements will also contribute to stress levels in the snakes. Chronic stress will reduce the snake's immune system and make them more susceptible to disease and therefore making them more likely to be a carrier of disease when they arrive at the shop. • Illegally imported snakes smuggled into the country are not checked at a border control points on entry. These checks would usually identify signs of ill health and ensure the animal was isolated and treated before being allowed to reach the pet shop. These illegally imported snakes will therefore not have undergone these checks and have a higher risk of incubating a disease. • When illegally imported snakes do come through customs, they will have forged / inaccurate paperwork, preventing officials from knowing the source and health status of the animal. This means they may be approved for entry into the country despite its unknown disease and parasite status which increases the risk of introducing disease/parasites into the shop.		
Total marks	6			
AO	AO2			
Qual spec reference	3.1 Biosecurity controls measures in the animal science sector to prevent the spread of disease.			

Section B

Q14	An animal management centre has acquired a new goat and needs to determine the most appropriate and easily digested diet to prevent nutritional deficiencies and disorders. The current source of nutrients for the goat is a large volume of cereals and grains with a small amount of roughage. The goat has limited access to water. Analyse how the structure and function of the goat's ruminant digestive system enables it to digest and extract nutrients from its herbivorous diet. Evaluate the suitability of the current sources of nutrients in the goat's diet.

Mark Scheme

Band	Marks	Descriptor
4	**10-12**	Demonstrates comprehensive application of knowledge and understanding of the structure and function of the ruminant digestive system in relation to the extraction of nutrients and of the nutritional requirements of animals to prevent deficiencies. Demonstrates comprehensive use of analysis of the structure and function of the ruminant digestive system in relation to extracting nutrients from a herbivorous diet. Demonstrates comprehensive evaluative skills by considering the suitability of the sources of nutrients in the goat's diet to prevent nutritional deficiencies. Evaluations are supported with highly detailed and relevant reasoning.
3	**7-9**	Demonstrates thorough application of knowledge and understanding of the structure and function of the ruminant digestive system in relation to the extraction of nutrients and of the nutritional requirements of animals to prevent deficiencies. Demonstrates thorough use of analysis of the structure and function of the ruminant digestive system in relation to extracting nutrients from a herbivorous diet. Demonstrates thorough evaluative skills by considering the suitability of the sources of nutrients in the goat's diet to prevent nutritional deficiencies. Evaluations are supported with mostly detailed and relevant reasoning.
2	**4-6**	Demonstrates good application of knowledge and understanding of the structure and function of the ruminant digestive system in relation to the extraction of nutrients and of the nutritional requirements of animals to prevent deficiencies. Demonstrates good use of analysis of the structure and function of the ruminant digestive system in relation to extracting nutrients from a herbivorous diet. Demonstrates good evaluative skills by considering the suitability of the sources of nutrients in the goat's diet to prevent nutritional deficiencies. Evaluations are supported with some detail and relevant reasoning.

1	**1-3**	Demonstrates basic application of knowledge and understanding of the structure and function of the ruminant digestive system in relation to the extraction of nutrients and of the nutritional requirements of animals to prevent deficiencies. Demonstrates basic use of analysis of the structure and function of the ruminant digestive system in relation to extracting nutrients from a herbivorous diet. Demonstrates basic evaluative skills by considering the suitability of the sources of nutrients in the goat's diet to prevent nutritional deficiencies. Evaluations are supported with minimal detail and relevant reasoning.
	0	**No relevant material**

Indicative content

Analysis

- To extract nutrients from food, the ruminant digestive system needs to masticate, ferment and digest the food which then allows them to absorb the nutrients. The fermentation process of the ruminant digestive system is more efficient when food is softened, has larger surface area and has smaller particles because it easier for the bacteria to come in contact directly with the food and ferment the plant cell wall in the first chamber of the ruminant digestive system.
- Different structures in the digestive system aim to soften and increase the surface area for effective fermentation. The absence of canine teeth (gap called diastema) enable roughage in the mouth to move between the teeth and the cheek and mix more with the saliva to soften and lubricate the food before swallowing.
- Large, ridged molar teeth enable effective grinding of the roughage before the ingesta is condensed into a fibrous pulp to be swallowed
- Large volumes of saliva are produced by salivary glands to neutralise the acidic contents regurgitated from the rumen/reticulum which continues to soften the food
- The ruminant digestive system regurgitates food so that it can be further chewed to further soften and increase the surface area of the food. The muscle wall of the oesophagus allows movement of ingested material from the ruminoreticulum section of the stomach back into the mouth via reverse peristalsis to allow this secondary chewing to happen.
- The rumen wall contains numerous papillae, while the reticulum wall contains folds, both of which are important to increase the surface area for action of the bacteria on the softened food to allow efficient fermentation.
- This efficient fermentation produces volatile fatty acids (VFAs)which are absorbed via diffusion through the rumen wall into the capillary network. The VFAs are used as an energy source by the body's cells.
- The inner surface of the omasum (third chamber) contains numerous folds to increase the surface area for water absorption. The absorbed water includes B vitamins and minerals which prevent deficiencies.
- The bacteria fermenting the food in the rumen travel to the fourth chamber to provide protein for the animal. The gastric pits of this chamber contain cells that secrete mucus, acid (hydrochloric) and enzymes that attack and destroy the bacteria cell releasing the protein inside the cell.
- The protein that is released in the fourth stomach moves through to the small intestine for digestion and for amino acids to be absorbed.

Evaluation of the dietary requirements:

	• The small amount of roughage in the goat's current diet is not sufficient to ensure the rumen bacteria remain healthy. The rumen bacteria are essential in the fermentation of roughage which results in the production of volatile fatty acids that provide the animal with energy for growth and development of muscle tone and function. The rumen bacteria would not function efficiently without sufficient roughage. • The rumen bacteria produce essential protein and amino acids for the goat. If the goat's diet does not contain sufficient roughage, the rumen bacteria would not be able to function and ferment the ingested plant material and produce essential amino acids (and protein) for growth, muscle development, healing, immune system development, coat condition and red blood cell production. • Roughage contains essential minerals and vitamins, such as calcium, magnesium, selenium, vitamin E. Therefore, the goat could develop hypovitaminosis and nutritional deficiencies, such as bone or skeletal deformities, poor growth and development, anaemia (lack of haemoglobin production for red blood cells), increased susceptibility to disease (lack of antibodies and poor healing). • Cereals and grains are needed in the diet to supply additional energy and nutrients to supplement the roughage, however too much cereal in the diet will have a negative effect on the function of rumen bacteria. The rumen bacteria ferment cereals very quickly, producing acid, and to feed too much grain at one time can prove fatal for the bacteria and for the goat. • Overfeeding cereals can also be detrimental to the goat's health by making them fat and cause hypervitaminosis. This can cause problems with mobility, increasing stress on the animal's skeleton and joints – increasing arthritic changes, increased susceptibility to diabetes and heart disease. • The limited water supply for the goat is unsuitable as it should be provided continuously to prevent dehydration/death. Goats need water for a large number of bodily functions (e.g. digestion, cell function, enzyme function, lubrication of joints, plasma content of blood, maintenance of body temperature etc). Water deficiency will result in loss of body fluid, dehydration and death.
Total marks	12
AO	AO2 = 4 AO3a = 4 AO3b = 4
Qual Spec Ref	5.1 The structure and function of the digestive system in relation to animal physiology 7.1 Types and sources of nutrients for animals 7.2 Causes, signs and treatment of nutritional deficiencies and disorders in animals

Q15	Lions have adapted in various ways to enable them to hunt and catch their prey. They demonstrate a range of social predator behaviours and strategies to hunt cooperatively and have physical adaptations to increase the chances of success. Analyse how a lion's skeletal system adaptations enable it to successfully hunt its prey. Evaluate how social behaviours used by a pride of lions can determine the outcome of a hunt. (12 marks)

Mark Scheme

Band	Marks	Descriptor
4	**10-12**	Demonstrates comprehensive application of knowledge and understanding of the adaptations of the lion skeletal system and of the social behaviours used by predator packs in relation to successful hunting. Demonstrates comprehensive use of analysis of the skeletal adaptations of a lion in relation to hunting its prey. Demonstrates comprehensive evaluative skills by justifying an excellent range of ways that social behaviours used by predator packs determine the outcome of a hunt. Justifications are supported with highly detailed and relevant reasoning.
3	**7-9**	Demonstrates thorough application of knowledge and understanding of the adaptations of the lion skeletal system and of the social behaviours used by predator packs in relation to successful hunting. Demonstrates thorough use of analysis of the skeletal adaptations of a lion in relation to hunting its prey. Demonstrates thorough evaluative skills by justifying a good range of ways that social behaviours used by predator packs determine the outcome of a hunt. Justifications are supported with mostly detailed and relevant reasoning.
2	**4-6**	Demonstrates good application of knowledge and understanding of the adaptations of the lion skeletal system and of the social behaviours used by predator packs in relation to successful hunting. Demonstrates good use of analysis of the skeletal adaptations of a lion in relation to hunting its prey. Demonstrates good evaluative skills by justifying a moderate range of ways that social behaviours used by predator packs determine the outcome of a hunt. Justifications are supported with some detail and relevant reasoning.
1	**1-3**	Demonstrates basic application of knowledge and understanding of the adaptations of the lion skeletal system and of the social behaviours used by predator packs in relation to successful hunting. Demonstrates basic use of analysis of the skeletal adaptations of a lion in relation to hunting its prey.

		Demonstrates basic evaluative skills by justifying a limited range of ways that social behaviours used by predator packs determine the outcome of a hunt. Justifications are supported with minimal detail and relevant reasoning.
	0	**No relevant material**

Indicative content
Analysis of skeletal adaptations

- Lions have a large powerful mandible/lower jaw and huge canine teeth that enable the lion to hold on to and bring down its prey during a hunt.
- A large nasal opening is important to ensure an increased volume of air can be inspired and expired during a chase. Inspiration ensures adequate oxygen intake into the lungs and therefore into the muscles which is required to produce energy and allows contraction of the muscle tissue during a chase.
- A deep rib cage protects enlarged bronchi & lungs. An enlarged lung field increases the amount of oxygen that can inspired to be taken to the muscles for them to produce the energy needed to run for an extended length of time. Aerobic respiration is important to ensure the efficient functioning of muscle contraction and prevent anaerobic respiration and lactic acid build up.
- Lions have flexible spines that allows for extreme flexion and extension and enable the lion to take long strides during a chase. The flexibility of the spine means it is able to 'bunch up' and extend when running therefore allowing for a greater reach to be achieved for the animal's stride length.
- The shoulder joint (scapula) is not attached to the body by bone but by muscle which enables greater flexibility of the forelimb during the chase and increases the lion's stride length.
- The carpal and metacarpal bones of the feet are arranged to allow a good range of motion which allows the lion to change its angle of motion as its prey moves.
- The pads on their feet are arranged so that the lion can move silently over the grass to enable them to approach without alerting its prey.
- Lion claws are large and can extend out when they need to latch onto and bring down prey. These claws also enable the lion to grip whilst running to improve its chances of maintaining a chase.
- Lions have a long, muscular tail that is used to maintain balance when changing directions during a chase, allowing them to change directions quickly.

Evaluation of social behaviours

- Each member of the pack will patiently observe the prey with one or two individuals of the pack being positioned at a vantage point (e.g. on higher ground) before the hunt starts. This allows the pack to identify an isolated individual or a slower, smaller or younger individual in the herd of prey animals to pursue who would be easier to catch and therefore increase the likelihood of a successful hunt.
- Each individual within the pack of hunters plays a specific role during the hunt to ensure a successful kill. Interspecific communication and behaviour between pack members identifies each individual's role. The dominant main hunter goes for the

	attack/kill, while the cooperative members are responsible for isolating, chasing and exhausting the prey animal. The pack members will place themselves strategically to cut off escape routes to ensure that the prey is caught and killed to the benefit of all members of the pack. • Communication within the group is displayed by body language, facial expressions and vocalisation (i.e. interspecific visual and behavioural communication). These are used to communicate when to advance closer to the prey animals, when to demonstrate patience and stay still and when to observe the prey animal's response to changes in the environment (wind, smell, movement etc.). This method is used as it results in the least disturbance, preventing prey animals from being alerted to the predator presence which could allow the prey to escape. • Experienced pack members will teach the juveniles the range of body language and facial communications through play. This is to ensure that when the juveniles are able to take part in the hunt, they can contribute to the success, and not alert the prey to the predator presence too early, which could result in the prey escaping and the hunt being unsuccessful. • Pack hunters use communication to be able to stalk their prey and get within as close a distance as possible. This is so that the dominant (or lead) predator is able to attack the chosen prey individual while the remaining pack can rush the prey in a coordinated effort to effectively ambush the prey animal. This means the prey animal will not have time to react to the predators' presence and attempt escape. In turn, this means that the predator pack uses less energy to catch the prey by reducing the chase required. • The behavioural co-operation between each member of the pack is important as it maintains the social stability of the group (specific hierarchy of the group i.e. dominant, subordinate individuals) resulting in an increased hunt success rate with less energy expenditure for each member while hunting. This, in turn, which leads to increased survival of the members of the pack.
Total marks	12
AO	AO2 = 4 AO3a = 4 AO3b = 4
Qual Spec Ref	5.5 The structure and function of the musculoskeletal system in relation to animal physiology. 8.1 Characteristics and causes of natural, atypical, desirable and undesirable behaviour for a species.

<table>
<tr><td>Q16</td><td>A severe thunderstorm has been forecasted to arrive in the next three days, bringing a risk of strong winds and flooding to both a donkey sanctuary and the surrounding area. This means that the sanctuary may be inaccessible for staff, deliveries and collections for the duration of the storm and the following days. The storm may also cause disruptions to the sanctuary’s power supply. There is no suitable transport available to move the donkeys offsite, therefore, a minimal number of staff will be required to stay in onsite accommodation during the storm due to the predicted inaccessibility of the sanctuary.

Analyse the hazards to the staff remaining onsite throughout the storm.
Justify recommended measures to ensure the ongoing care of the donkeys during the period of inaccessibility.

(12 marks)</td></tr>
<tr><td>Mark Scheme</td><td>
<table>
<tr><th>Band</th><th>Marks</th><th>Descriptor</th></tr>
<tr><td>4</td><td>10-12</td><td>Demonstrates comprehensive application of knowledge and understanding of hazards and of measures to ensure ongoing care of animals in relation to emergency situations.

Demonstrates comprehensive use of analysis of hazards in relation to an emergency situation.

Demonstrates comprehensive evaluative skills by justifying an excellent range of measures to ensure the ongoing care of animals in an emergency situation. Justifications are supported with highly detailed and relevant reasoning.</td></tr>
<tr><td>3</td><td>7-9</td><td>Demonstrates thorough application of knowledge and understanding of hazards and of measures to ensure ongoing care of animals in relation to emergency situations.

Demonstrates thorough use of analysis of a range of hazards in relation to an emergency situation.

Demonstrates thorough evaluative skills by justifying a good range of measures to ensure the ongoing care of animals in an emergency situation. Justifications are supported with mostly detailed and relevant reasoning.</td></tr>
<tr><td>2</td><td>4-6</td><td>Demonstrates good application of knowledge and understanding of hazards and of measures to ensure ongoing care of animals in relation to emergency situations.

Demonstrates good use of analysis of a range of hazards in relation to an emergency situation.

Demonstrates good evaluative skills by justifying a moderate range of measures to ensure the ongoing care of animals in an emergency situation. Justifications are supported with some detail and relevant reasoning.</td></tr>
</table>
</td></tr>
</table>

1	**1-3**	Demonstrates basic application of knowledge and understanding of hazards and of measures to ensure ongoing care of animals in relation to emergency situations. Demonstrates basic use of analysis of a range of hazards in relation to an emergency situation. Demonstrates basic evaluative skills by justifying a limited range measures to ensure the ongoing care of animals in an emergency situation. Justifications are supported with minimal detail and relevant reasoning.
	0	**No relevant material**

Indicative content
Analysis of hazards to staff

- Reduced staff numbers may result in lone working which poses a number of risks including being unable to get help if an accident or injury occurs, having to carry out physically demanding tasks individually and the effect of isolation on mental health.
- Lack of staff increases the pressure on existing staff, where the animal husbandry tasks must still be completed to ensure welfare standards are maintained.
- The poor weather may make the ground difficult to walk on increasing the risk of slips and falls.
- The donkeys may be difficult to lead as the high winds and change of routine could result in flighty / unpredictable behaviour, increasing the risk of injury to the handler from being pulled over, bitten or kicked.
- Storm damage to enclosures could result in the donkeys escaping. If animals have escaped, they are likely to display unpredictable behaviour which increases the risk of injury to handlers when trying to catch and return them.
- The isolated location of the sanctuary would make it more difficult to gain help should an accident or emergency occur. As an isolated location, it could be easily cut off due to fallen trees / flooded roads.
- The storm may result in damage to trees and buildings, posing an additional risk to health from falling debris.
- Flooding / rain may make some areas of the sanctuary impassable or difficult to reach increasing the risks of slips, trips and falls, this includes wet floors, uneven surfaces and muddy fields.
- The storm could damage power lines, resulting in a power cut. Working in darkness creates additional risk of injury through slips, trips, falls and injury through walking into objects.
- Lightning or power surges may pose a fire risk. The donkey sanctuary would store hay / straw which would easily ignite.

Justification of recommended measures

- Carry out a risk assessment to identify potential hazards and risks due to the storm and flooding, to identify areas where the hazard/risk factors can be reduced.
- Identify procedures should the building flood:
    - Switch off mains electricity to remove risk of electrocution.

	○ Provide an area where a dry surface is available as stagnant water on the floor could cause problems with the donkey's hoof care and general health should they be housed indoors. • Provide training to the staff remaining onsite on storm-related hazards, animal handling and restraint during storms, and animal first aid to ensure that they are prepared for emergencies. • Ensure evacuation plans are in place for staff should the situation escalate and pose a risk to life so that evacuations can take place quickly and orderly if necessary. • Compile a list of the staff remaining on site so that checks can be undertaken regularly to ensure that all staff are accounted for. • Ensure records of the donkeys onsite are current so that any animal escape can be identified. • Control measures related to inclement weather should be in place i.e. use of correct PPE, maintaining flood defences, moving everything from floor level, laying sandbags around the sanctuary to protect supplies and equipment that will be needed to maintain the health and welfare of the animals. • When safe to do so, check the donkeys for signs of injury and stress, take remedial action where appropriate to ensure any first aid required can be administered. Additional PPE may be required as animals may be stressed / fearful. • Plan for short term disruption to supplies when being cut off from deliveries: ○ Ensure there is sufficient stock of medications and first aid equipment so that animals can continue to be treated during the period of isolation and emergency situations can be dealt with ○ Ensure sufficient supply of food, water and bedding for animals so that the animals can continue to be fed and watered throughout the storm to maintain animal health and welfare. ○ Ensure sufficient supplies of food and water for staff to be able to maintain the welfare of staff so that they can continue to care for the donkeys. ○ Ensure sufficient supply of torches and batteries. Test batteries (or generator operated equipment) to ensure they are in working order so that they can used in the event of a power cut. ○ A generator could be acquired to ensure heating, lighting and refrigeration can be maintained in the case of a power cut. • Plan for storage of stock during isolation to ensure that the storage area is safe and not vulnerable to potential flooding so that supplies are available for the period of isolation and do not run out. • Extra bedding and food and water provisions should be prepared prior to the storm while there are more staff on site. As there will be fewer staff onsite during the storm, only minimal husbandry tasks will be able to be performed. • Establish a reliable communication system among onsite staff and have a backup communication plan in case of network outages to ensure that staff are able to contact each other where help is needed in handling the donkeys. • Compile an updated list of emergency contacts, including local authorities, emergency services and veterinarians so that staff are able to attempt to make contact and request emergency help if needed. • Charge phones and other emergency equipment prior to the storm so that the staff are still able to communicate with those outside of the sanctuary in the case of a power cut. • Set up regular check-ins and updates to ensure the wellbeing of staff and animals. • Install security cameras or weather monitoring devices so that animal conditions and sanctuary integrity can be remotely assessed by the staff who

	are not onsite so that emergency services can be notified of any issues if needed. • Securing of the building and animal enclosures should be completed prior to the storm when a higher number of staff are onsite, to ensure that appropriate animal handling techniques can be utilised to keep animals safe during movement and reduce the risk of animal escape or injury to handlers. • Ensure enclosures are able to withstand a storm/ flooding e.g. check structures, roof etc. so that the risk of injury to animals and of animal escape is minimised. • Consider keeping the donkeys outside with shelter rather than inside as this may be better suited to the donkey's fight or flight instincts. This would allow them to react in a natural way to the storm which would reduce the likelihood of animal injury. • No access to or from the sanctuary will mean there is no access to waste removal, therefore any clinical waste should be stored safely, double bagged and away from animals and food until collection can be made to prevent cross contamination. • Ensure the muck heap, with waste material from cleaning out the donkeys, is stored in a dry area away from potential flooding to prevent contamination of the water source which would contravene the Environmental Protection Act.
Total marks	12
AO	AO2 = 4 AO3a = 4 AO3b = 4
Qual Spec Ref	1.1 Hazards, risks and control measures associated with working in the animal science sector. 1.2 Procedures and contingency and emergency plans to follow when dealing with emergency situations in the animal science sector. 2.1 Waste management principles in the animal science sector. 4.2 Principles of consumables and stock management in the animal science sector