



Australian and New Zealand College of Veterinary Scientists

Membership Examination

June 2018

Medicine and Management of Laboratory Animals

Paper 1

Perusal time: **Fifteen (15)** minutes

Time allowed: **Two (2)** hours after perusal

Answer **ALL FOUR (4)** questions

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Answer **FOUR (4)** questions, each worth 30 marks.....total 120 marks

Paper 1: Medicine and Management of Laboratory Animals

Answer all four (4) questions

1. Answer **both** parts of this question:

a) For mice, rabbits and sheep in a research environment, list:

i. the common methods of animal identification for **each** species
(5 marks)

ii. the advantages and disadvantages of **each** method for **each** species.
(10 marks)

b) For rats, rabbits and sheep in a research environment:

i. outline the caging and/or penning options for **each** species listing the advantages and disadvantages of **each** housing option (12 marks)

ii. nominate the **most** preferred option for housing of **each** species, including a brief description of any constraints. (3 marks)

2. **Outline** the key components of an animal facility induction and training programme for small groups of new investigators (two to three [2-3] people). This induction and training programme is to be delivered before they conduct animal-based research using a centralised animal facility. Assume the facility provides breeding services for genetically modified rodents, has a holding area for rodents undergoing experimental procedures, and has common-use procedure rooms and specialised laboratories.
(30 marks)

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3. Answer **both** parts of this question:

a) Answer **all** sub-parts of this question:

- i. Describe the potential causes of increased ammonia levels in an experimental rodent holding room. *(6 marks)*
- ii. Describe the potential consequences of increased ammonia levels. *(3 marks)*
- iii. Outline the actions/changes that can be undertaken to correct the increased ammonia levels. *(6 marks)*

b) Address **each** of the points below regarding the challenges of holding rats for **three (3)** years, for an investigator requiring aged rats for an approved study:

- i. List the specific health and welfare issues that are associated with aged rats. *(5 marks)*
- ii. Detail how these issues can be managed to remove or reduce the impact on the animals. *(5 marks)*
- iii. Describe a specific monitoring regime appropriate for aged rats, including an ethical endpoint. *(5 marks)*

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4. Regarding a research sheep flock, housed both indoors and in a paddock that is adjacent to a commercial breeding flock, sharing a common dam.

Answer **all** parts of this question:

- a) Outline the measures required when purchasing sheep to prevent the introduction of disease to the research location. Include the major diseases of concern **and** how the health of the sheep can be assessed prior to their introduction to the research herd. *(15 marks)*

- b) Outline the measures required to maintain the health of the research sheep during the study. *(10 marks)*

- c) List the workplace health and safety considerations for personnel working with these sheep. *(5 marks)*

End of paper



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Answer **ALL FOUR (4)** questions

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Answer **FOUR (4)** questions, each worth 30 marks.....total 120 marks

Paper 2: Medicine and Management of Laboratory Animals

Answer all four (4) questions

1. You are a category A member of the organisational Animal Ethics Committee who is responsible for the management and welfare of animals used within the animal facility. An investigator has approached you with a new project that requires wild-caught rodents to be captured and transported to the animal facility for study. This study is novel for both the investigator and the organisation.

Detail the project's specific issues for consideration before it is feasible for this study to proceed. Include in your answer, details of:

- i. the approvals, **including** specific issues associated with the approval to use wild-sourced animals, that are required to be addressed in relation to the proposed work, for all aspects of the proposed study
(10 marks)
- ii. the caging and infrastructure requirements for these animals to be housed in the facility (8 marks)
- iii. the management considerations regarding the introduction of these animals into the facility. (12 marks)

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2. Answer **both** parts of this question:

- a) A genetically modified mouse line has a phenotype of spontaneously developing type 1 diabetes. This genetically modified line, sold by a commercial vendor, has a 90% incidence of type 1 diabetes in homozygous females by seven-months of age. Breeding pairs are heterozygous x heterozygous cross. After five years of successfully breeding a small colony of this genetically modified line in a research facility, the incidence of diabetes has rapidly declined to 25%.

Answer **all** parts of this sub-question:

- i. Briefly describe the factors that impact on phenotype expression in genetically modified lines. (5 marks)
 - ii. Briefly describe how the causes of declining phenotype expression can be investigated. (5 marks)
 - iii. Briefly describe the strategies for resolving **each** of the factors in question 2 a) i. (5 marks)
- b) Disease surveillance is a key component to maintaining a healthy zebrafish colony.

Answer **both** parts of this sub-question:

- i. Name **two (2)** of the most common pathogens that infect zebrafish colonies, including **one (1)** that is potentially zoonotic.
For **each** pathogen:
 - list the clinical signs associated with infection from the pathogen.
 - describe the methods for diagnosis of the pathogen(8 marks total)
- ii. For **both** pathogens identified in 2 b) i., briefly outline a disease surveillance programme **and** key husbandry management strategies to minimise the incidence of infection and disease. (7 marks)

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3. Answer **both** parts of this question:

- a) A stand-alone animal facility is located 20 kilometres from the nearest town. The facility houses rodents and rabbits, as well as sheep in its pasture. Following significant flooding surrounding the facility, road access has been completely cut off and the situation is expected to last for one week. Power, gas and fresh water supplies have been significantly disrupted. A facility disaster plan is in place for a range of disasters or significant emergencies, including flood.

Answer **both** parts of this sub-question:

- i. Detail how this situation could impact on the operation of the facility **and**, potentially, the welfare of the animals. (5 marks)
 - ii. List the components of the disaster plan that should be actioned to reduce or remove the impact of this event on the animals held in the facility and paddocks. (10 marks)
- b) A barrier facility that breeds rodents and sources animals from suppliers, conducts quarterly screens for common rodent contaminants. No positive results for viruses, bacteria or parasites have been detected since in-house breeding colonies were rederived. In the latest testing, a pooled sample from a mouse experimental room has detected pinworm.

Detail the steps required to investigate this problem. Include in your answer:

- i. the potential causes of the contamination of the experimental room with pinworm (5 marks)
- ii. the most appropriate immediate action to resolve the problem (5 marks)
- iii. the most appropriate long-term action to resolve the problem. (5 marks)

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3. For **each** of the animal models listed below:

- detail the potential negative impact on the animal's wellbeing
- propose specific monitoring criteria to detect the impact on the animal's wellbeing
- specify relevant ethical endpoints.
 - i. adjuvant arthritis in the rat *(6 marks)*
 - ii. streptozotocin-induced diabetes in the mouse *(6 marks)*
 - iii. tumour inhibition studies in the nude mouse *(6 marks)*
 - iv. experimental autoimmune encephalitis (EAE), as a model for multiple sclerosis in the mouse *(6 marks)*
 - v. graft versus host disease in the mouse, induced by total-body irradiation. *(6 marks)*

End of paper