



AUSTRALIAN AND NEW ZEALAND COLLEGE OF VETERINARY SCIENTISTS

MEMBERSHIP GUIDELINES

Medicine and Management of Laboratory Animals

INTRODUCTION

These Membership Guidelines should be read in conjunction with the *Membership Candidate Handbook*.

ELIGIBILITY

Refer to the *Membership Candidate Handbook*.

OBJECTIVES

To demonstrate that the candidate has sufficient knowledge of and experience in medicine and management of laboratory animals, to be able to give sound advice in this field to veterinary and technical colleagues and research scientists. Membership of the College is an official recognition of a veterinarian's knowledge and experience in Medicine and Management of Laboratory Animals. Membership is an indication to the profession and the general public of an advanced practitioner, representing a middle-tier of knowledge, competence and experience in Medicine and Management of Laboratory Animals. Membership is not a specialist qualification. Membership requires examination with members signified by post-nominals MANZCVS.

LEARNING OUTCOMES

For the purposes of this document “Laboratory Animals” are defined as those species commonly encountered in laboratory facilities in Australia and New Zealand. These can be divided into core species and other species:

Core species include:

- Mice
- Rats
- Sheep

Other species that are used less commonly for research purposes that should be considered include:

- | | |
|----------------------|--------------------|
| • Guinea pigs | • Wildlife species |
| • Non-human primates | • Zebrafish |
| • Pigs | • Rabbits |

1. The candidate will have a **sound**¹ knowledge of:

¹ Knowledge Levels:

- a. Standard strains of core species and relevant nomenclature systems.
- b. Anatomy, reproduction, and natural ethology of core species of laboratory animals.
- c. Nutritional requirements of core species laboratory animals including: methods of dietary supplementation; common nutritional deficiencies and intoxications; microbiological standards for laboratory animal foods; methods of sterilisation of foods and water,, relevant efficacy and effects on nutrient value, palatability, digestion, microbiome; provision of roughage.
- d. Breeding requirements and breeding systems for core species of laboratory animals. This includes mating, weaning, identification, breeder replacement, cross-fostering, record keeping, pedigrees, reproductive assessment and planning production to meet orders/research needs and limit animal wastage. Breeding systems includes inbreeding, outbreeding, the development of congenic mutant strains; recombinant inbred strains; the advantages or disadvantages of F1 hybrids compared to inbred and outbred animals. Monitoring breeding to minimise genetic drift including main methods for genetic surveillance, refreshing strains & backcrossing where applicable. The impact of establishment, management and maintenance of mice with diverse microbial exposure.
- e. The principles of genetically modified (GM) animals including an awareness of the techniques used to create GM animals; the assisted reproductive technologies that complement the production of GM animals; the techniques used for routine monitoring of the genotype of GM animals; the welfare concerns associated with the creation, production and use of GM animals for research purposes and phenotype monitoring and assessment strategies.
- f. Pathology, diagnosis, and control of common/ important diseases of core species:

For mice and rats:

- Viral, bacterial, protozoal and parasitic diseases commonly found in Australian or New Zealand laboratory animal facilities.
- Viral diseases that must be excluded during the importation of mice and rats.
- Congenital abnormalities occurring frequently in inbred strains.
- Non-infectious conditions commonly associated with aging, transport, breeding, dominance behaviours, cage trauma, and self-mutilation.
- Common neoplasms

For sheep:

- Viral, bacterial, and parasitic diseases common in Australian or New Zealand flocks.
- Common metabolic & feeding disorders

- g. Application of commonly used anaesthetics for core species of laboratory animals including inhalation and injectable anaesthetics, peri operative care; anaesthetic monitoring; peri-operative analgesia; species-specific pain assessment; use of neuromuscular blocking agents.
- h. Chemical and physical methods of euthanasia of core species of laboratory animals: advantages and disadvantages of various methods, including ethical and welfare issues.

Sound knowledge – candidate must know all of the principles of the topic including some of the finer detail, and be able to identify areas where opinions may diverge. A middle level of knowledge.

Basic knowledge – candidate must know the main points of the topic and the core literature.

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- i. Handling, manual restraint, and use of restraining devices in core species of laboratory animals; injection techniques and collection of body fluid samples (venous, arterial, and heart blood; urine); welfare and safety issues associated with techniques used.
- j. Health monitoring and disease diagnosis techniques in core species of laboratory animals including postmortem, sample collection and available testing modalities. Health surveillance planning for conventional, Specific Pathogen Free and germ-free colonies including selection of pathogens, use of sentinels and/ or environmental testing.
- k. Laboratory animal housing - Species specific housing requirements for the core species of laboratory animals including.
 - i. Environmental requirements such as temperature and humidity, lighting and illumination levels and light/ dark cycle, noise, vibration, timing of experimental protocols.
 - ii. Cage/ pen construction materials, designs and how they meet the welfare requirements of the species. Alternate methods to supply water, food, and the different bedding, nesting and environmental enrichment options.
 - iii. Social requirements – Group housing and associated problems, the impact of social isolation for each species and how to minimise its impact.
 - iv. Specialised restraint and transport options to meet the species requirements.
- l. General husbandry and management of microbiologically defined laboratory animals (specifically rats and mice):
 - i. Definition and classifications of microbiologically defined laboratory animals including Specific Pathogen Free, Specified and Opportunistic Pathogen-Free, germ-free/ gnotobiotic and understanding the role these play in microbiome research.
 - ii. Methods of rederivation and cryopreservation and the role these play in colony management.
 - iii. Operating procedures and general management of SPF barrier units including sterilisation/ sanitation methods, specialised barrier equipment, entry procedures, and transport.
 - iv. Operating procedures and general management of colonies of mice with diverse microbial exposure particularly when associated with other SPF barrier facilities and the common need for veterinary care.
 - v. Quarantine importation/exportation guidelines for core species of laboratory animals and reproductive material. Quarantine and treatment of imported and introduced animals, health monitoring, conditioning and release.
- m. Legislation associated with animal experimentation, welfare and ethics applicable in **any one state/territory of Australia or in New Zealand.**
 - i. The “Australian Code for the Care and Use of Animals for Scientific Purpose” (8th Edition, 2013, updated 2021); the role and recommended constitution of Animal Ethics Committees; compliance with the 3Rs; methods

of ensuring compliance with provisions of the Code and the AEC including relevant state/ territory legislation.

- ii. The New Zealand “Users Guide to Part 6 of the Animal Welfare Act 1999 – The use of animals in research, testing and teaching current edition”); the role and recommended constitution of Animal Ethics Committees; compliance with the 3Rs; the role of an institutional Animal Welfare Officer; Codes of ethical conduct, preparation and use; Good Practice Guide for the use of animals in research, testing and teaching March 2024.
 - n. Key elements of emergency procedures for animal facilities including evacuation (if applicable); disaster planning and preparedness; backup and offsite storage of cryopreserved germplasm; building equipment redundancy; alternate energy source/s, and plans for provision of food, water and animal care during the emergency.
2. The candidate will have a **basic**² knowledge of:
- a. Epidemiology, pathology, diagnosis, and control of common diseases of the other (non-core) mammalian laboratory animal species (beyond mice, rats, sheep, rabbits), maintained in a research environment.
 - b. Less common diseases of core species that appear on Australia & New Zealand health screen reports, the role of opportunistic pathogens, common commensals and emerging pathogens.
 - c. Issues concerning antimicrobial resistance and stewardship associated with the use of these products in the animal research sector.
 - d. The management, housing, breeding, nutrition and major diseases of the non-core laboratory animal species commonly used in biomedical research.
 - e. Development of housing and husbandry to meet the requirements of diverse wildlife species in a research environment.
 - f. Housing systems to maintain zebrafish, water quality requirements, routine husbandry; common fish diseases that impact research, quarantine procedures; euthanasia, anaesthesia and treatment methodologies.
 - g. The potential impact of husbandry, disease status and experimental methods on the microbiome and phenotype of research animals.
 - h. Laboratory animal facility design and use:
 - i. Layout and design of laboratory animal facilities, including animal housing, service, storage, transport and staff areas.
 - ii. Control of temperature, humidity, ventilation and noise to meet species requirements.
 - iii. Equipment including sterilising options, water treatment plants, cage washers, fumigation units, storage and handling systems, waste disposal units, euthanasia chambers.

² **Knowledge Levels:**

Sound knowledge – candidate must know all of the principles of the topic including some of the finer detail, and be able to identify areas where opinions may diverge. A middle level of knowledge.

Basic knowledge – candidate must know the main points of the topic and the core literature.

- iv. Design of specialised areas such as experimental procedure rooms, operating theatres, anaesthetic/pre-surgical preparation, animal imaging areas.
- v. Special design considerations for SPF, germ free, diverse microbial exposure or quarantine units.
- i. Other relevant Australian or New Zealand legislative compliance, controls or best research practice:
 - i. Australian legislative and regulatory compliance and controls in any one Australian state or territory or in the Commonwealth including Gene Technology Act (OGTR), Biosecurity Act and requirements for Approved Arrangements; Drugs and Poisons Act; Work Health and Safety; AA/EEO,
 - ii. New Zealand legislative and regulatory compliance and controls including Health and Safety in Employment, Misuse of Drugs, Biosecurity Act; Hazardous Substances and New Organisms Act, Agricultural Compounds and Veterinary Medicines Act, MAF Standard 154.03.03: Containment Facilities for Vertebrate Laboratory Animals.
 - iii. The role of other bodies in the community in the debate on the ethics and welfare of laboratory animals e.g. RSPCA/RNZSPCA, ANZCCART, ANZLAA, Australian/New Zealand Animal Welfare Strategy, NCCAW/NAWAC, Animals Australia/SAFE, Animal Welfare Chapter ANZCVS, AVAWE;
 - iv. Australian code for the responsible conduct of research 2018, Openness Agreement in animal research and teaching, Understanding Animal Research Oceania, ARRIVE Guidelines, PREPARE Guidelines, OBSERVE Guidelines
- j. Laboratory animal staff management and training, work health & safety and animal house administration:
 - i. Work health and safety considerations, arising from contact, use and care of core and non-core animal species, use of equipment, chemicals and radiation in animal facilities.
 - ii. Formal training options for laboratory animal technicians: systems in place in Australia or New Zealand and the requirement for additional in-house training.
 - iii. Training of researchers in animal ethics, handling and procedures for animals, aseptic surgery, anaesthesia and analgesia, monitoring including detection of pain, record keeping requirements and the reporting of unexpected adverse events.
 - iv. Economic considerations in laboratory animal management including labour and operations, forecasting requirements, budgeting, matching supply with demand, problems of one-off orders and strategies to supply.
- k. Research design including:
 - i. Principles of statistical design, appropriate selection of species, genotype, phenotype, controls, sex, use of appropriate housing, bedding, diet, environment, attention to behavioural requirements, disease status;
 - ii. Non-experimental variables, the confounding effects on research data of a range of factors including the common pathogens, temperature and humidity,

light intensity and duration, noise, diet, anaesthetics, analgesics and antibiotics, pheromones, restraint and handling stress.

3. The candidate will **have the knowledge to:**

Ensure that management of laboratory animal facilities demonstrate best practice, are able to limit experimental variability, can enhance scientific validity, can justify the use of animals for research, minimise animal wastage, preserve animal welfare and maintain a safe workplace for all.

EXAMINATIONS

For information on both the standard and format of the Written and Oral examinations, candidates are referred to the *Membership Candidates Handbook*. The Membership examination has **two separate components:**

1. **Written Examination** (*Component 1*)
Written Paper 1 (two hours): Principles of the Subject – 120 marks
Written Paper 2 (two hours): Applied Aspects of the Subject – 120 marks
2. **Oral Examination** (*Component 2*)
Oral (one hour)

The written examination will comprise two separate two-hour written papers taken on the same day. There will be an additional 15-minute perusal time for each paper, during which no typing is permitted.

In each paper you are provided with questions to answer, with a total of 120 marks per paper. There is no choice of questions. Questions may be long essay type, a series of shorter answer sub-questions, or multiple-choice questions. Marks allocated to each question and to each subsection of questions will be clearly indicated on the written paper.

For Australian and New Zealand candidates, any questions concerning acts, regulations, guidelines, codes of practice and codes of ethical conduct, should be answered as they relate to the country in which they reside and work. Candidates working outside of either Australia or New Zealand may choose, at enrolment, from which country perspective they will answer such questions. However, these candidates are expected to have a basic knowledge of Australian and/or New Zealand acts, regulations, guidelines, codes of practice and codes of ethical conduct.

Written Paper 1:

This paper is designed to test the Candidate's knowledge of the principles of medicine and management of laboratory animals as described in the Learning Outcomes. Answers may cite specific examples where general principles apply but should primarily address the theoretical basis underlying each example.

Written Paper 2:

This paper is designed to (a) test the Candidate's ability to apply the principles of medicine and management of laboratory animals to particular cases/problems or tasks and (b) test the Candidate's familiarity with the current practices and current issues that arise from activities within the discipline of medicine and management of laboratory animals in Australia and New Zealand.

Oral Examination:

This examination requires the candidate to demonstrate achievement of the above-mentioned Learning Outcomes. The duration of this examination is approximately one (1) hour. Images associated with;

- 1) management of laboratory animals, laboratory animal facilities and experimental situations and
- 2) diagnosis and treatment of diseases commonly found in laboratory animals may be used during this examination.

Situations or aspects of laboratory animal management and/or medicine are presented with supporting questions asked verbally either in person or via a digital platform (such as Zoom). The oral examination has a total of 100 marks.

RECOMMENDED READING MATERIAL

The candidate is expected to read widely within the discipline, paying particular attention to areas that are not part of their normal work experiences. *The list is not comprehensive and is not intended as an indicator of the content of the examination.*

The list of recommended textbooks, and regulatory guidelines below is brief. For additional references, journals and other resources contact the College Office for further information.

Recommended Textbooks³

Fox, JG., Anderson, LC., Otto, G., Pritchett-Corning, K., Whary, M., eds., *Laboratory Animal Medicine*, 3rd Edition. American College of Laboratory Animal Medicine, Academic Press, 2015.

Golledge H., Richardson C., , *The UFAW Handbook on the Care and Management of Laboratory and Other Research Animals*, 9th Edition, Wiley- Blackwell, 2024.

Smith, BP., Waudby, HP., Alberthsen, C., & Hampton, JO., eds., *Wildlife research in Australia: Practical and applied methods*. CSIRO Publishing 2022.

Recommended Regulatory Guidelines- Select guideline from relevant country

Australian Code for the Care and Use of Animals for Scientific Purposes. 8th edition Endorsed by NH&MRC, ARC, CSIRO, Universities Australia. Australian Government Publishing Service, 2013.

Good Practice Guide for the use of animals in research, testing and teaching March 2024. Ministry of Agriculture and Forestry / National Animal Ethics Advisory Committee, New Zealand Government

Recommended Journals

Laboratory Animals:

This is an international journal covering laboratory animal science, technology, welfare, and medicine, published by SAGE and the official journal of several organizations like FELASA and ECLAM. Sage Publishing

Journal of the American Association for Laboratory Animal Science (JAALAS):

This journal, published by the American Association for Laboratory Animal Science, includes refereed articles on biology, technology, management, and other topics relevant to laboratory animal science.

ILAR Journal:

This journal, published by Oxford Academic, focuses on research methods in life sciences, including laboratory animal research.

Lab Animal:

This journal, published by Nature, covers in vivo science and technology using model organisms of human health and disease.

³ **Definitions of Textbooks**

Recommended textbook – candidates should own or have ready access to a copy of the book and have a sound knowledge of the contents.

Additional references – candidates should have access to the book and have a basic knowledge of the contents.

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FURTHER INFORMATION

For further information contact: the College Office

Telephone: International +61 (07) 3423 2016

Email: examinations@anzcvcs.org.au

Web: www.anzcvcs.org.au

Postal Address : Building 3, Garden City Office Park, 2404 Logan Road
EIGHT MILE PLAINS QLD 4113 Australia

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