



## AUSTRALIAN AND NEW ZEALAND COLLEGE OF VETERINARY SCIENTISTS

### MEMBERSHIP GUIDELINES

#### *Animal Reproduction*

#### 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 animal reproduction and to be able to give sound advice to colleagues on problems and procedures commonly encountered in this field of general veterinary practice.

#### LEARNING OUTCOMES

1. The candidate will have a **sound<sup>1</sup> knowledge** of the comparative reproduction in domestic mammalian species. Domestic animal species is defined as: horse, cow, sheep, pig, goat, dog, cat and camelid.

Specific outcomes around this **sound knowledge** are that the candidate will be able to:

- 1.1 Describe the normal reproductive anatomy of males and females of the above domestic species, internal and external reproductive organs, gross and histological features of the normal organs.

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<sup>1</sup> **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 major literature

- 1.2 Explain the general embryonic development of the reproductive system in male and female mammals, considering the influence of the main genes that drive sexual differentiation, and the development of gonads, ductal system and external genitalia.
- 1.3 Describe the origin, structure, target tissues and mode of action for the hormones from the hypothalamus, pituitary, gonads and reproductive tissues that act to coordinate and stimulate reproduction in males and females of the listed domestic species.
- 1.4 Explain the events leading to and the consequences of puberty.
- 1.5 Explain the normal female reproductive cycle including behavioural, endocrinological and structural changes during the cycle, detailing individual ovarian cycles, and the annual reproductive events in female domestic animals, such as seasonality, for all species listed above. This should include figures for cycle length and stages, oestrus display, time of ovulation, such that you can describe the most appropriate time of mating, by natural and artificial insemination, to result in pregnancy.
- 1.6 Describe the normal processes of male reproduction, including spermatogenesis and its specific stages; normal mating considering the anatomy and physiology of erection and ejaculation; and the processes of sperm maturation through to fertilisation.
- 1.7 Describe the processes required for successful fertilisation and early embryonic development
- 1.8 Describe the embryonic development and uterine responses from fertilisation through to formation of a functional placenta, including details on the maternal recognition of pregnancy.
- 1.9 List the different types of placentation in domestic species, and describe the implications of these variations.
- 1.10 Describe the normal hormonal events during pregnancy, such as maintenance of pregnancy, and hormone production.
- 1.11 Explain the techniques for diagnosis of pregnancy, and the time during gestation when the different techniques are useful.
- 1.12 Explain the processes and hormonal events leading to initiation and progression of normal parturition in domestic species.
- 1.13 Describe the anatomical position, presentation and posture of a fetus during parturition and/or dystocia.
- 1.14 List the common diseases of the reproductive system of male and female animals and describe the pathophysiology. Include disorders of embryological development (such as cryptorchidism, freemartinism, pseudo/hermaphroditism), infectious diseases of all parts of the reproductive tract, endocrinological disorders, degenerative changes.
- 1.15 List and explain the general causes of embryonic loss and abortion, including specific diseases and abnormalities which result in loss of pregnancy in domestic animals.

- 1.16 Describe the process for gross examination of the fetal membranes, and the pathological processes that may affect the placenta of domestic species
2. In the application of this sound knowledge the candidate will be able to do the following with **sound expertise**<sup>2</sup>:
  - 2.1 Describe the processes for breeding soundness examination of male and female domestic animals, including consideration of the examination of individuals and groups (e.g. herd and flock level), specific reproductive examination of individuals, and collection and processing of appropriate samples for laboratory investigation. Describe your use of pregnancy diagnosis techniques to effectively manage the breeding and monitoring of domestic animals.
  - 2.2 Interpret findings from breeding soundness examination of male and female domestic animals, with reference to the normal parameters and findings in the species listed above, including semen evaluation.
  - 2.3 Examine and interpret findings from a male or female animal with reproductive dysfunction, generating differential diagnoses, explain the processes of differentiation of those possibilities, and suggest management and treatment options.
  - 2.4 Explain the processes for investigating loss of pregnancy and/or abortion with specific reference to the main causes in the above listed domestic species.
  - 2.5 Explain the use of drugs and management to exert control over reproduction in the female domestic species, such as induction of oestrus, synchronisation of oestrus, manipulation and timing of ovulation, contraception, induction of pregnancy termination, and induction of parturition.
  - 2.6 Evaluate reproductive performance of individuals and groups of animals by analyzing records and gathering history of management and reproductive practices.
  - 2.7 Dystocia:
    - 2.7.1 Describe the principles of diagnosing and managing dystocia.
    - 2.7.2 Identify and provide valid management options for common cause of dystocia.
    - 2.7.3 Identify commonly used obstetrical equipment and explain its use.
  - 2.8 Diagnostic imaging:
    - 2.8.1 **Basic knowledge** regarding the principles of ultrasonography
    - 2.8.2 Describe the use of ultrasonography in evaluating the ovaries and uterus, and for monitoring pregnancy viability in the listed species.

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<sup>2</sup> **Skill levels:**

**Sound expertise** — the candidate must be able to perform the technique with a moderate degree of skill, and have moderate experience in its application. A middle level of proficiency.

**Basic expertise** — the candidate must be able to perform the technique competently in uncomplicated circumstances.

- 2.9 Describe the processes of artificial insemination with fresh, chilled and frozen semen (including sexed semen) as appropriate and commonly used for each domestic species. Include in this description information about equipment used for the procedure, technique for insemination, handling of the semen, and timing of insemination.
  - 2.10 Describe how to collect then process semen for fresh or chilled insemination. In general terms explain the processes required for freezing of semen and the use of frozen semen.
3. The candidate will have a **basic**<sup>1</sup> knowledge of the following in the listed domestic species, to achieve these objectives:
- 3.1. Reproductive technology:
    - 3.1.1. Describe the general processes for embryo transfer, including collection of in vivo generated embryos, cryopreservation and transfer to suitably prepared recipients.
    - 3.1.2. Describe the general processes for the collection of oocytes for in vitro fertilisation.
  - 3.2. Describe the development of the mammary gland and the physiology of lactogenesis.
  - 3.3. Describe the techniques for common surgeries involving the reproductive system, including caesarean, ovariectomy/ovariohysterectomy, castration, Caslicks' procedure (vulvoplasty).
  - 3.4. Describe the principles and common techniques for neonatal resuscitation and monitoring.

## EXAMINATIONS

For information on both the standard and the 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  
**Written Paper 2** (two hours): Applied Aspects of the Subject
2. **Oral Examination** (*Component 2*)  
**Oral** (one hour)

The written examination will comprise of two separate two-hour written papers taken on the same day. There will be an additional 15 minutes perusal time for each paper, during which no writing in an answer booklet is permitted. In each paper you are provided with four (4) questions to answer, worth 30 marks each, giving a total of 120 marks per paper. There is no choice of questions. Questions may be long essay type or a series of shorter answer sub-questions. Marks allocated to each question and to each subsection of questions will be clearly indicated on the written paper.

### **Written Paper 1:**

This paper is designed to test the candidate's knowledge of the principles of animal reproduction as described in the Learning Outcomes using essay-style, short answer and note-point formats. 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 animal reproduction to particular cases/problems or tasks and (b) test the candidate's familiarity with the current practices and issues that arise from activities within the discipline of animal reproduction in Australia and New Zealand. This paper assesses knowledge of applied reproduction.

### **Oral Examination:**

This examination requires the candidate to demonstrate achievement of the above mentioned Learning Outcomes. Discussion will be predominantly based on case material. The duration of this examination is approximately one (1) hour. Clinical and clinicopathologic images, laboratory test results, radiographs and basic ultrasound images are likely to be used during this examination. Six (6) cases are presented with supporting questions asked verbally in a face-to-face setting. The oral examination has a total of 60 marks with each case allocated 10 marks.

## RECOMMENDED READING MATERIAL

The candidate is expected to read widely within the discipline, paying particular attention to areas not part of their normal work experiences. This list of books and journals is intended to guide the candidate to some references and other source material. Candidates also should be guided by their mentors. *The list is not comprehensive and is not intended as an indicator of the content of the examination.*

## TEXTBOOKS<sup>3</sup>

Senger, PL 2012, *Pathways to pregnancy and parturition*, 3rd edn, Current Conceptions, Redmond, Or. [www.currentconceptions.com](http://www.currentconceptions.com)

Hopper, R. M. (ed) (2014) Front Matter, in *Bovine Reproduction*, John Wiley & Sons, Inc, Hoboken, NJ, USA. doi: 10.1002/9781118833971.fmatter (also an e book, retrieved from <http://onlinelibrary.wiley.com>.)

Noakes DE, Parkinson TJ & England GCW (eds) 2009, *Veterinary reproduction and obstetrics*, 9th edn, Saunders, Edinburgh. [www.elsevierhealth.com](http://www.elsevierhealth.com)

Youngquist RS & Threlfall WR editor. *Current Therapy in Large Animal Theriogenology*. 2nd revised edn. Saunders, Elsevier, 2007 Also as an e book

Johnston SD, Root Kustritz MV & Olson PNS. *Canine and Feline Theriogenology*. W.B Saunders, Harcourt Health Sciences Company, 2001.

McKinnon AO, Squires EL, Vaala WE & Varner DD, editors. *Equine Reproduction*. 2nd Edn. Wiley-Blackwell, 2011. Also as an e book.

Texts with Several relevant sections

Green, M., Bradley, A., Breen, J., Higgins, H., Hudson, C., Huxley, J., Statham, J., Green, L., Hayton, A.J. (2012) *Dairy Herd Health*. CABI. Oxfordshire, UK. Retrieved from <http://www.ebilib.com>

Evans G, Chisholm Maxwell WM & Salamon S, editors. *Salamon's Artificial Insemination of Sheep and Goats*. Butterworths, 1987.

Brinsko, SP, Blanchard, TL, Varner, DD, Schumacher, J, Love, CC, Hinrich, K & Hartman, D 2011, *Manual of equine reproduction*, 3rd edn, Elsevier/Mosby, St Louis, Mo. Print and [online](#).

Hafez B & Hafez ESE. *Reproduction in Farm Animals*. 7th edn. Wiley, 2000.

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<sup>3</sup> **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.

### **Other texts providing useful sections:**

Smith, B.P. (2014) *Large Animal Internal Medicine* (5<sup>th</sup> ed.) Elsevier Health Sciences.

Parkinson, T.J., Vermunt, J.J., & Malmo, J. (2010) *Diseases of Cattle in Australia*. Vetlearn.

Carleton CL, editor. *Blackwell's Five Minute Veterinary Consult Clinical Companion: Equine Theriogenology*. Wiley-Blackwell, 2011.

Dyce KM, Sack WO & Wensing CJG. *Textbook of Veterinary Anatomy*. 4th edn. Philadelphia, Saunders, 2002.

Banks WJ. *Applied Veterinary Histology*. 3rd edn. Elsevier Health Sciences, 1992.

Australian Veterinary Association Special Interest Group Publications:

Beggs, D.S. (Ed) 2013. *Pregnancy Diagnosis in Cattle* (3<sup>rd</sup> Ed). Australian Association of Cattle Veterinarians, Eight Mile Plains, Qld

Beggs, DS (ed.) 2013 *Veterinary bull breeding soundness evaluation*, Australian Association of Cattle Veterinarians, Eight Mile Plains, Qld

### **JOURNALS<sup>4</sup>**

Candidates should be aware of journal articles, with the following journals recommended for coverage of the topic:

*Theriogenology*

*Reproduction in Domestic Animals*

*Animal Reproduction Science*

*Reproduction* ([www.reproduction-online.org](http://www.reproduction-online.org))

*Clinical Theriogenology* (<http://st.omnibooksonline.com/>)

*Proceedings: Society For Theriogenology (SFT)*. ([www.therio.org](http://www.therio.org))

*Journal of Animal Science*

### **Web Resources:**

[www.ivis.org](http://www.ivis.org)

Access to a wide variety of books, journals and proceedings.

Library of reproduction images: [lorimainsection.blogspot.ca](http://lorimainsection.blogspot.ca)

[www.drostproject.org](http://www.drostproject.org)

<http://www.animalandrology.org/> - Association for Applied Animal Andrology

<http://www.therio.org/> - Society for Theriogenology

International Embryo Transfer Society: <http://www.iets.org/>

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#### <sup>4</sup> **Definitions of Journals**

**Recommended Journal** – candidates should have ready access to either print or electronic versions of the journal and have a sound knowledge of the published articles in the subject area.

**Additional Journal** – candidates should be able to access either printed or electronic versions of the journal and have a basic knowledge of the published articles in the subject area.

**Additional Reading Materials** - These are conference proceedings, other non-refereed publications and other journals that would offer some information in the subject area including differing points of view, but are not required reading.

Society for the Study of Reproduction: <http://www.ssr.org/>  
The InCalf Project: [www.incalf.com.au](http://www.incalf.com.au)  
LSU – theriogenology course VETMED 5361  
[www.lsu.edu](http://www.lsu.edu)  
[www.drostproject.org](http://www.drostproject.org)  
<https://lorimainsection.blogspot.com>

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## **FURTHER INFORMATION**

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