



AUSTRALIAN AND NEW ZEALAND COLLEGE OF VETERINARY SCIENTISTS

FELLOWSHIP GUIDELINES

Veterinary Ophthalmology

ELIGIBILITY

1. The candidate must meet the eligibility prerequisites for Fellowship outlined in the *Fellowship Candidate Handbook*.
2. Membership of the College must be achieved prior to Fellowship examination.
3. Membership must be in Canine Medicine, Feline Medicine, Small Animal Medicine, Small Animal Surgery, Emergency Medicine and Critical Care, Equine Medicine or Equine Surgery.

OBJECTIVES

To demonstrate that the candidate has sufficient knowledge, training, experience, and accomplishment to meet the criteria for registration as a specialist in Veterinary Ophthalmology.

LEARNING OUTCOMES

1. The candidate will have a **detailed**¹ knowledge of:
 - 1.1. the aetiology, pathogenesis, pathophysiology, diagnosis, differential diagnosis and treatment of ophthalmic diseases in all domestic animal and major wildlife species
 - 1.2. the principles of ophthalmic pharmacology and therapeutics
 - 1.3. ocular diagnostic procedures including gonioscopy, tonometry, cytology, ultrasonography, and photography
 - 1.4. ocular techniques including medicine and surgery of the eye and neuro-ophthalmology

¹ Knowledge levels:

Detailed knowledge — candidate must be able to demonstrate an in-depth knowledge of the topic including differing points of view and published literature. The highest level of knowledge.

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.

- 1.5. ocular embryology, ocular and comparative anatomy, ocular biochemistry, ocular physiology, optics and physiology of vision, ocular immunology
 - 1.6. clinical microbiology and clinical pathology as they relate to diseases of the eye
 - 1.7. ocular pathology and ocular histology and histopathology
 - 1.8. the principles of comparative ophthalmic examination.
2. The candidate will have a **sound** knowledge of:
- 2.1. ophthalmology as a comparative science with particular reference to all domestic animals, major wildlife species, birds, fish and reptiles
 - 2.2. eye diseases in exotic species, wildlife, laboratory animals, fish and reptiles
 - 2.3. ocular manifestations of systemic diseases in animals
 - 2.4. aspects of human eye research and clinical ophthalmology that have relevance to ophthalmology of domestic animal species
 - 2.5. ophthalmic oncology.
 - 2.6. ancillary diagnostic procedures computerised tomography (CT scanning) and magnetic resonance imaging (MRI)
3. The candidate will , with a **detailed**² expertise, be able to:
- 3.1. perform all specialist level ophthalmologic diagnostic and surgical procedures
 - 3.2. design pre-operative, operative and post-operative management plans in clinical cases involving the eye and related organ systems
 - 3.3. analyse complex ophthalmologic medical problems and make clinical judgements
 - 3.4. collect, interpret and record clinical data including interpreting a range of diagnostic modalities (gonioscopy, tonometry, cytology, ultrasonography, computerised tomography (CT scanning) and magnetic resonance imaging (MRI) in complex ophthalmologic cases
 - 3.5. communicate effectively with clients, referring veterinarians and peers
 - 3.6. integrate these skills to provide high-quality care for patients with the most efficient use of resources in a manner that is responsive to the owner's needs and wishes
 - 3.7. evaluate and incorporate new scientific information relevant to the practice of Veterinary Ophthalmology
 - 3.8. advanced knowledge in Veterinary Ophthalmology through clinical innovation, research and publication

² Skill levels:

Detailed expertise — the candidate must be able to perform the technique with a high degree of skill, and have extensive experience in its application. The highest level of proficiency.

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

EXAMINATIONS

The Fellowship examination has **four separate, autonomous components**:

- 1. Written Paper 1** (*Component 1*)
Basic Science Principles (three hours)
- 2. Written Paper 2** (*Component 2*)
Clinical Practice and Applications (three hours)
- 3. Practical Examination** (*Component 3*) (two hours)
Ophthalmic Examination and Diagnostic Techniques
Surgical Technique
- 4. Oral Examination** (*Component 4*)
Oral (One to two hours)

The written examination will comprise of two separate three-hour written papers taken on two consecutive days. There will be an additional 20 minutes perusal time for each paper, during which no writing in an answer booklet is permitted. Each examination will consist of Section A and Section B. Section A, will have twenty (20) short answer questions, worth four (4) marks each, providing a total of 80 marks. Candidates should allow approximately 80 minutes to complete this section. Section B consists of ten (10) long answer questions worth 10 marks each. Candidates should allow approximately 100 minutes to complete this section. There is no choice of questions. Marks allocated to each question and to each subsection of questions will be clearly indicated on the written paper.

Written Paper 1: Basic Science and Principles

This paper is designed to test the candidate's knowledge of the principles of Veterinary Ophthalmology as described in the Learning Outcomes listed earlier. Answers may cite specific examples where general principles apply, but should primarily address the theoretical basis underlying each example.

Written Paper 2: Clinical Practice and Applications

This paper is designed to (a) test the candidate's ability to apply the principles of Veterinary Ophthalmology 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 Veterinary Ophthalmology.

Practical Examination

This examination will further test the candidate's achievement of the Learning Outcomes. The duration of the practical examination will be two hours. The practical will consist of twelve (12) questions in total that may contain sub-questions. Each question will be worth ten (10) marks, providing a total of 120 marks. The candidate will be required to provide written answers to questions presented in an audiovisual format (e.g. Power Point). The questions can relate to ophthalmic examination of commonly encountered species, diagnostic procedures, clinical images, slit lamp photos, fundus photos, gonioscopy photos, cytology photos, videos, radiographs, CT and MRI images, surgical procedures and techniques, or surgical materials. In addition, with the use of a light microscope, the candidate will be required to critically examine and discuss the pathological changes in histological sections of ocular tissue.

Oral Examination (duration of minimum one hour, maximum two hours)

The oral examination will consist principally of an audiovisual material session and the candidate will be required to identify, assess and problem solve using the information presented. Questions typically include listing lesions or abnormalities, discussing a differential diagnosis list for the specific disease process, stating the most likely aetiologic diagnosis(es) and pathogenesis, listing morphologic diagnosis, listing appropriate therapy for the condition, or identifying species on the slide. Candidates will be presented with twelve (12) questions asked verbally in a face-to-face setting. The oral examination has a total of 120 marks with each question allocated 10 marks.

TRAINING PROGRAM

In addition to the requirements of the *Fellowship Candidate Handbook*, the Chapter imposes the following:

1. 144 weeks of Direct Supervised Training (DST), at least 25 hours a week, is required during a three-year, 156-week period.
2. The candidate is expected to attend relevant scientific meetings and conferences and attendance at an international veterinary ophthalmology conference is recommended. The credentials document must show documentary evidence that the candidate has prepared and presented at least one oral or poster presentation paper at a national or international ophthalmologic meeting or conference prior to examination.
3. Cases must be of the type seen in ophthalmology referral institutions which are considered to be specialist procedures. The candidate should attempt to gain as broad a range of experience as possible.
4. Case Minima

Case minima by category are only relevant for cases that require surgery. The candidate must be the primary surgeon for 25% of these cases. For example, if 40 eyelid surgeries are required the candidate must be the primary surgeon for at least 10 of these cases and assistant surgeon for no more than 30 of the cases.

Case minima for species are relevant for all cases seen, both medical and surgical. These must be supervised ophthalmic examinations or surgeries recorded individually. Thus, they may include herd examinations as long as individual animals are recorded separately in hospital records. It is expected however, in the species where herd examinations are performed e.g horses and cattle, that clinical cases will also constitute some part of the totals. Case minima refer to the period of the training program and must be met in order for credentials to be successful.

Case Minima for Category	
Orbital/globe surgery (includes enucleation, intrascleral prosthesis, orbitotomy, retinal detachment, intraocular tumour removal, laser surgery, glaucoma surgery)	30
Eyelid surgery (includes entropion, eyelid reconstruction [following trauma or tumour removal or eyelid agenesis], distichiasis, ectopic cilia)	40
Conjunctiva/TE (includes scrolled cartilage of the third eyelid, prolapse of the third eyelid gland, repair/reconstruction [trauma/tumour removal/eyelid agenesis], symblepharon)	20
Cornea/Sclera (includes tumour removal, foreign body removal, corneal repair, conjunctival graft, keratectomy, corneo-conjunctival transposition, keratoleptysis, corneal grafting)	50
Lens (include extracapsular lens removal, intracapsular lens removal, phacoemulsification, foreign body removal)	40

Case Minima for Species	
Canine	300
Feline	100
Equine	30
Other large animal (incl bovine, ovine, caprine)	10
Exotics/birds/Zoo	30

TRAINING IN RELATED DISCIPLINES

Refer to the *Fellowship Candidate Handbook*, Section 2.4.2

Candidates for Fellowship in Veterinary Ophthalmology must spend eight of the 144 weeks supervised time in the Training in Related Disciplines (TRD). Five weeks must be as per the following:

- William Magrane Basic Science Course in Veterinary and Comparative Ophthalmology (40 hours, 1 week)
- small animal medicine (80 hours, 2 weeks)
- small animal or large animal surgery (80 hours, 2 weeks).

The other three weeks of TRD should be composed from any of the following disciplines:

- veterinary ocular histopathology training (40 hours, 1 week)
- veterinary diagnostic imaging (40 hours, 1 week)
- veterinary oncology (40 hours, 1 week)
- veterinary dermatology (40 hours, 1 week)
- veterinary anaesthesia and critical care (40 hours, 1 week)
- veterinary neurology (40 hours, 1 week)
- human ophthalmic clinical training (40 hours, 1 week)
- laboratory animals/ocular toxicology (40 hours, 1 week)
- feline medicine (40 hours, 1 week)
- aquatic, avian, zoo or wildlife medicine (40 hours, 1 week).

TRD must be undertaken with a registered specialist in that discipline or other person approved by the Training and Credentials Committee (TCC) (see Appendix 2).

EXTERNSHIPS

Refer to the *Fellowship Candidate Handbook*, Section 2.4.1

Candidates for Fellowship in Veterinary Ophthalmology must complete four weeks of Externship activity. This may be completed in two, two-week blocks or alternatively, one continuous four week externship. The candidate may be required to complete additional Externship(s), following assessment of the Training Program Document by the TCC.

ACTIVITY LOG SUMMARY

Candidates should refer to the *Fellowship Candidate Handbook*. The Activity Log Summary (ALS) should be kept in the format of Appendix 1. An electronic version of the template is available on the college website. This log records detailed case information which should be recorded on a daily basis throughout training.

The activity log summary should include medical AND surgical cases although only initial presentation of cases should be documented. Candidates are required to state whether a case was managed medically (Md) or surgically (Sx) and the system involved, by placing the correct abbreviation in the appropriate box. Obviously more than one system may be involved in an individual case and all systems should be indicated. Candidates should also indicate the working diagnosis (where possible).

The template for the ALS must be submitted for approval with the Training Program documents and completed throughout the training program. The cumulative ALS must be submitted with the annual supervisor report.

PUBLICATIONS AND PRESENTATION

Refer to the *Fellowship Candidate Handbook*, Section 2.10

RECOMMENDED READING LIST³⁴

The candidate is expected to research the depth and breadth of the knowledge of the discipline. All written examination questions are supported by a reference within the past seven years or from a textbook or journal article on the list of “required” references.

This list is intended to guide the candidate to some core references and source material. The list is not comprehensive and is not intended as an indicator of the content of the examination.

REQUIRED TEXTS

Anatomy, Histology, Embryology

Evans H, editor. *Miller’s anatomy of the dog (ocular and orbital sections)*. 4th edn. WB Saunders, 2012 (chapters on eye, orbit, and cranial nerves).

³ **Definitions of Textbooks:**

Core textbook: candidates are expected to own a copy of the textbook and have a detailed knowledge of the contents.

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.

⁴ **Definitions for Journals:**

Core Journal: candidates are expected to have ready access to either print or electronic versions of the journal and have a detailed knowledge of the published articles in the subject area.

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.

Physiology

Levin L, Nilsson S, Ver Hoeve J, Wu S, Kaufman P & Alm A.. *Adler's physiology of the eye*. 11th edn. Elsevier, 2011.

Pharmacology

Gelatt (ed). *Veterinary Ophthalmology*. 5th end. Wiley-Blackwell 2013 (Chapter 7 by Regnier, Clode, Rankin and Herring)

Pathology, Immunology

Dubielzig R, Ketring K, McLellan G & Albert D. *Veterinary Ocular Pathology: A Comparative Review*. Elsevier 2010.

Gelatt (ed). *Veterinary Ophthalmology*. 5th end. Wiley-Blackwell 2013 (Chapter 8 by Grahn and Peiffer)

Klintworth GK & Garner AG, editors. *Garner and Klintworth's pathobiology of ocular disease*. 3rd edn. Informa HealthCare, 2008.

Maxie M, editor. *Jubb, Kennedy and Palmer's pathology of domestic animals*. 5th edn. Saunders Elsevier, 2007 (eye chapter only).

Neuro-ophthalmology

Gelatt (ed). *Veterinary Ophthalmology*. 5th end. Wiley-Blackwell 2013 (Chapter 34 by Webb and Cullen)

Lorenz MD, Coates J & Kent M. *Handbook of veterinary neurology*. 4th edn. Elsevier, 2011 (chapter 11 Blindness, anisocoria, and abnormal eye movements).

Surgery

Eisner G. *Eye surgery*. Springer-Verlag, 1990.

Gelatt (ed). *Veterinary Ophthalmology*. 5th end. Wiley-Blackwell 2013 (Chapter 11 by Wilkie)

Gelatt KN & Gelatt JP. *Small animal ophthalmic surgery*. Reed Educational/Elsevier, 2010.

Seibel BS. *Phacodynamics: mastering the tools and techniques of phacoemulsification surgery*. 4th edn. SLACK Incorporated, 2005.

Clinical Ophthalmology

Barnett. *Equine Ophthalmology: An Atlas and Text*, Mosby, 2004

Gilger. *Equine Ophthalmology*, 3rd Edition Wiley Blackwell , 2016

Gelatt. *Veterinary Ophthalmology*, 45h Edition Blackwell Publishing 2013

Gelatt K and Plummer C. *Color Atlas of Veterinary Ophthalmology* Lippincott 2017

Ketring K and Glaze M. *Atlas of Feline Ophthalmology. 2nd Edition* Veterinary Learning Systems 2012

Maggs, Miller and Ofri. *Slatter's Fundamentals of Veterinary Ophthalmology*, 6th Edition, Saunders, 2017

Rubin, *Atlas of Veterinary Ophthalmoscopy*, Lea and Febiger, 1975, (though this text is out of print it is still available in most veterinary school libraries and is essential reading).

REQUIRED JOURNALS

The past seven years of journal articles *in print* prior to January 1 of the year of the examination. Date of e-publication is irrelevant.

Essential Veterinary Journals (large majority of questions for the written examination will be derived from these journals. Articles from these veterinary journals should be reviewed for any situation or disease that involves ocular, periocular, or neuro-ophthalmic structures, or systemic conditions relevant to ocular disease):

American Journal of Veterinary Research

Journal of Small Animal Practice

Journal of the American Animal Hospital Association

Journal of the American Veterinary Medical Association

Journal of Veterinary Internal Medicine

Veterinary Clinics of North America — Equine, Exotic Animal, Food Animal and Small Animal Practice

Veterinary Ophthalmology

Other Veterinary and Human Journals (questions derived from pertinent articles from these journals may occur infrequently on the written examination. Review of basic science and human clinical journals should be limited to those articles dealing with situations or diseases directly applicable to veterinary ophthalmology, or one where a common domestic animal is used as an animal model. Reviews of human clinical conditions or basic science articles unrelated to veterinary ophthalmology are not necessary for examination preparation);

Australian Veterinary Journal

Equine Veterinary Journal

New Zealand Veterinary Journal

Veterinary Pathology

Veterinary Record

Veterinary Surgery

Veterinary Ophthalmology 2018

© 2018 The Australian and New Zealand College of Veterinary Scientists ABN 00 50 000894 208

Last updated: October 2018

Experimental Eye Research

Investigative Ophthalmology and Visual Science

Vision Research

Other Resource Material

AAHA Self Study Courses in Ophthalmology Kerry Ketring. The Retina Parts I and II

ACVO Histology Teaching Set

FURTHER READING

Classic journal article list:

The following articles are considered recommended reading for veterinary ophthalmologists and ophthalmology residents. However, specific examination questions will not originate from these articles. Most are still available in many veterinary school libraries. This list has been revised in October 2013 by the American College of Veterinary Ophthalmologists:

Acland, G.M., and Aguirre, G.D.: Retinal degenerations in the dog: IV. Early retinal degeneration (erd) in Norwegian Elkhounds. *Exp. Eye Res.*, 44:491, 1987.

Aguirre, G.D., and Acland, G.M.: Variations in retinal degeneration phenotype inherited at the prcd locus. *Exp. Eye. Res.* 46:663,1988.

Aguirre, G.D., and Laties, A.: Pigment epithelial dystrophy in the dog. *Exp. Eye. Res.*, 23:247, 1976.

Aguirre, G.D., and Rubin, L.F.: Progressive retinal atrophy in the Miniature Poodle: An electrophysiologic study. *JAm. Vet. Med. Assoc.*, 160:191,1972.

Aguirre GD, Rubin LF, Bistner SI. Development of the canine eye. *Am J Vet Res* 1972; 33(12): 2399-2414.

Aguirre, G.D., et al.: Rod-cone dysplasia in Irish Setters: A defect in cyclic GMP metabolism in visual cells. *Science*, 201:1133, 1978.

Aguirre, G.D.: Electroretinography in veterinary ophthalmology. *JAm. Anim. Hosp. Assoc.*, 9:234, 1973.

Aguirre, G.D.: Retinal degeneration in the dog. I. Rod dysplasia. *Exp. Eye Res.*, 26:233, 1977.

Albert, D.M., et al.: Retinal neoplasia and dysplasia. I. Induction by feline leukemia virus. *invest. Ophthalmol. Vis. Sci.*, 16:325, 1977.

Albert, D.M., et al: Canine herpes-induced retinal dysplasia and associated ocular anomalies. *Invest. Ophthalmol. Vis. Sci.*, 15:267, 1976.

Anderson: Morphologic recovery in the reattached retina. *invest. Ophthalmol. Vis. Sci.*,27(2): 168-183, 1986.

- Bahn CF, Glassman RM, MacCallum DK, Lillie JH, Meyer RF, Robinson BJ, Rich NM. Postnatal development of corneal endothelium. *Invest Ophthalmol Vis Sci.* 1986 Jan; 27(1):44- 51.
- Bedford PGC. A gonioscopic study of the iridocorneal angle in the English and American breeds of cocker spaniel and the basset hound ..*J Small Anim Pract* 1977;18:631-642.
- Bellhorn, R.W., and Bellhorn, M.S.: The avian pecten. I.Fluorescein permeability. *Ophthalmol.Res.*, 7:1, 1975.
- Bellhorn, R.W., Aguirre, G.D., and Bellhorn, M.B.: Feline central retinal degeneration. *Invest. Ophthalmol. Vis. Sci.* 13:608, 1974.
- Bellhorn, R.W.: A survey of ocular findings in 16-to-24-week-old beagles. *JAm. Vet. Med. Assoc.*, 162:139, 1973.
- Bellhorn, R.W.; Fluorescein fundus photography in veterinary ophthalmology. *JAm. Anim. Hasp. Assoc.*, 9:227, 1973.
- Bergsma, D.R., and Brown, K.S.: White fur, blue eyes and deafness in the domestic cat, *J Hered.*, 62:171, 1971.
- Berson, E.L., et al.: Retinal degeneration in cats fed casein. II. Supplementation with methionine, cysteine, or taurine. *Invest. Ophthalmol. Vis. Sci.*, 15:52, 1976.
- Bill, A.: Formation and drainage of aqueous humor in cats. *Exp. Eye Res.*, 5:185, 1966.
- Bistner, S.I., Rubin, L.F., and Saunders, L.Z.: The ocular lesions of bovine viral diarrhea-mucosal disease. *Vet. Pathology*, 7:272, 1970.
- Blair, N.P., Dodge, J.T., and Schmidt, G.M.: Rhegmatogenous retinal detachment in Labrador Retrievers. I. Development of retinal tears and detachment. *Arch. Ophthalmol.*, 103:842, 1985.
- Blair, N.P., Dodge, J.T., and Schmidt, G.M.: Rhegmatogenous retinal detachment in Labrador Retrievers. II. Proliferative vitreoretinopathy. *Arch. Ophthalmol.*, 103:848, 1985.
- Bok: Retinal photoreceptor-pigment epithelium interactions. *Invest. Ophthalmol. Vis. Sci.*, 26(11):1659-1694, 1985.
- Buyukmihci, N.C., Aguirre, G., and Marshall, J.: Retinal degenerations in the dog. II. Development of the retina in rod-cone dysplasia. *Exp. Eye Res.*, 30:575, 1980.
- Buyukmihci, N.C.: Photic retinopathy in the dog. *Exp. Eye. Res.*, 33:95, 1981. 27)
- Carmichael, L.E.: The pathogenesis of ocular lesions of infectious canine hepatitis I.Pathology and virological observations. *Pathol. Vet.*, 1:73, 1964.
- Carmichael, L.E.: The pathogenesis of ocular lesions of infectious canine hepatitis II. Experimental ocular hypersensitivity produced by the virus. *Pathol. Vet.*,2:344, 1965.
- Chase, I.: The evolution of retinal vascularization in mammals. *Ophthalmology*, 89:1518-1525, 1982.
- Crispin SM, Barnett KC. Dystrophy, degeneration and infiltration of the canine cornea. *J Small Anim Pract* 1983;24:63-83.
- Curtis R, Barnett KC. Primary lens luxation in the dog. *J Small Anim Pract* 1980;21:657-668.

- Davidson MG et al. Phacoemulsification and Intraocular Lens Implantation: a Study of Surgical Results in 182 Dogs. *Vet Comp Ophthalmol* 1991; 1(4):233-238.
- de Schaepdrijver L, Simoens P, Lauwers H. Morphologic study of the retinal microvasculature in the dog. *Vet Comp Ophthalmology* 1996;6(2):100-109.
- Donovan, A.: The postnatal development of the cat retina. *Exp. Eye Res.*, 5:249, 1966.
- Gelatt, K.N. et al.: Animal models for inherited cataracts: A review. *Curr. Eye Res.*, 3(5):765-778, 1984.
- Gelatt, K.N., Henderson, S.F., and Steffen, G.R.: Fluorescein angiography of the normal and diseased ocular fundi of the laboratory dog. *JAm. Vet. Med. Assoc.*, 169:980, 1976.
- Gelatt KN, Peiffer RL, Gwin RM, Gum GG, Williams LW. Clinical manifestations of inherited glaucoma in the beagle. *Invest Ophthalmol Vis Sci* 1977;16(12):1135-1142.
- Gum, G.C., et al.: Maturation of the retina of the canine neonate as determined by electroretinography and histology. *Am. J Vet. Res.*, 45: 1166, 1984.
- Gwin, R.M., Lerner, I., Warren, K., and Gum, G.: Decrease in canine corneal endothelial cell density and corneal thickness as a function of age. *Invest. Ophthalmol. Vis. Sci.*, 22:267, 1982.
- Hayes, K.C., Nielson, S.W., and Eaton, H.D.: Pathogenesis of the optic nerve lesion in vitamin A deficient calves. *Arch. Ophthalmol.*, 80:777, 1968.
- Johnston, M.C., et al.: Origins of avian ocular and periocular tissues. *Exp. Eye Res.*, 29:27-43. 1979.
- Jubb, K.V., Saunders, L.Z., and Coates, H.V.: The intraocular lesions of canine distemper. *J Comp. Pathol.*, 67:21, 1957.
- Kern TJ. Orbital neoplasia in 23 dogs. *JAVMA* 1985;186(5):489-491.
- Martin, C.L., and Chambreau, T.: Cataract production in experimentally orphaned puppies fed a commercial replacement for bitch's milk. *J. Am. Anim. Hosp. Assoc.*, 18:115, 1982.
- Martin, C.L.: Development of pectinate ligament structure of the dog: Study by scanning electron microscopy. *Am. J. Vet. Res.*, 35:1433, 1974.
- Martin, C.L.: Gonioscopy and anatomical correlations of the drainage angle of the dog. *J. Small Anim. Pract.*, 10:171, 1969.
- Martin, C.L.: Scanning electron microscopic examination of selected canine iridocorneal angle abnormalities. *J Am. Anim. Ho)p. Assoc.*, 11:300, 1975.
- Martin, C.L.: Slit lamp examination of the normal canine anterior ocular segment. Part I: Introduction and technique. *J Small Anim. Pract.*, 10:143, 1969.
- Martin, C.L.: Slit lamp examination of the normal canine anterior ocular segment. Part II: Description *J Small Anim. Pract.*, 10:151,1969.
- Martin, C.L.: Slit lamp examination of the normal canine anterior ocular segment. Part III: Description and summary. *J Small Anim. Pract.* 10:163, 1969.

Martin, C.L.: The normal canine iridocorneal angle as viewed with the scanning electron microscope. *JAm. Anim. Hasp. Assoc.*, 11:180, 1975.

Miller PE, Pickett JP. Comparison of the human and canine Schiötz tonometry conversion tables in clinically normal dogs. *JAVMA* 1992;201(7):1021-1025.

Miller PE, Pickett JP. Comparison of the human and canine Schiötz tonometry conversion tables in clinically normal cats. *JAVMA* 1992;201 (7):1 017-1020.

Miller PE, Murphy CJ. Vision in dogs. *JAVMA* 1995;207(12): 1623-1634.

Millichamp NJ, Dziezyc J.: Cataract phacofragmentation in horses. *Vet Ophthalmol.* 2000; 3(2-3):157-164.

Moore CP, Wilsman NJ, Nordheim EV, Majors LJ, Collier LL. Density and distribution of canine conjunctival goblet cells. *invest Ophthalmol Vis Sci* 1987;28:1925-1932.

Murphy, C.J., and Howland, H.C.: The optics of comparative ophthalmology. *Vision Res.*, 27:599, 1987.

Mutti DO, Zadnik K, Murphy CJ.: Naturally occurring vitreous chamber-based myopia in the Labrador retriever. *Invest Ophthalmol Vis Sci.* 1999 Jun;40(7): 1577-84.

Narfstrom, K.: Progressive retinal atrophy in the Abyssinian cat: Clinical characteristics. *Invest. Ophthalmol. Vis. Sci.*, 26:193, 1985.

Peiffer, R.L., Jr., Gelatt, K.N., and Gum, G.C.: Determination of facility of outflow in the dog comparing in vivo and in vitro tonographic and constant pressure perfusion techniques. *Am. J Vet. Res.*, 37:1473, 1976.

Peiffer RL, Wilcock BP. The Pathogenesis and Significance of Pre-iridal Fibrovascular membrane in Domestic Animals. *Vet Pathol* 1990;27:41-45.

Percy, D.H., Scott, F.W., and Albert, D.M.: Retinal dysplasia due to feline panleukopenia virus infection. *JAm. Vet. Med. Assoc.*, 167:935, 1975.

Priester, W.A.: Congenital ocular defects in cattle, horses, cats, and dogs. *JAm. Vet. Med. Assoc.*, 160:1504-1511, 1972.

Ramsey DT, Hauptman .TG, Petersen-Jones SM.: Corneal thickness, intraocular pressure, and optical corneal diameter in Rocky Mountain Horses with cornea globosa or clinically normal corneas. *Am. J Vet Res.* 1999 Oct; 60 (10):1317-21.

Riis RC, Shetly BE, LoewE, Kern T.T, Smith .TS. Vitamin E deficiency retinopathy in dogs. *Am J Vet Res* 1981;42:74-86.

Roberts, S.R., and Dellaporta, A., and Winter, F.C.: The collie ectasia syndrome. Pathology of the eyes of young and adult dogs. *Am. J Ophthalmol.*, 62:728, 1966.

Roberts, S.R., Dellaporta, A., and Winter, F.C.: The collie ectasia syndrome. Pathologic alterations of the eyes of pups one to fourteen days of age. *Am. J Ophthalmol.*, 61 :1458, 1966.

Roberts, S.R.: The Collie eye anomaly. *f. Am. Vet. Med. Assoc.*, 155:859, 1969.

- Rodriguez-Peralta L.: The blood-aqueous barrier in five species. *Am J Ophthalmol.* 1975, Oct; 80(4):713-25.
- Sandberg, M.A. et al.: Full field electroretinograms in miniature poodles with progressive rod-cone degeneration. *invest. Ophthalmol. Vis. Sci.*, 27:1179, 1986.
- Schmidt, S.Y., Berson, E.L., and Hayes, K.C.: Retinal degeneration in cats fed casein. I. Taurine deficiency. *invest. Ophthalmol. Vis. Sci.*, 15:47, 1976.
- Schmidt, S.Y., et al.: Retinal degeneration in cats fed casein. III. Taurine deficiency and ERG amplitudes. *invest. Ophthalmol. Vis. Sci.*, 16:673, 1977.
- Sharpnack, et al.: Vascular pathways of the anterior segment of the canine eye. *Am. J Vet. Res.*, 45(7):1287-1294, 1984.
- Shatz, C.J., and Levay, S.: Siamese cat: Altered connections of visual cortex. *Science*, 204:328, 1979.
- Shively, J.N., and Epling, G.: Fine structure of the canine eye: cornea. *Am. J. Vet. Res.*, 13:713, 1970.
- Shively, J.N., and Epling, G.P.: Fine structure of the canine eye: Iris. *Am. J. Vet. Res.*, 30:219, 1969.
- Shively, J.N., Epling, G.P., and Jensen, R.: Fine structure of the postnatal development of the canine retina. *Am. J Vet. Res.*, 32:283, 1971.
- Shively, J.N., Epling, G.P., and Jensen, R.: Fine structure of the canine eye: Retina. *Am. J. Vet. Res.*, 31:1339, 1970.
- Stryer, L. The molecules of visual excitation. *Sci. American*, 257(1), 42-50, 1987.
- Tripathi, R.C., and Tripathi, B.J.: The mechanisms of aqueous outflow in primates, lower mammals and birds. A comparative study. *Exp. Eye Res.*, 17:393, 1973.
- 81) Tripathi, R.C.: Ultrastructure of the exit pathway of the aqueous in lower mammals. *Exp. Eye Res.*, 12:311, 1971.
- Van Buskirk, E.M.: The canine eye: The vessels of aqueous drainage. *Invest. Ophthalmol. Vis. Sci.*, 18:223, 1979.
- Whiteley, H.E., et al.: Ocular lesions of bovine malignant catarrhal fever. *Vet. Pathol.*, 22:219, 1985.
- Wilcock, B.P., and Peiffer, R.L.: Morphology and behavior of primary ocular melanomas in 91 dogs. *Vet. Pathol.*, 23:418, 1986.
- Wilcock, B.P., and Peiffer, R.L.: The pathology of lens-induced uveitis in dogs. *Vet. Pathol.*, 24:549, 1987.
- Witzel, D.A., et al.: Congenital stationary night blindness: An animal model. *invest. Ophthalmol. Vis. Sci.*, 17:788-796, 1978.
- Wong, et al.: Vasculature of cat eye. *Arch. Ophthalmol.*, 72:351-358, 1964.

FURTHER INFORMATION

For further information contact the College Office

Telephone: International +61 (07) 3423 2016

Fax: International +61 (07) 3423 2977

Email: examinations@anzcvs.org.au

Web: www.anzcvs.org.au

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

© 2018 The Australian and New Zealand College of Veterinary Scientists ABN 00 50 000894 208

This publication is copyright. Other than for the purposes of and subject to the conditions prescribed under the Copyright Act, no part of it may in any form or by any means (electronic, mechanical, microcopying, photocopying, recording or otherwise) be reproduced, stored in a retrieval system or transmitted without prior written permission. Enquiries should be addressed to the Australian and New Zealand College of Veterinary Scientists

APPENDIX 2

Learning Outcomes for Training in Related Disciplines

Throughout the 144-week training program, the Fellowship candidate in Veterinary Ophthalmology must be exposed to and actively involved in training in several related disciplines. The Fellowship candidate is encouraged to develop a working relationship with one or more specialists in each discipline to facilitate regular discussion and interaction regarding case management. In addition, involvement and participation of a specialist in these disciplines in clinical rounds and seminars attended by the Fellowship candidate is encouraged, as is participation of the Fellowship candidate in relevant rounds and seminars specific to this discipline. The Fellowship candidate must ensure that this time is spent effectively in consolidating knowledge and skills and in covering aspects of this discipline that will not be addressed adequately during the remainder of their program. The Fellowship candidate is expected to be proactive in searching out opportunities, materials and expert tuition and in compiling and organizing relevant material for future reference.

Attendance at the William Magrane Basic Science Course in Veterinary and Comparative Ophthalmology

The William Magrane Basic Science Course will contribute to 40 hours (one week) of the candidate's Training in Related Disciplines requirement. For course dates and registration details see www.acvo.org.

The purpose of course attendance is to assist the candidate in acquiring a detailed knowledge of ocular embryology, ocular and comparative anatomy, ocular biochemistry, ocular physiology, optics and physiology of vision, ocular immunology, ocular pathology and histopathology.

Training in the Related Discipline of Small Animal Medicine

The 80 hours (2 weeks) must be directly supervised by a Fellow of the ACVSc (Small Animal Medicine, Canine Medicine or Feline Medicine), or a Diplomate of the ECVIM or ACVIM, or exceptionally and with prior approval from the credentials committee, another recognised expert. The role of the supervisor is to provide guidance and training in internal medicine as it applies to veterinary ophthalmology patient.

Essential techniques/topics the candidate should gain practical experience with, include but are not limited to the following:

1. exposure to medical conditions with ocular manifestation of disease e.g. diabetes, renal disease, endocrine diseases, infectious diseases and medical conditions that may affect the patient during anaesthesia, surgery or recovery
2. the development of a broad view of veterinary medical patient evaluation and their ocular implications
3. the formulation of treatment plans that encompass the medical needs of veterinary patients
4. the indication for laboratory and other diagnostic tests and interpretation of their results e.g. blood pressure measurement, techniques and pitfalls
5. monitoring the patient's response to treatment and modifying treatment as indicated.

Training in the Related Discipline of Small Animal or Large Animal Surgery

The 80 hours (2 weeks) must be directly supervised by a Fellow of the ACVSc (Small Animal or Large Animal Surgery), or a Diplomate of the ECVIM or ACVIM, or exceptionally- and with prior approval from the credentials committee- another recognised expert. The role of the supervisor is to provide guidance and training in surgery as it applies to veterinary ophthalmology patient.

Essential techniques/topics the candidate should gain practical experience with include but are not limited to the following:

1. participation in small animal or large animal surgical cases involving the head and neck
2. an understanding of the underlying principles of surgery including, but not limited to: asepsis, haemostasis, tissue handling, wound healing, wound infection and antibiotic therapy
3. formulation of a treatment plan that encompasses the surgical and anaesthesia requirements of the patient
4. indications for and use of other diagnostic modalities e.g MRI and CT and the interpretation of these results
5. monitoring the patient's response to treatment and modifying treatment as indicated
6. evaluation of the patient during anaesthesia, surgery and recovery, and
7. biopsy techniques.

Training in the Related Discipline of Veterinary Histopathology

The 40 hours (1 week) of histopathology training must be directly supervised by a Fellow of the ACVSc, Diplomate of the ECVIM or ACVIM or exceptionally - and with prior approval from the credentials committee - another recognised expert. The role of the supervisor is to provide guidance and training in ocular histopathology.

Essential techniques/topics the candidate should gain practical experience with include but are not limited to the following:

1. normal comparative histological anatomy and embryology
2. ocular cytology
3. histopathological patterns of common ocular diseases e.g. conjunctivitis, keratitis, ulcerative keratitis, ocular trauma, uveitis, scleritis, inherited retinal diseases (PRA, CEA, retinal dysplasia), optic neuritis, glaucoma, cataractogenesis and common ocular tumours.

Training in the Related Discipline of Veterinary Diagnostic Imaging

The 40 hours (1 week) of veterinary diagnostic imaging must be directly supervised by a Fellow of the ACVSc (Diagnostic imaging), Diplomate of the ECVDI or ACVR, or exceptionally - and with prior approval from the credentials committee - another recognised expert. The role of the supervisor is to provide guidance and training in diagnostic imaging as it applies to the veterinary ophthalmology patient.

Essential techniques/topics the candidate should gain practical experience with include but are not limited to the following:

1. radiography including digital radiography of the head and neck
8. ocular ultrasonography
9. computed tomography (CT) of head and neck
10. magnetic resonance imaging (MRI) of the head and neck.

Training in the Related Discipline of Veterinary Oncology

The 40 hours (1 week) of veterinary oncology must be directly supervised by a Fellow of the ACVSc, Diplomate of the ECVIM or ACVIM or exceptionally - and with prior approval from the credentials committee - another recognised expert. The role of the supervisor is to provide guidance and training in veterinary oncology as it applies the veterinary ophthalmology patient.

Essential techniques/topics the candidate should gain practical experience with include but are not limited to the following:

1. aetiopathogenesis, epidemiology, pathology, diagnosis, treatment and management measures for common oncological diseases of small animal and large animal patients. This should include exposure to surgical principles generally, and specifically in relation to oncology
2. cytology and histopathology of neoplasia.

Training in the Related Discipline of Veterinary Anaesthesia and Critical Care

The 40 hours (1 week) of veterinary anaesthesia and critical care must be directly supervised by a Fellow of the ACVSc, Diplomate of the ECVIM or ACVIM or exceptionally - and with prior approval from the credentials committee - another recognised expert. **The role of the supervisor is to provide guidance and training in veterinary anaesthesia and critical care.**

Essential techniques/topics the candidate should gain practical experience with include but are not limited to the following:

1. Critical care:
 - 1.1. fluid and electrolyte disorders and their therapy
 - 1.2. nutrition and metabolism in surgical patients
 - 1.3. management of patients with special needs e.g. diabetic patients, animals affected by endocrine disease and small animals with kidney or liver disease
 - 1.4. cardiac failure and resuscitation
 - 1.5. monitoring the of the veterinary surgical patient.

2. Pain management:
 - 2.1. basic physiology of acute and chronic pain
 - 2.2. recognition and monitoring of pain in surgical patients
 - 2.3. prevention and control of pain: pre-emptive analgesia, post-operative analgesic techniques, management of acute (including post-operative) and chronic pain.
3. Anaesthesia:
 - 3.1. pre-operative assessment and patient preparation: pre-anaesthetic evaluation and premedication
 - 3.2. equipment used in general anaesthesia delivery and monitoring
 - 3.3. drugs used for sedation/ tranquilization, analgesia, muscle relaxation and anaesthesia, and their application in small and large animal patients
 - 3.4. neuromuscular blocking agents, their use and patient monitoring
 - 3.5. application of analgesic techniques before, during and after a surgical procedure and knowledge of their influence on the course of anaesthesia
 - 3.6. anaesthesia induction, maintenance and recovery techniques in small and large animal surgery patients
 - 3.7. airway maintenance, oxygenation and ventilation, acute respiratory failure
 - 3.8. special anaesthetic considerations: anaesthesia of the neonate, geriatric patient and veterinary patients with special needs eg. patients affected by endocrine disease, renal disease, cardiac disease and liver disease
 - 3.9. standing sedation and general anaesthesia of horses and foals
 - 3.10. monitoring during anaesthesia, effects on the respiratory and CV systems and support of these systems during anaesthesia
 - 3.11. prevention and management of anaesthetic accidents and crises
 - 3.12. local and regional anaesthesia techniques used in large and small animals.

Training in the Related Discipline of Veterinary Neurology

The 40 hours (1 week) of veterinary neurology must be directly supervised by a Fellow of the ACVSc, Diplomate of the ECVIM or ACVIM or exceptionally - and with prior approval from the credentials committee - another recognised expert. **The role of the supervisor is to provide guidance and training in neurology as it applies to the veterinary ophthalmology patient.**

Essential techniques/topics the candidate should gain practical experience with include but are not limited to the following:

1. neurological assessment of small and large animals with special emphasis on cranial nerve examination of veterinary patients
2. diagnostic investigation and management of neurological diseases in small animal patients
3. particular diseases of interest may include neuro-ophthalmic diseases e.g. Horner's syndrome, neurological keratoconjunctivitis sicca (KCS), causes of anisocoria and nystagmus, central causes of vision loss, neoplastic or inflammatory CNS diseases and disorders of the autonomic nervous system.

Training in the Related Discipline of Human Ophthalmic clinical training

The 40 hours (1 week) of human ophthalmic clinical training must be directly supervised by a Fellow of the Royal Australian and New Zealand College of Ophthalmology (RANZCO) or exceptionally - and with prior approval from the credentials committee - another recognised expert. **The role of the supervisor is to provide guidance and training in human ophthalmology.**

Essential techniques/topics the candidate should gain practical experience with include but are not limited to the following:

1. the aetiology, pathogenesis, pathophysiology, diagnosis, differential diagnosis and treatment of ophthalmic diseases in humans
2. principles of ophthalmic pharmacology and therapeutics
3. ocular diagnostic procedures
4. optics and physiology of vision
5. principles of human ophthalmic surgery
6. aspects of human eye research and clinical ophthalmology that have relevance to ophthalmology of domestic animal species.

Training in the Related Discipline of Laboratory Animals/Ocular toxicology

The 40 hours (1 week) of laboratory animals/ocular toxicology must be directly supervised by a Fellow of the ACVSc, Diplomate of the ECVIM or ACVIM or exceptionally - and with prior approval from the credentials committee - another recognised expert. **The role of the supervisor is to provide guidance and training in ophthalmic laboratory animal/ocular toxicology studies.**

Essential techniques/topics the candidate should gain practical experience with include but are not limited to the following:

1. aspects of eye research and clinical ophthalmology relevant to veterinary clinical ophthalmic practice
2. observations of preclinical laboratory animal toxicology and pharmacology studies in the biotechnology, pharmaceutical and chemical industries
3. performance of ophthalmic examinations on laboratory animals and observe the effects of various toxicology studies on the eye.

Training in the Related Discipline of Aquatic, Avian, Zoo or Wildlife medicine

The 40 hours (1 week) of aquatic, avian, zoo or wildlife medicine must be directly supervised by a Fellow of the ACVSc, Diplomate of the ECVIM or ACVIM or exceptionally - and with prior approval from the credentials committee - another recognised expert. **The role of the supervisor is to provide guidance and training in aquatic, avian, zoo or wildlife medicine.**

Essential techniques/topics the candidate should gain practical experience with include but are not limited to the following:

1. understanding the handling, examination and medicating techniques related to the species being studied
2. gaining an understanding of the most important diseases affecting the species being studied
3. formulating of a differential diagnosis list for relevant conditions
4. formulating of a treatment plan
5. monitoring the response to treatment and modifying treatment as indicated
6. indications for laboratory and other diagnostic tests and interpretation of results.

Training in the Related Discipline of Veterinary Dermatology

The 40 hours (1 week) must be directly supervised by a Fellow of the ACVSc (Dermatology), or a Diplomate of the ECVD or ACVD, or exceptionally- and with prior approval from the credentials committee- another recognised expert. **The role of the supervisor is to provide guidance and training in dermatology as it applies to veterinary ophthalmology patient.**

Essential areas that should be covered include but are not limited to:

1. where possible the candidate should seek exposure to dermatologic conditions with ocular manifestation of disease. For example: parasitic, viral, bacterial, mycotic and allergic blepharitis, immune mediated blepharitis (pemphigus group, ocular-dermatologic syndrome, medical canthal ulcerative syndrome, discoid lupus, systemic lupus), inflammatory pseudotumours (histiocytoses, nodular fasciitis) and idiopathic facial dermatitis of brachycephalic cats
2. encourage a broad view of veterinary dermatology patient evaluation
3. indications for laboratory and other diagnostic tests, their evaluation and interpretation of results e.g. cytology, skin scrapping, microbial culture and sensitivity testing, histological assessment of tissues and skin allergy testing
4. formulation of a treatment plan that encompasses the medical needs of veterinary dermatology patients
5. monitoring the patient's response to treatment and modifying treatment as indicated.