ECVDI Board Certification Examination Programme: Large Animal Track Theoretical Content Outline

This document is a content guide for the examination committee based on the results of the job task analysis performed in 2018. In addition to examination of basic principles of anatomy and physiology, question content is divided in to broad categories according to the proportion of time spent on these tasks by practicing veterinary radiologists. The previous syllabus (2015) has been modified to remove material that is no longer applicable and this updated syllabus is the study guide for residents. It is recommended that the multiple-choice questions used in each section should be approximately 30% recall, 50% application and 20% analysis question types (see appendix 1). Approximately 80% of questions should refer to large animal species and 20% of questions to canine and feline species. Imaging related canine and feline species questions should be at a textbook level.

Imaging anatomy: 20 items (Recall: 7, Application: 10, Analysis: 3)

Questions should assess a knowledge of anatomy necessary for image interpretation in radiology, computed tomography, ultrasonography and magnetic resonance imaging.

Pathophysiology: 20 items (Recall: 7, Application: 10, Analysis: 3)

Questions should be designed to assess an understanding of the basic principles of physiology and pathophysiology as they apply to diagnostic imaging.

Image Management and Communication: 2 items (Recall: 1, Application: 1)

Questions should be designed to assess an understanding of the following hardware and software applications as it pertains to medical imaging:

- Secure management of digital images and information (e.g., DICOM, PACS).
- Technical specifications of various image-viewing software and PACS solutions.
- Voice recognition software for reporting

Radiology/Fluoroscopy: 38 items (Recall: 13, Application: 19, Analysis: 6)

Principles of study acquisition: 12 items

Questions should be designed to assess an understanding of the physics and physics of instrumentation behind study acquisition. The knowledge evaluated should be that needed to understand the following principles and/or perform the following tasks:

- Assessment of image quality
- Techniques for image optimisation
- Radiation safety and monitoring
- Technical specifications of equipment
- Artifacts that may hinder interpretation
- Selection of appropriate acquisition protocols, including positioning, timing, and choice of contrast media
- Evaluation of the risks and benefits of positive/negative contrast agents and methods of administration of contrast agents

Principles behind study interpretation: 26 items

Questions should be designed to assess an understanding of the imaging findings associated with the following studies. Approximately 50% of these questions should be at a textbook level and approximately 50% at a specialist level, found within the recent literature.

Radiology of the following regions:
- thorax
- abdomen
- limbs
- pelvis
- spine
- head
- neck (soft tissues)
- The following studies:
- fluoroscopy
- positional radiographs
- stress radiographs
- outcome of interventional procedure

Contrast studies of the following systems:
- alimentary (e.g. oesophagography, upper gastrointestinal series)
- genitourinary
- neurological (myelography)
- cardiovascular
- musculoskeletal

Ultrasonography: 18 items (Recall: 6, Application: 9, Analysis: 3)

Principles of Study Acquisition: 6 items

Questions should be designed to assess an understanding of the physics and physics of instrumentation behind study acquisition. The knowledge evaluated should be that needed to understand the following principles and/or perform the following tasks:

Techniques to optimise imaging, including:
- positioning, image depth, gain, focal zone adjustment
- harmonic imaging
- Doppler (e.g., PW, CW, colour, power)

- Artifacts that may hinder or aid interpretation.

Principles behind study Interpretation: 12 items

Questions should be designed to assess an understanding of the imaging findings associated with the following studies. Approximately 50% of these questions should be at a textbook level and approximately 50% at a specialist level, found within the recent literature.

Sonographic studies of the following types and regions:

- abdomen
- reproductive
- echocardiography
- thoracic (non-cardiac)
- musculoskeletal
- neck
- ocular
- vascular

Interventional procedures:
- aspirates
- biopsies
- percutaneous pyelograms
- diagnostic -centesis
- therapeutic -centesis
- Evaluation of the outcome of interventional procedure

Computed Tomography (CT): 19 items (Recall: 8, Application: 12, Analysis: 5)

Principles of study acquisition: 7 items

Questions should be designed to assess an understanding of the physics and physics of instrumentation behind study acquisition. The knowledge evaluated should be that needed to understand the following principles and/or perform the following tasks:

Acquisition protocols to optimise imaging
- Single and multi-phase angiographic protocols to optimise imaging
- CT scanner operation
- CT radiation safety and monitoring
- Recognition of artifacts that may hinder interpretation of CT
- Comparison of the technical specifications of CT equipment

Principles behind study interpretation: 12 items

Questions should be designed to assess an understanding of the imaging findings associated with the following studies. Approximately 50% of these questions should be at a textbook level and approximately 50% at a specialist level, found within the recent literature.

Routine studies on the following:
- brain
- head
- vertebral column
- pelvis
- limbs
- abdomen
- thorax
- neck
- guided biopsy/FNA

- radiation and surgical planning
- Directed/specific contrast studies of the following systems:
- alimentary
- genitourinary
- neurological (including myelography)
- musculoskeletal (e.g., arthrography)
- respiratory

Magnetic Resonance Imaging (MRI): 27 items (Recall: 9, Application: 13, Analysis: 5)

Principles behind study acquisition: 9 items

Questions should be designed to assess an understanding of the physics and physics of instrumentation behind study acquisition. The knowledge evaluated should be that needed to understand the following principles and/or perform the following tasks:

Acquisition protocols, including positioning, timing, and choice of contrast media
- Modification of MRI pulse sequences as needed (e.g. to improve image quality, to shorten acquisition time)
- Single and multi-phase angiographic protocols to optimise imaging
- Safety factors for MRI
- Artifacts that may hinder interpretation of MRI
- Technical specifications of MRI equipment
- Use of contrast agents in MRI

Principles behind study interpretation: 18 items

Questions should be designed to assess an understanding of the imaging findings associated with the following studies. Approximately 50% of these questions should be at a textbook level and approximately 50% at a specialist level, found within the recent literature.

MRI studies on the following:
- brain
- head
- spine
- peripheral nerves
- limbs
- neck
- radiation and surgical planning

Directed/specific contrast studies of the following systems/areas:
- neurological
- musculoskeletal (e.g., arthrography)

Nuclear Medicine: 6 items (Recall: 2, Application: 3, Analysis: 1)

Principles behind study acquisition: 2 items

Questions should be designed to assess an understanding of the physics and physics of instrumentation behind study acquisition. The knowledge evaluated should be that needed to understand the following principles and/or perform the following tasks:

- Safe handling of radiopharmaceuticals, patients, and patient waste
- Artifacts that may hinder interpretation

Principles behind study interpretation: 4 items

Questions should be designed to assess an understanding of the imaging findings associated with the following studies. Approximately 50% of these questions should be at a textbook level and

approximately 50% at a specialist level, found within the recent literature.

Studies of the following areas:
- musculoskeletal
- Studies with the following radiopharmaceuticals: 99m-Tc.

Appendix 1:

Difficulty categorisation labels multiple choice questions as **recall**, **application** or **analysis** type questions. Recall questions test basic facts (e.g. The speed of ultrasound in soft tissue). Application questions require additional understanding of concepts (e.g. Larmor frequency of protons in different strength magnetic fields). Analysis questions test the ability to synthesise multiple variables including evaluation of data and problem solving (e.g. assessment of patient signalment and presentation to order differential diagnoses.