Australian and New Zealand College of Veterinary Scientists

Fellowship Examination

June 2017

Equine Medicine

Paper 1

Perusal time: **Twenty (20)** minutes

Time allowed: **Four (4)** hours after perusal

Answer **ALL** <u>**EIGHT (8)**</u> questions

All eight questions are of equal value

Answer **EIGHT** questions each worth 30 marks ....total 240 marks

Paper 1: Equine Medicine

Answer all eight (8) questions

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

   a) Define the following terms and provide an example of **each**:

      i. intrinsic antimicrobial resistance   *(2.5 marks)*

      ii. extrinsic (acquired) antimicrobial resistance.   *(2.5 marks)*

   b) Describe the **four (4)** mechanisms by which microbes are resistant to antimicrobials.   *(8 marks)*

   c) Describe how genes conferring resistance can be acquired or transferred.
   (7 marks)

   d) Discuss in detail risk factors, manifestations and diagnosis of methicillin resistant *Staphylococcus aureus* infections (MRSA) in the horse. Include risk factors for colonisation in horses and humans.   *(10 marks)*

2. Equine asthma refers to a spectrum of chronic inflammatory airway diseases in horses which includes both inflammatory airway disease (IAD) and recurrent airway obstruction (RAO).

   Answer **both** parts of this question

   a) Compare and contrast the clinical presentation and diagnostic confirmation of IAD and RAO.   *(15 marks)*

   b) Discuss in detail the pathophysiology of IAD.   *(15 marks)*

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

  a) Define the following and where applicable, list clinical and clinicopathological criteria used for diagnosis of:

      i. systemic inflammatory response syndrome *(2.5 marks)*

      ii. sepsis *(2.5 marks)*

      iii. severe sepsis *(2.5 marks)*

      iv. septic shock. *(2.5 marks)*

  b) Discuss in detail the management of severe sepsis and septic shock in the neonatal foal. Your answer should include antimicrobial treatment, fluid resuscitation, haemodynamic support and general supportive measures. Include in your answer the rationale and level of evidence for any treatment discussed.
  (20 marks)

4. Answer **all** parts of this question:

  a) List the cranial nerves. *(2.5 marks)*

  b) Define and describe reversible and irreversible peripheral nerve injuries and include in your answer **one (1)** clinical example of **each**. *(12.5 marks)*

  c) List the clinical signs of Horner's syndrome. *(2.5 marks)*

  d) Describe in detail the possible neuroanatomic locations of a lesion causing Horner's syndrome. *(12.5 marks)*

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5.   Dysrhythmias are not uncommon in equine medicine.

Answer **all** parts of this question:

a) Using a diagram, describe the ionic events that occur during the 4 phases of normal depolarisation in the cardiomyocyte.   *(2.5 marks)*

b) Briefly describe: *(7.5 marks)*

   i.   re-entry

   ii. enhanced automaticity

   iii. triggered activity.

   and

provide an example of a dysrhythmia produced by **each** mechanism.

c) Describe the Vaughan Williams classification of anti-arrhythmic drugs, including the mechanism of action for **each** class (and subclass if applicable). Provide **one (1)** example of a drug belonging to **each** class (and subclass if applicable) and state indications and contraindications to use.   *(20 marks)*

6.   For **each** of the congenital diseases listed below (a to e), briefly describe:

- breed or lineage most commonly affected

- common clinical presentation(s)/clinical pathology abnormality(ies)

- pathophysiology

- genetic basis if known.

a) Glycogen branching enzyme deficiency   *(6 marks)*

b) Lavender foal syndrome   *(6 marks)*

c) Fell pony syndrome   *(6 marks)*

d) Ileocolonic aganglionosis   *(6 marks)*

e) Junctional epidermolysis bullosa.   *(6 marks)*

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7.   Answer **all** parts of this question:

    a) Describe the physiology of normal intestinal motility.   *(8 marks)*

    b) List risk factors for development of post-operative ileus in horses.   *(4 marks)*

    c) Describe the pathophysiology of ileus.   *(12 marks)*

    d) List **three (3)** prokinetic drugs used to treat ileus in the horse. For **each,** briefly describe the mode of action and potential adverse effects.   *(6 marks)*

8.   Discuss **in detail** the diseases listed below. Include in your answer the infectious agent, route of infection, pathogenesis and methods of diagnosis to support clinical findings:

    a) Hendra virus.   *(15 marks)*

    b) Equine herpesvirus 1 (EHV1).   *(15 marks)*

End of paper

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Paper 2

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Answer **ALL** <u>**EIGHT (8)**</u> questions

All eight questions are of equal value.

Answer **EIGHT** questions each worth 30 marks ....total 240 marks

Paper 2: Equine Medicine

Answer all eight (8) questions

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

   a) Burns are classified according to the depth of injury. Define the structures
       affected in the following burns classifications:

       i. first degree burns   *(2 marks)*

       ii. second degree burns   *(2 marks)*

       iii. third degree burns   *(2 marks)*

       iv. fourth degree burns.   *(2 marks)*

   b) Summarise the important pathophysiological features of:

       i. early burn injury and burn shock   *(7 marks)*

       ii. smoke inhalation.   *(5 marks)*

   c) Briefly describe treatment for a horse that has extensive second degree burns on
       its flanks and chest.   *(7.5 marks)*

   d) List the factors associated with a poor prognosis in association with burns and
       smoke inhalation.   *(2.5 marks)*

2.   Electrolyte abnormalities are common in severely ill horses and foals. For **each** of the situations listed below, describe:

- pathophysiologic mechanism of the electrolyte abnormality

- clinical manifestations of the electrolyte abnormality

- principles of treatment.

a) Hyponatraemia (sodium 113 mmol/L, ref 140–150 mmol/L) due to severe enteritis in a neonatal foal.   *(10 marks)*

b) Hypocalcaemia (ionised calcium 0.6 mmol/L, ref 1.3–1.4 mmol/L) in a 14-year-old post parturient Thoroughbred broodmare.   *(10 marks)*

c) Hyperkalaemia (potassium 8.0 mmol/L, ref 3.5–5.1 mmol/L) in a three-day-old colt foal diagnosed with ruptured bladder.   *(10 marks)*

3.   A three-year-old Thoroughbred mare is presented to you with inappetance, fever, lymphadenopathy and scant nasal discharge suggestive of *Streptococcus equi* var *equi* (strangles) infection. Three weeks ago the mare was introduced onto an agistment farm of approximately 20 mature horses.

Answer **all** parts of this question:

a) Discuss in detail the diagnostic tests for *Streptococcus equi* var *equi*. Include in your answer indications for use, sensitivity and specificity of the test, advantages and disadvantages of use.   *(12 marks)*

b) Discuss treatment of *Streptococcus equi* infection in the index case.   *(3 marks)*

c) Describe in detail biosecurity recommendations for management of a strangles outbreak on the above farm, including screening and treatment of carriers.
(10 marks)

d) List **ten (10)** potential complications of strangles infection.   *(5 marks)*

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4. A six-month-old, unweaned Thoroughbred filly presents with a history of diarrhoea of 48-hours duration. The clinical examination reveals the foal to have a body condition score of 3/9 and a small plaque of pitting oedema caudal to the xiphoid. Auscultation of the lungs, including with a rebreathing bag, is normal. Haematology and biochemistry are submitted giving the following results:

Haematology

Parameter	Units	Patient value	Reference Range
Red blood cell count	x10^{12}/L	10.65	7.4–12.1
Haemoglobin	g/L	147	127–190
Haematocrit	L/L	0.37	0.35–0.53
MCV	fL	35	39–51
MCH	pg	14	14–18
MCHC	g/L	374	330–378
White blood cell count	x10^9/L	**19.7**	5.0–10.8
Neutrophils	x10^9/L	**13.4**	2.7–7.5
Lymphocytes	x10^9/L	4.3	1.2–4.3
Monocytes	x10^9/L	**1.2**	0–0.7
Eosinophils	x10^9/L	**0.59**	0–0.5
Basophils	x10^9/L	0.2	0–0.3
Fibrinogen	g/L	**5.5**	2–4

Question 4 continued over page

Plasma biochemistry

Parameter	Units	Patient value	Reference Range
Sodium	mmol/L	**131**	134–144
Potassium	mmol/L	3.7	2.7–5.1
Chloride	mmol/L	104	95–105
Calcium	mmol/L	**2.09**	2.7–3.3
Phosphate	mmol/L	**2.04**	0.7–1.8
Magnesium	mmol/L	0.7	0.7–1.0
Bicarbonate	mmol/L	18	26–34
Anion gap	mmol/L	13	4–16
Urea	mmol/L	11	2.5–7.4
Creatinine	µmol/L	109	89–166
Total bilirubin	µmol/L	13	0–74
AST	IU/L	120	150–400
CK	IU/L	**692**	50–400
ALP	IU/L	146	91–250
GGT	IU/L	<5	6–45
Total protein	g/L	**27**	51–69
Albumin	g/L	**12**	29–40
Globulin	g/L	**15**	18–35
SAA	mg/L	<5	0–7

Answer **both** parts of this question:

a) Interpret the laboratory data.   *(10 marks)*

b) The foal is suspected to have *Lawsonia intracellularis* enteropathy.

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

    i. Describe further diagnostics tests that would either support or confirm diagnosis of *Lawsonia intracellularis* infection in this foal.
(2.5 marks)

    ii. Briefly describe an appropriate treatment plan for the affected foal.
(7.5 marks)

    iii. The filly comes from a small Thoroughbred stud and has been kept in a paddock with five other mares and foal pairs. Discuss management of *L. intracellularis* from a herd health perspective.   *(10 marks)*

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5.	A horse is presented to your clinic with a history of shifting lameness, firm boney prominences around the frontonasal sutures and pain when eating. The horse is suspected of having nutritional secondary hyperparathyroidism (NSH).

Answer **all** parts of this question:

a)	Describe in detail the pathophysiology of NSH. You may use diagrams.
(12.5 marks)

b)	Describe in detail the diagnosis of NSH.	*(12.5 marks)*

c)	Describe the management of the case described above.	*(5 marks)*

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

a)	List the clinical signs associated with hepatic insufficiency and failure in the horse, and for each clinical sign, describe in detail the pathophysiologic basis of these manifestations.	*(20 marks)*

b)	Discuss in detail the management of hepatic encephalopathy.	*(10 marks)*

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7. A 450 kg two-year-old Thoroughbred colt was presented with acute onset severe watery diarrhoea. Pertinent findings from a thorough physical examination revealed moderate signs of depression, significant tachycardia between 80–100 bpm, pyrexia of 39.1°C, and dark injected mucous membranes with CRT of around 3 seconds. Small petechial haemorrhages were also noted on the lower lip mucous membranes. The colt's peripheral pulses were mildly weak and his lower limbs felt cool to the touch. His digital pulses were not elevated at the time of presentation. The colt urinated a small volume at presentation and the urine was thick with a dark red tinge.

Stall side laboratory analysis performed on a venous sample at presentation yielded the abnormal results as below:

Plasma biochemistry

Parameter	Units	Patient value	Reference Range
pH		**7.1**	7.35–7.45
Sodium	mmol/L	130	130–151
Potassium	mmol/L	**5.5**	2.6–5.2
Chloride	mmol/L	**110**	97–109
Bicarbonate	mmol/L	**14.7**	20–30
Base excess	mmol/L	**-13**	0–2
Lactate	mmol/L	**6**	<2
PCV	%	**61**	30–45
Total protein	g/L	60	58–70
PCV urine after spinning down	%	**3**	0
Serum creatinine	μmol/L	**398**	90–140
Urine specific gravity		**1.060**	1.020–1.050

Haematology

Parameter	Units	Patient value	Reference Range
White blood cell count	x10⁹/L	**22.2**	6.7–16.8
Neutrophils	x10⁹/L	**16.0**	3.9–10.3
Band neutrophils	x10⁹/L	**0.5**	0–0.24
Fibrinogen	g/L	**5.5**	2–4

Answer **both** parts of this question:

a) Interpret the laboratory results and state your clinical diagnosis for this gelding.
(10 marks)

b) Describe in detail an appropriate immediate resuscitation and treatment plan for the first 24 hours for this colt. Your answer should include products/therapeutic agent required, method of delivery, and assessment of response to treatment. Justify each product or therapeutic agent chosen and include dose rates where appropriate. *(20 marks)*

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

a) You are planning to perform a randomised clinical trial (RCT) evaluating a novel treatment for endotoxaemia in colic patients.

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

    i. Describe **four (4)** potential sources of bias that must be considered in the design, conduct and reporting of RCTs and for **each** of these briefly describe **one (1)** method by which **each** type of bias can be avoided. *(12 marks)*

    ii. Define type I and type II error and describe how **each** of these might be avoided when performing clinical research. *(6 marks)*

b) Evaluation of a novel serum biomarker for the rapid diagnosis of sepsis is performed in a sample of 100 patients with fever. The biomarker is compared with positive culture results as the gold standard and yields the following information:

	Sepsis present (culture positive)	Sepsis absent (culture negative)
Biomarker positive	30 **A**	10 **B**
Biomarker negative	30 **C**	30 **D**
N	60	40

    i. With reference to the results presented above, define the following:

        a.   sensitivity

        b.   specificity

        c.   positive predictive value

        d.   negative predictive value.

Include in your answer the formulae you would use to calculate **each** parameter, using the groups **A**, **B**, **C** and **D** in the table above.
(12 marks)

End of paper