



# Australian and New Zealand College of Veterinary Scientists

## **Fellowship Examination**

June 2014

## **Equine Medicine**

## **Paper 1**

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

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

Answer **ALL EIGHT (8)** questions

All eight questions are of equal value

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

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# Paper 1: Equine Medicine

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Answer all eight (8) questions

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

- a) Discuss the physiology and pathophysiology of lactate production in the adult horse. In your answer define type A and type B hyperlactataemia and list **three (3)** causes for **each** type. (25 marks)
- b) Explain factors that influence accurate lactate measurement. (5 marks)

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

- a) Discuss primary and secondary processes that may be involved in acute traumatic brain injury in the adult horse. (15 marks)
- b) Discuss the principles of management of traumatic brain injuries. Include in your answer, recommended pharmacologic treatments and their mechanism of action. (15 marks)

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

- a) Describe the clinical applications for intravenous administration of lignocaine in horses **and** the proposed mechanisms of action supporting these applications. (25 marks)
- b) List the clinical manifestations of lignocaine toxicity in the horse. (5 marks)

**Continued over page**

4. Discuss, in detail, the pathogenesis of corneal ulceration in the horse. In your answer include the endogenous and exogenous factors that may be involved in the pathogenesis (15 marks) **and** how these factors may be detected during an ophthalmic examination (15 marks).
5. Answer **all** parts of this question:
- a) Compare and contrast the mechanisms involved in the development of primary and secondary atrial fibrillation in the adult horse. (15 marks)
  - b) Describe the clinical findings associated with atrial fibrillation in adult horses. (5 marks)
  - c) Discuss in detail how the mechanisms involved in the development of atrial fibrillation influence the management of adult horses with this condition. (10 marks)
6. Answer **all** parts of this question:
- a) Define the sensitivity, specificity, negative predictive value and positive predictive value of a diagnostic test. (8 marks)
  - b) Explain the influence of disease prevalence on sensitivity, specificity, negative predictive value and positive predictive value of a diagnostic test. (6 marks)
  - c) In epidemiological terms, discuss the recommendation for multiple faecal cultures when testing for *Salmonella* species. (8 marks)
  - d) Describe the basis for using **two (2)** different diagnostic tests in series with differing sensitivity and specificity to maximise the accuracy of diagnosis of failure of passive transfer in foals. (8 marks)

**Continued over page**

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

- a) Compare and contrast the life cycles and pathological features of *Strongylus vulgaris* and cyathostomin species and relate these to the clinical manifestations of **each**. (15 marks)
- b) Discuss factors influencing development of anthelmintic resistance in nematode populations in an equine herd. Describe the methods available for detection of anthelmintic resistance including factors which may influence test results. (15 marks)

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

- a) Outline the roles of the hypothalamic-pituitary-adrenal axis (HPA-axis) in the perinatal period in healthy foals. (5 marks)
- b) Discuss how the HPA-axis function may change with:
  - i. accelerated foetal maturation,
  - ii. prematurity/dysmaturity **and**
  - iii. sepsis in foals.

Include in your answer laboratory indices of dysfunction and association with prognosis. (20 marks)

- c) Outline the consequences of HPA-dysfunction in neonatal disease. Include in your answer potential influence on morbidity and mortality. (5 marks)

**End of paper**



# Australian and New Zealand College of Veterinary Scientists

## Fellowship Examination

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## Equine Medicine

## Paper 2

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

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

Answer **ALL EIGHT (8)** questions

All eight questions are of equal value.

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

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# Paper 2: Equine Medicine

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## Answer all eight (8) questions

1. A four-day-old Thoroughbred filly presented for progressive abdominal distension, straining to urinate, dribbling urine, dull mentation and inappetence. Gestation and parturition were unremarkable. The foal is quiet and ambulating and weighs 55 kg. Physical examination reveals a heart rate of 110 beats per minute, respiratory rate of 44 breaths per minute, increased respiratory effort and nostril flare. Cardiac auscultation reveals a regular rhythm and no murmurs; lung auscultation is harsh with reduced lung field size bilaterally. Rectal temperature is 37.9°C; mucous membranes are light pink with a capillary refill time of two seconds. Jugular refill is slow, peripheral pulses are weak and distal extremities are cool to touch. The abdomen is tautly distended and the foal postures to urinate frequently, but urine is not produced. The filly is mildly dehydrated. Abdominal ultrasonography reveals a large volume of hypoechoic free fluid in the peritoneal cavity. Uroperitoneum secondary to a bladder defect is suspected. An arterial blood gas analysis and minimum data base electrolytes and creatinine were performed using an iSTAT point of care monitor, results below:

### Arterial blood gas, electrolytes and clinical chemistry

Parameter	Units	Patient value	Reference range
pH		7.32	7.37–7.41
PaO <sub>2</sub>	mmHg	52	80–91
PaCO <sub>2</sub>	mmHg	30	44.5–48.9
HCO <sub>3</sub> <sup>-</sup>	mmol/L	22	24–31
Lactate	mmol/L	4.8	<2
Sodium	mmol/L	118	132–145
Potassium	mmol/L	6.2	3.8–5.0
Chloride	mmol/L	80	97–109
Glucose	mmol/L	8.2	7.0–11.0
Creatinine	µmol/L	356	81–164

Question 1 continued over page

Answer **all** parts of question one:

- a) Briefly discuss the likely cause and underlying mechanisms of respiratory distress in this foal. (5 marks)
  
- b) Briefly discuss the likely cause(s) and underlying mechanisms of tachycardia in this foal. (5 marks)
  
- c) Interpret the laboratory abnormalities and formulate an appropriate initial medical treatment plan for this filly. Justify **each** therapeutic agent chosen. Assume you have access to a well-equipped hospital. (20 marks)

**Question 2 begins on next page**

2. An adult (~450 kg) horse presents with acute typhlocolitis and diarrhoea. The horse has physical examination findings supportive of hypovolaemia and dehydration. A venous blood gas, packed cell volume (PCV) and total plasma protein (TP) are performed at the time of presentation, results below:

**Venous blood gas analysis**

Parameter	Units	Patient value	Reference range
pH		7.33	7.35–7.45
PvCO <sub>2</sub>	mmHg	40	38–49
HCO <sub>3</sub> <sup>-</sup>	mmol/L	18	24–28
Lactate	mmol/L	3.3	<2
Sodium	mmol/L	124	132–145
Potassium	mmol/L	2.8	2.4–4.7
Chloride	mmol/L	94	99–109
Total protein	g/L	55	54–79
Haematocrit	L/L	0.48	0.30–0.50

Answer **all** parts of question two:

- According to Stewart's approach to clinical acid-base physiology, list the **three (3)** independent factors that determine plasma pH and HCO<sub>3</sub><sup>-</sup>. (3 marks)
- List the **four (4)** principle strong ions used to calculate the simplified strong ion difference (SID). Calculate and interpret the SID for this case using the available laboratory parameters (include the equation and calculations used to determine your answer). (8 marks)
- Name the value that can be used to predict the presence of hyperlactataemia in the absence of a specific lactate measurement. Calculate this value using the available laboratory data (include the equation and calculations used to determine your answer) and interpret this calculated value in comparison to the lactate concentration provided in the table. (7 marks)
- Name the **two (2)** most common acid-base abnormalities in horses with acute severe colitis and diarrhoea. (2 marks)
- Discuss the most appropriate approach to fluid therapy, including the route, type, and rate of administration for management of the acid-base abnormalities in this case. (10 marks)

**Question 3 begins on the next page**



3. A 12-year-old Warmblood mare presents with a history of stiffness after completion of a cross-country event five days previously. The mare was treated for the first three days post-exercise with phenylbutazone at 4.4 mg/kg IV q24 hours. A favourable response to treatment was noted in relation to the stiffness; however, during the last 48 hours the mare became dull and inappetent. Pertinent findings on clinical examination include profoundly altered demeanour, heart rate of 48 beats per minute, respiratory rate 26 breaths per minute and signs of moderate dehydration. Analyses of a venous blood sample and a urine sample, collected at presentation, yield the following results:

### Haematology

Parameter	Units	Patient value	Reference Range
Red blood cell count	$\times 10^{12}/L$	9.22	6.8–12.9
Haemoglobin	g/L	153	110–190
Haematocrit	L/L	0.48	0.32–0.53
MCV	fL	44.5	37.0–58.5
MCH	Pg	16.6	12.3–19.7
MCHC	g/L	373	310–386
White blood cell count	$\times 10^9/L$	12.9	5.4–14.3
Neutrophils	$\times 10^9/L$	12.2	2.7–6.8
Lymphocytes	$\times 10^9/L$	0.6	1.5–5.5
Monocytes	$\times 10^9/L$	0.1	0.0–0.8
Eosinophils	$\times 10^9/L$	0.0	0.0–0.93
Basophils	$\times 10^9/L$	0.0	0.0–0.78
Platelets	$\times 10^9/L$	138	100–350
Fibrinogen	g/L	5.3	2–4

**Question 3 continued over page**

**Biochemistry**

<b>Parameter</b>	<b>Units</b>	<b>Patient value</b>	<b>Reference Range</b>
Sodium	mmol/L	132	130–151
Potassium	mmol/L	4.8	2.6–5.2
Chloride	mmol/L	87.4	94–113
Calcium	mmol/L	3.59	2.78–3.30
Phosphate	mmol/L	0.74	0.9–2.1
Magnesium	mmol/L	1.2	0.6–1.1
Triglyceride	mmol/L	1.48	<0.80
Glucose	mmol/L	4.2	3.5–7.1
Urea	mmol/L	28.1	3.3–5.8
Creatinine	μmol/L	787	62–140
Total bilirubin	μmol/L	24	<25
Alkaline phosphatase	U/L	272	<280
Aspartate aminotransferase	U/L	24286	<240
Gamma glutamyltransferase	U/L	18	<40
Creatine kinase	U/L	9653	<150
Total protein	g/L	81	60–78
Albumin	g/L	37	26–35
Globulin	g/L	44	30–55

**Question 3 continued over page**

## Urinalysis

Parameter	Result
pH	7.0
Specific gravity	1.009
Protein	0.30 g/L (30 mg/dL)
Creatinine	2776 $\mu$ mol/L (31.4 mg/dL)
Protein: creatinine ratio	0.97
Blood	positive
Leukocytes	negative
Epithelial cells	positive
Organisms	negative
Hyaline casts	negative
Granular casts	occasional
Epithelial casts	negative
Crystals	negative
Sodium	50.0 mmol/L
Chloride	27.1 mmol/L
Potassium	49.4 mmol/L
Calcium	5.5 mmol/L

Answer **all** parts of question three:

- Interpret the biochemical and haematological abnormalities in relation to the history and clinical exam findings. (10 marks)
- Interpret the results of the urinalysis, including determination of the fractional excretion values for electrolytes, and categorise the azotaemia present in this case. Provide workings of any calculations used. (10 marks)
- Discuss the pathophysiological processes contributing to the renal disease in this case. (10 marks)

**Question 4 and 5 over page**

4. Two horses in a local racing stable are suspected to have contracted equine Herpesvirus-1 (EHV-1) myeloencephalopathy; one is recumbent and unable to rise due to grade four hind limb ataxia, and the other is dull, inappetant, pyrexia and hyperaesthetic. The stable has 30 horses in training, nine horses out-of training and six broodmares, which are all in the third trimester of pregnancy.

Answer **both** parts of question four:

- a) Discuss how to obtain a definitive diagnosis of EHV-1 infection in the index case(s). *(10 marks)*
- b) Discuss, in detail, the recommendations necessary to control any potential outbreak of EHV-1. *(20 marks)*
5. Compare and contrast Hendra **and** Equine Influenza viral infections in the adult horse. Include in your answer the method of disease transmission, pathogenesis, clinical signs, diagnosis, management and control of **each** disease. *(30 marks)*

**Question 6 begins on the next page**

6. A five-year-old Warmblood cross mare presents with a history of insidious weight loss of two months duration. A clinical exam is unremarkable, with the exception of a body condition score of 3/9. The mare is reported to have a good appetite, no dysphagia and is being fed appropriately. Haematology and biochemistry are submitted giving the following results:

**Haematology**

Parameter	Units	Patient value	Reference Range
Red blood cell count	$\times 10^{12}/L$	6.2	6.8–12.9
Haemoglobin	g/L	107	110–190
Haematocrit	L/L	0.28	0.32–0.53
MCV	fL	45.2	37.0–58.5
MCH	Pg	17.2	12.3–19.7
MCHC	g/L	382	310–386
White blood cell count	$\times 10^9/L$	6.9	5.4–14.3
Neutrophils	$\times 10^9/L$	3.5	2.7–6.8
Lymphocytes	$\times 10^9/L$	2.4	1.5–5.5
Monocytes	$\times 10^9/L$	0.4	0.0–0.8
Eosinophils	$\times 10^9/L$	0.7	0.0–0.93
Basophils	$\times 10^9/L$	0.1	0.0–0.78
Platelets	$\times 10^9/L$	189	100–350
Fibrinogen	g/L	3	2–4

**Question 6 continued over page**

## Biochemistry

Parameter	Units	Patient value	Reference Range
Sodium	mmol/L	135	130–151
Potassium	mmol/L	4.0	2.6–5.2
Chloride	mmol/L	101	94–113
Calcium	mmol/L	2.9	2.78–3.30
Phosphate	mmol/L	0.9	0.9–2.1
Magnesium	mmol/L	0.9	0.6–1.1
Bicarbonate	mmol/L	23	26–34
Anion gap	mmol/L	13.6	6–16
Glucose	mmol/L	3.8	3.5–7.1
Urea	mmol/L	5.8	3.3–5.8
Creatinine	µmol/L	110	62–140
Total bilirubin	µmol/L	21	<25
Alkaline phosphatase	U/L	218	<280
Aspartate aminotransferase	U/L	246	<240
Gamma glutamyltransferase	U/L	10	<40
Creatine kinase	U/L	261	<150
Total protein	g/L	49	60–78
Albumin	g/L	27	26–35
Globulin	g/L	22	30–55

Answer **all** parts of question six:

- Interpret the history, clinical examination findings and laboratory data. (10 marks)
- List the differential aetiological diagnoses for this case. (5 marks)
- Develop a diagnostic plan for this case, justify the selection and sequence of **each** diagnostic test. (15 marks)

**Question 7 and 8 over page**

7. Answer **all** parts of this question:
- a) Briefly discuss the diagnosis **and** pharmacological management of:
    - i. piroplasmosis (5 marks)
    - ii. cryptococcal pneumonia (5 marks)
    - iii. *Clostridium difficile* enterocolitis. (5 marks)
  - b) Define the genetic basis **and** briefly describe the clinical presentation of:
    - i. hereditary equine regional dermal asthenia (5 marks)
    - ii. junctional epidermolysis bullosa (5 marks)
    - iii. ileocolonic aganglionosis. (5 marks)
8. Discuss in detail, a systematic approach to the investigation of an adult horse with a history of episodic collapse. Include a thorough list of differential diagnoses and diagnostic tests indicated. Assume you are working in a well-equipped equine referral centre. (30 marks)

**End of paper**