



Australian and New Zealand College of Veterinary Scientists

Fellowship Examination

June 2013

Equine Medicine

Paper 1

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

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

Answer **ALL EIGHT (8)** questions

Answer **EIGHT** questions each worth 30 markstotal 240 marks

Equine Medicine Paper 1

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Paper 1: Equine Medicine

Answer all eight (8) questions

1. Laminitis is a serious complication of gastrointestinal disease in adult horses. Discuss, in detail, the pathogenesis of laminitis associated with acute colitis. (30 marks)

2. Answer **both** parts of this question:
 - a) Discuss, in detail, the pathophysiology of exercise-induced pulmonary haemorrhage (EIPH) in the horse. (15 marks)

 - b) Discuss pharmacological treatments used for EIPH including their proposed mechanism of action in relation to the pathophysiology of EIPH. (15 marks)

3. For **each** of the following drugs:
 - list the indication(s) (both on and off-label)
 - list the potential adverse effects
 - describe in detail the mechanism of action
 - describe the administration (including dose)
 - i. furosemide (8 marks)
 - ii. cyproheptadine (8 marks)
 - iii. dobutamine (7 marks)
 - iv. xylazine. (7 marks)

4. With respect to abdominal effusion in horses:
 - a) Describe pathophysiological mechanisms responsible for abdominal effusion, giving a clinical example for **each** mechanism. (15 marks)

 - b) List the laboratory tests used to discriminate between different types of effusion and discuss interpretation of their results. (15 marks)

Continued over page

5. Electrolyte disturbances are common medical and post-surgical problems in horses:
- a) Discuss, in detail, hypocalcaemia (serum ionised calcium 1.1 mmol/L) in a Thoroughbred broodmare after laparotomy to correct a torsion of the large colon. Include in your answer the pathogenesis, possible clinical manifestations and management of the electrolyte disorder. [Normal serum ionized calcium 1.45–1.73 mmol/L] (15 marks)
 - b) Discuss, in detail, hyponatraemia (serum sodium 109 mmol/L with serum chloride 80 mmol/L), in a three-day-old filly. Include in your answer the pathogenesis, possible clinical manifestations and management of the electrolyte disorder. [Normal serum sodium 129–140 mmol/L; normal serum chloride 90–103 mmol/L] (15 marks)
6. Ataxia is the loss of coordination of muscular movement due to altered proprioception:
- a) Describe neural pathways and tissues that, when damaged, result in ataxia and outline their location in the nervous system. (10 marks)
 - b) For **each** of the following diseases, describe how signalment, history, physical and neurological examination and other ancillary tests can be used to determine both the neuroanatomical location of the lesion and the aetiology.
 - i. cervical stenotic myelopathy (5 marks)
 - ii. temporohyoid osteoarthropathy (5 marks)
 - iii. equine herpesvirus type 1 myeloencephalopathy (5 marks)
 - iv. bacterial vertebral osteomyelitis. (5 marks)

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7. Polyuria / polydipsia (PU/PD) in horses may have several causes:
- a) List causes of polyuria / polydipsia (PU/PD) in horses. (5 marks)
 - b) For **each** of these causes, briefly describe the pathophysiology of the PU/PD. (10 marks)
 - c) Formulate an appropriate diagnostic plan for the investigation of an adult horse with PU/PD assuming access to a well-equipped clinic and laboratory. Include in your answer diagnostic features of: signalment, history, physical examination and ancillary tests that would discriminate among the possible causes of PU/PD. (15 marks)
8. With respect to monensin toxicity in horses:
- a) List the clinical manifestations. (6 marks)
 - b) Describe in detail the pathogenesis. (8 marks)
 - c) Describe in detail ancillary tests useful for diagnosis. (10 marks)
 - d) Outline your management of a riding horse that accidentally gained unrestricted access to calf starter pellets containing monensin 50 ppm (mg per kg) DM. (6 marks)

End of paper



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Paper 2

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

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

Answer **ALL EIGHT (8)** questions

Answer **EIGHT** questions each worth 30 markstotal 240 marks

Paper 2: Equine Medicine

Answer all eight (8) questions

1. An 11-year-old Welsh mountain pony gelding, used for pony club riding, is presented to you for assessment of a shuffling forelimb gait. The pony has been in the owner's possession for the last five years, and is housed at pasture. The pony receives supplementary feeding of pellets and lucerne hay when pasture cover is poor. The owner is concerned that while the gelding is eating normally, it is lethargic. On physical examination, the pony has a body condition score of 3/5, and non-painful mild diffuse swelling of the prepuce and supraorbital fossae. Heart rate is 48 beats per minute, rectal temperature is 37.7°C and respiratory rate is 16 breaths per minute. Digital pulses are mildly increased in the forelimbs. Haematological and serum biochemical examinations are performed with the following results:

Haematology:

Parameter	Patient value	Reference range
Haematocrit L/L	0.34	0.32–0.52
Total leukocytes x 10 ⁹ /L	11.1	5.5–12.5
Neutrophils x 10 ⁹ /L	9.6	2.5–8.0
Lymphocytes x10 ⁹ /L	1.2	1.5–5.5
Monocytes x10 ⁹ /L	0.3	0.0–0.9
Platelets x10 ¹² /L	202	100–500

Question 1 table continued over page

Biochemistry:

Parameter	Patient value	Reference range
Total serum protein g/L	65	58–76
Albumin g/L	30	28–38
Globulin g/L	35	26–40
Creatinine $\mu\text{mol/L}$	110	81–164
Urea mmol/L	3.9	3.6–8.9
Creatine kinase U/L	347	50–400
Aspartate transaminase U/L	477	150–400
Glutamate dehydrogenase U/L	25	0–20
Glucose mmol/L	6.9	3.5–6.5
Total bilirubin $\mu\text{mol/L}$	76	4–100
Gamma-glutamyl transpeptidase U/L	71	20–38
Triglycerides mmol/L	0.94	0.20–1.00
Sodium mmol/L	137	132–152
Potassium mmol/L	4.4	2.8–5.0
Chloride mmol/L	95	92–102
Total calcium mmol/L	2.81	2.50–3.60
Phosphate mmol/L	1.01	0.80–1.70

Lateromedial radiographs were taken of the pony's forefeet.



Question 1 continued over page

Answer **both** parts of this question:

- a) Interpret the historical, physical examination and diagnostic testing information for this pony and provide major differential diagnoses. (10 marks)
- b) Discuss in detail and justify the diagnostic procedures that could be performed for assessment of this horse, in relation to the major differential diagnoses. Include the diagnostic accuracy for each test in terms of: sensitivity, specificity and predictive values and possible endogenous and exogenous influences on test results. (20 marks)

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

- a) Describe how you would set up a blood donor program at an equine referral hospital. Outline how you would select potential donors and briefly describe collection and storage procedures for blood. (12 marks)
- b) Describe, in detail, how you would determine the need for transfusion in a neonatal foal with neonatal isoerythrolysis. (12 marks)
- c) Describe potential complications resulting from transfusion of blood. (6 marks)

3. Effective intravenous fluid therapy requires comprehensive assessment of each patient's particular needs:

- a) Describe, in detail, the use of physical examination findings to determine the nature of a horse's fluid deficits, in terms of which fluid compartment(s) is/are affected predominantly. (5 marks)
- b) Describe, in detail, the use and interpretation of laboratory testing in the horse to determine the nature of fluid deficits. (5 marks)
- c) The net rate of movement of fluid (J) from the vascular space to the interstitium is described by the Starling-Landis equation:

$$J = LpA(Pc - Pi) - \sigma (\pi p - \pi i)$$

List the components of this equation and outline how these constituents influence fluid movement. (5 marks)

- d) Discuss, in detail, strategies for resuscitative fluid therapy in a horse with acute severe blood loss. (15 marks)

Continued over page

4. Tetanus and botulism are important clostridial diseases that affect horses:
- Compare and contrast the pathophysiology of tetanus and botulism and describe how they relate to the resulting clinical neurological abnormalities. (15 marks)
 - Describe, in detail, the management of a four-year-old Clydesdale mare with tetanus, including consideration of factors which influence prognosis. (12 marks)
 - Outline appropriate protocols for the prevention of tetanus in adult horses and in foals. (3 marks)
5. You are presented with a nine-year-old warmblood gelding with profuse watery diarrhoea. Heart rate is 88 beats per minute. Respiratory rate is 20 breaths per minute. Rectal temperature is 37.4°C. Mucous membranes are dark pink with a capillary refill time of four seconds. The gelding is dull and inappetent. Venous blood is collected for haematological, blood biochemical and blood gas examinations (provided below) at the time of placement of a catheter in the left jugular vein.

Haematology:

Parameter	Patient value	Reference range
Haematocrit L/L	0.69	0.32–0.52
Total leukocytes x 10 ⁹ /L *	3.2	5.5–12.5
Neutrophils x 10 ⁹ /L	1.5	2.5–8.0
Band neut. x 10 ⁹ /L	0.6	0.0–0.2
Lymphocytes x10 ⁹ /L	1.0	1.5–5.5
Monocytes x10 ⁹ /L	0.1	0.0–0.9
Platelets x10 ¹² /L	130	100–500

*White blood cell morphology: moderate basophilic stippling, Dohle bodies and cytoplasmic basophilia

Question 5 tables continued over page

Biochemistry:

Parameter	Patient value	Reference range
Total serum protein g/L	62	58–76
Albumin g/L	32	28–38
Globulin g/L	30	26–40
Fibrinogen g/L	3.0	2–4
Serum amyloid A mg/L	483	<7
Creatinine $\mu\text{mol/L}$	247	81–164
Urea mmol/L	14.4	3.6–8.9
Creatine kinase U/L	819	50–400
Aspartate transaminase U/L	241	150–400
Glutamate dehydrogenase U/L	33	0–20
Glucose mmol/L	10.7	3.5–6.5
Total bilirubin $\mu\text{mol/L}$	30	4–100
Gamma-glutamyl transpeptidase U/L	23	20–38
Triglycerides mmol/L	0.32	0.20–1.00
Sodium mmol/L	126	132–152
Potassium mmol/L	3.0	2.8–5.0
Chloride mmol/L	89	92–102
Total calcium mmol/L	2.16	2.50–3.60
Phosphate mmol/L	1.68	0.80–1.70
Bicarbonate mmol/L	18	23–32
Anion gap mmol/L	22	8–16
Lactate mmol/L	4.6	<1.5

Venous blood gas:

Parameter	Patient value	Reference range
pH	7.31	7.34–7.42
pCO ₂	39	38–48
pO ₂	45	35–48

Question 5 continued over page

Answer **all** parts of this question:

- a) Interpret the provided laboratory data. (5 marks)
- b) Describe, in detail, an appropriate diagnostic and treatment plan for this gelding assuming the owner has expressed financial commitment to the treatment and you have access to a well-equipped hospital and laboratory. (15 marks)
- c) After 48 hours of treatment the horse is reluctant to move its neck and some heat and pain associated with the left jugular vein is detected by palpation. Identify the likely cause of these findings and describe the assessment and treatment of this clinical problem. (5 marks)
- d) Outline known risk factors for the development of acute colitis in adult horses. (5 marks)

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6. A five-year-old Thoroughbred broodmare is presented to you six weeks post-partum. Stud staff have noticed the mare urinate red urine during the previous 24 hours. The mare appears otherwise clinically normal apart from dark pink mucous membranes. Haematology and blood biochemical results are presented below. Serum electrolyte values were within normal limits.

Haematology:

Parameter	Value	Normal Range (adult)
Haematocrit L/L	0.48	0.32–0.46
Total leucocytes x 10 ⁹ /L	18.1	6.0–12.0
Neutrophils x 10 ⁹ /L	9.11	2.47–5.0
Lymphocytes x 10 ⁹ /L	5.62	1.63–4.40
Monocytes x 10 ⁹ /L	1.03	0–0.72
Eosinophils x 10 ⁹ /L	2.17	0–0.96

Biochemistry:

Parameter	Value	Normal Range (adult)
Total plasma protein g/L	72	55–75
Albumin	28	29–37
Fibrinogen	2	2–4
Urea µmol/L	0.8	3.9–10.2
Creatinine µmol/L	98	56–149
Glucose mmol/L	6.44	4.5–6.3
Creatine kinase U/L	3,791	0–380
Aspartate transaminase U/L	2797	0–340
Total Bilirubin µmol/L	433	0–36
Alkaline phosphatase U/L	807	< 200
Gamma glutamyl transferase U/L	212	< 22
Lactate dehydrogenase U/L	10,699	250–2070
Bile acids µmol/L	142	< 20
Lactate mmol/L	3.38	0.5–1.8

Answer **all** parts of this question:

- Interpret the laboratory data and list your differential diagnoses with their possible causes. (10 marks)
- Briefly explain why the mare could have red urine. (5 marks)
- Describe, in detail, how you would manage this case. Include in your answer aspects of further diagnosis and treatment. (15 marks)

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7. A Thoroughbred colt is presented at 72 hours-of-age. Parturition was uneventful and the foal appeared normal during the first 48 hours of life with adequate passive transfer of immunity. The foal had become lethargic with inadequate suckling during the previous 24 hours. The foal was in good body condition, but appeared mildly dehydrated. Physical examination showed oral petechiation and ecchymoses on the inside of the pinnae and sclera. Relevant haematological and blood biochemical results are presented below.

Haematology:

Parameter	Value	Normal Range (foal)
Haematocrit L/L	0.48	0.28–0.46
Total leucocytes x 10 ⁹ /L	3.0	5.2–12.0
Band neutrophils x 10 ⁹ /L	0.6	0–0.4
Neutrophils x 10 ⁹ /L	1.5	3.21–10.6
Lymphocytes x 10 ⁹ /L	0.5	0.67–3.12
Monocytes x 10 ⁹ /L	0.3	0–0.58
Eosinophils x 10 ⁹ /L	0.1	0–0.20
Platelets x 10 ⁹ /L	10	100–400

Biochemistry:

Parameter	Value	Normal Range (foal)
Total plasma protein g/L	58	55–75
Albumin	32	29–37
Fibrinogen	2	2–4
Urea mmol/L	5.0	3.9–10.2
Creatinine µmol/L	72	56–149
Glucose mmol/L	4.5	4.5–6.3
Lactate mmol/L	3.5	0.5–1.8
Serum electrolytes	Within normal limits	

Answer **all** parts of this question:

- Interpret the clinical and laboratory data presented. (5 marks)
- List the **two (2)** most likely differential diagnoses and briefly describe their pathogenesis. (5 marks)
- Discuss, in detail, additional tests that would assist diagnosis. (10 marks)
- Describe, in detail, your treatment of this case. (10 marks)

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8. Ingestion of the following plants can cause poisoning of horses. For **each**, briefly describe the clinical syndrome that results from ingestion of the plant by horses, the toxic principle (if known) and mechanism of action:
- a) Patterson's curse (*Echium plantagineum*) (8 marks)
 - b) perennial ryegrass (*Lolium perenne*) (8 marks)
 - c) tall fescue (*Festuca arundinaceae*) (7 marks)
 - d) flatweed (*Hypochaeris radicata*). (7 marks)

End of paper