Questions

1. Was is the anatomic structure pictured below:



Answer: vertical vaginal septum in nulliparous southern white rhino

1. What had the biggest effect on circulating vitamin D levels in *Diceros bicornis michaeli*?
2. Oral supplementation of vitamin D
3. Serum calcium levels
4. Feeding alfalfa over timothy hay
5. Natural sunlight exposure
6. Feeding commercial pellets

Answer: D

Which of the following is true regarding a single dose of oral flunixin meglumine (1mg/kg) in white rhinoceros (*Ceratotherium simum*)?

1. GI ulcerations were documented
2. It was metabolized more quickly than expected based on data in horses
3. Some animals had diarrhea
4. Azotemia was documented
5. No clinical side effects were documented

Answer: e

A white rhinoceros (*Ceratotherium simum*) gives birth to a stillborn fetus and histology of the placenta reveals necrosuppurative placentitis. The dam lacks any clinicals signs. What is a possible bacterial cause of this presentation?

Answer: Coxiella burnetti (Brucella would also potentially be a reasonable answer)

**Assessment Of Capillary Zone Electrophoresis And Serum Amyloid A Quantitation In Clinically Normal And Abnormal Southern White Rhinoceros (*Ceratotherium Simum Simum*) And Southern Black Rhinoceros (*Diceros Bicornis Minor*)**

Meyer A, Emerson JA, Rainwater KL, Haefele H, Arheart KL, Hammond E, Hooijberg E, Cray C.

*JZWM* 2022;53(2):319-330

Provide two benefits of capillary zone electrophoresis over traditional agarose gel electrophoresis?

Answer: higher resolution (more defined peaks with additional subfractions), lower variation

**Development of a quantitative immunoassay for serum haptoglobin as a putative disease marker in the southern white rhinoceros (ceratotherium simum simum).**

Petersen HH, Stenbak R, Blaabjerg C, Krogh AK, Bertelsen MF, Buss P, Heegaard PM.

Journal of Zoo and Wildlife Medicine. 2022;53(1):141-52.

Which of the following changes would be expected for a white rhinoceros with acute systemic inflammation? (AGE - agarose gel electrophoresis, CZE - capillary zone electrophoresis, SAA - serum amyloid A)

1. Elevated alpha 1 on AGE
2. Elevated alpha 2 on CZE
3. Elevated haptoglobin
4. Elevated albumin
5. Elevated iron

Answer: C - elevated haptoglobin (SAA also proven positive APP – Meyer 2022)

Distractors: alpha1 subfraction not appreciated on AGE, no change in CZE, albumin and iron are negative APPs.

**Key Points:**

* SAA is a highly conserved major APP in many species
	+ A multispecies sandwich ELISA for SAA has been validated for white & black rhinos
	+ In the black rhinos, SAA levels were higher in animals under managed care in conjunction with elevated cytokines and insulin-to-glucose ratio
	+ SAA in white rhinos was significantly higher from a group with tissue injury
	+ In the present study, SAA levels were found to increase in varied clinical presentations in white and black rhinos
* In the present study, SAA > 20 mg/L were consistent with systemic inflammation
	+ Results < 7 mg/L should be interpreted as normal or possible mild inflammation
	+ SAA values tended to correlate with clinical signs
	+ SAA returned to normal when clinical signs resolved
* CZE provides increased fraction resolution vs. AGE
	+ AGE is a semiautomated method; proteins separated by size/charge on a gel substrate
		- Fractions are then resolved using protein-binding dyes
	+ CZE is an automated method; protein fractionation is done via high voltage in a capillary
		- The fractions are quantitated by a UV detector
* No significant differences were observed in the electrophoresis measurands between clinically normal and abnormal white and black rhinoceros
	+ This contrasts with injured white rhinos using AGE where changes including decreased albumin, α2, and β1 globulins were observed in acute and chronic inflammation
	+ These changes were associated with wounds and tissue trauma, which were often extensive and untreated

**TLDR:** SAA is a clinically useful major positive APP in white and black rhinos

**Practice Question:** Briefly describe the difference between capillary zone electrophoresis and agarose gel electrophoresis.

Answer:

* AGE is a semiautomated method; proteins separated by size/charge on a gel substrate
	+ Fractions are then resolved using protein-binding dyes
* CZE is an automated method; protein fractionation is done via high voltage in a capillary
	+ The fractions are quantitated by a UV detector

**Related Articles:**

* Toonder M, Perrault JR, Cray C. Comparison of agarose gel and capillary zone electrophoresis methods using plasma from green turtles (*Chelonia mydas*). J Zoo Wildl Med. 2020;51(1):123–130
* Hooijberg EH, Cray C, Steenkamp G, Buss P, Goddard A, Miller M. Assessment of the acute phase response in healthy and injured southern white rhinoceros (*Ceratotherium simum simum*). Front Vet Sci. 2019; 6:475
* Hooijberg EH, Miller M, Cray C, Buss P, Steenkamp G, Goddard A. Serum protein electrophoresis in healthy and injured southern white rhinoceros (*Ceratotherium simum simum*). PLoS One. 2018;13(7): e0200347

**Practice Question:** Which of the following was found when black rhinoceroses (*Diceros bicornis*) immobilized with etorphine were suspended from their feet?

1. Higher PaCO2
2. Higher PaO2
3. Lower SaO2
4. Lower pH
5. Lower PAO2

Answer: B

**Practice Question:** Which of the following biochemistry parameters decreased after transporting black rhinoceros (*Diceros bicornis*) 600 km by vehicle?

1. Conjugated dienes
2. Triglycerides
3. Lactate
4. Albumin
5. Iron

Answer: E

**Article:** Gimmel, Angela, et al. "Milk composition of i=Indian rhinoceros (Rhinoceros unicornis) and changes over lactation." Journal of Zoo and Wildlife Medicine 49.3 (2018): 704-714.

Which nutrient increases over the lactation period in the Indian rhino but decreases in the African elephant?

1. Crude protein
2. Lactose
3. Calcium
4. Fatty acids
5. Gross energy

Answer: B

**Article:** Chaney, Sarah B., et al. "The use of intradermal skin testing and hyposensitization injections to control seasonal dermatitis in greater one-horned rhinoceroses (rhinoceros unicornis)." Journal of Zoo and Wildlife Medicine 53.2 (2022): 485-491.

Which therapy has been the most successful for reducing severity of seasonal dermatitis in greater one-horned rhino?

1. Prophylactic diphenhydramine
2. Fly repellent spray
3. Intermittent prednisolone
4. Topical zinc oxide
5. Hyposensitization injections

Answer: E