Latin Comparative Pathology Group

The Latin Subdivision of the CL Davis Foundation

Diagnostic Exercise

Case #: 16 Month: December Year: 2011

Answer Sheet

Diagnosis:

1. Gross image description: Cross section of hind limb showing the striated skeletal muscle from a bovine. On the left there is a well-demarcated large area of white discoloration which imparts a fish flesh aspect to the affected muscle (Fig. 1).

2. Morphologic Diagnosis: Skeletal muscle, multifocal segmental degeneration and necrosis, acute, monophasic (Degenerative Myopathy)

3. Four differentials:

a. *Senna occidentalis* poisoning (the etiology in this case)

b. Selenium/Vitamin E deficiency

c. Poisoning by ionophore antibiotics

d. Ischemic [compressive] muscle necrosis in recumbent heavy cattle

Complete Clinical History: Nine calves were weaned on May 10, 2009 and held in a 10 hectares paddock contiguous with an area from where soybean had been harvested and which was at the time heavily infested by coffee senna (*Senna occidentalis*). Due to a breach in the fence, on May 15 the calves broke into the senna infested area and consumed the weed. One calf was reported sick on the morning of May 18 and died in the afternoon of the same day. Two additional calves were found sick in the morning of the next day (May 19). One of them died at 4 pm of the same day and was necropsied and the other calf (the one of this report) died in the morning of the next day (May 20) and was necropsied 2 hours after death. Clinical signs included muscle weakness, apathy, anorexia, tachypnea, instability of the pelvic limbs with dragging of the toes, tremors of muscles in the thighs, neck, and head, ear dropping, lateral recumbency, and death. In the ruminal content pods of coffee senna were observed. No disease was observed in the remaining six calves which were all females. However, the owner reported that the 3 affected calves (all males) were socially dominant over the rest of the lot and predominate in disputes for forage. The ingestion of coffee senna by these calves occurred after the first frost that, in this part of the country, usually takes place in May.

Figure 1

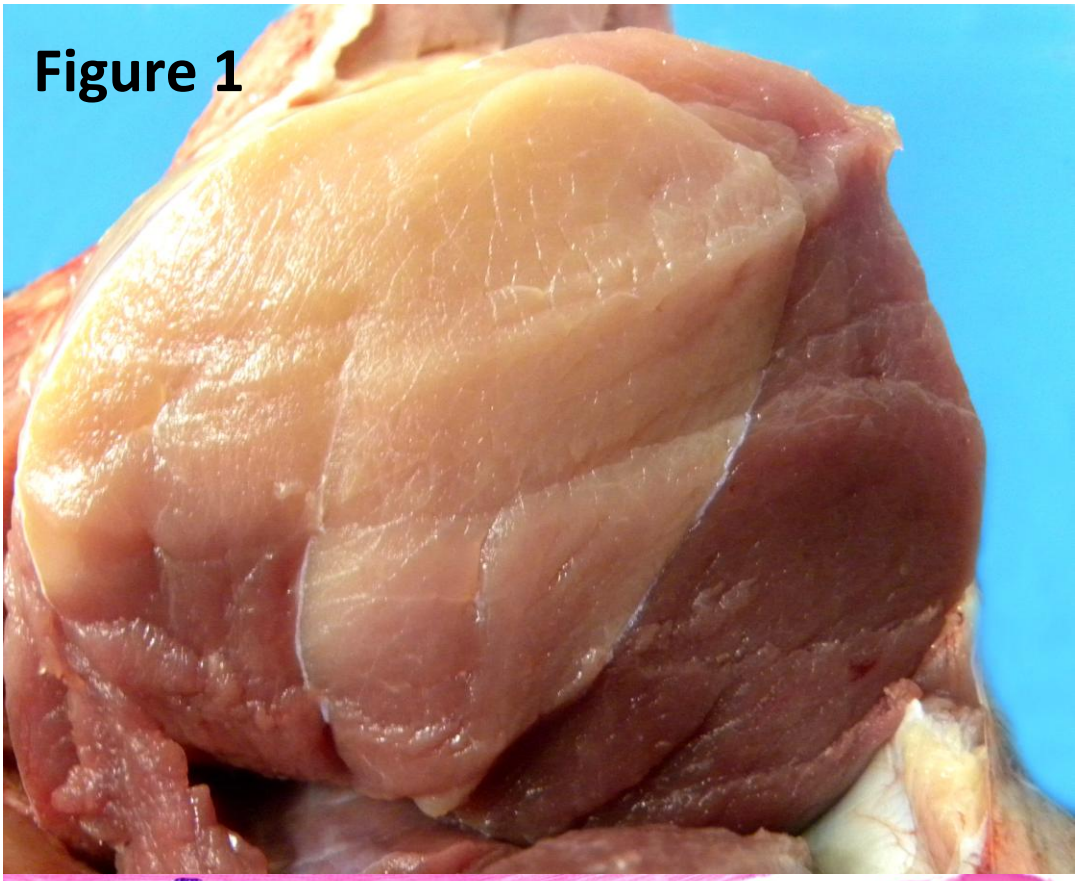
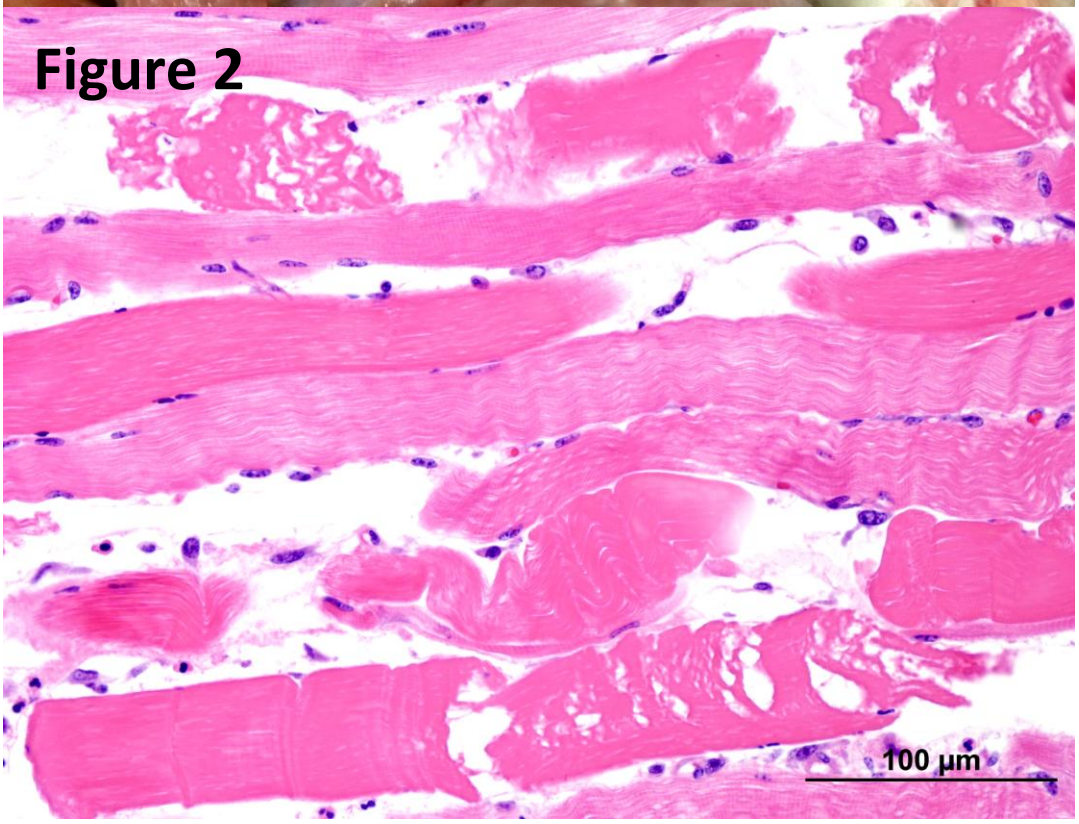


Figure 2



Gross findings (Figure 1): The calf was in good body condition. The conjunctiva was moderately congested. Subcutaneous gelatinous edema was observed in both thighs. Admixed with abomasal contents there were numerous specimens of *Haemonchus contortus* and in the lumen of spiral colon there was bloody content admixed with numerous specimens of *Trichuris discolor*. A dark-brown discoloration was observed in both kidneys. The urinary bladder was distended by large amount of dark-brown discolored urine. In the heavy muscles of the thigh, dorsum and shoulders there were large pale areas which contrasted with the red-brown color of the normal muscles (Fig. 1). The muscle pallor seems to fade out in the interface with the normal muscle. Adjacent to the affected muscle there were areas of marked edema.

Typical microscopic findings (Figure 2): Affected muscles show acute monophasic multifocal degeneration. Some myofibers have a coagulated, hyaline and swollen sarcoplasm; some adjacent myofibers have fragmented segments of sarcoplasm (flocular necrosis). Signs of myofiber invasion by either inflammatory cells and/or centrally migrating satellite cells are minimal, indicating that the lesions are acute and caused by one blow of the aggressor agent. Cysts of *Sarcocystis* sp. are observed in some myofibers in absence of an inflammatory response. Fig. 2 shows acute segmental degenerative myopathy of striated muscle from the cow affected by *Senna occidentalis* poisoning. Some fibers are swollen and hyalinized and others consist of floccular hyaline contractile muscle elements enclosed by preserved sarcolemma heaths.(morphological dx.: Skeletal muscle, multifocal segmental degeneration and necrosis, acute, monophasic)

Discussion: The ingestion of *Senna occidentals*, formerly *Cassia occidentalis* (Fabaceae, Leguminosae), causes intoxication characterized by myopathy and degenerative cardiomyopathy. This plant is found in pastures, fertile soils, or as a weed in soybean, corn and sorghum fields. The intoxication can affect different animal species including birds, cattle, pigs, and horses. Outbreaks at pasture are associated with heavy presence of the plant in the field and generally affects cattle over one year old, typically with outbreaks affecting 10-60% of the herd, or more rarely affecting individual sporadic cases. Fatality rate is high, approaching 100%. The toxicity associated with cattle being fed crop leftovers are due to contamination of harvested crop grains like sorghum, soybean and corn by coffee senna beans during mechanical harvest; this is particularly important when there is contamination of sorghum by seeds of *S. occidentalis* because seeds of both plant species are similar in size and density. This form of poisoning occurs during the whole year whenever contaminated crop leftovers are fed to cattle.

In cattle the disease begins with diarrhea 2-4 days after initial ingestion, and occasionally is accompanied by colic and tenesmus. Within a few days there are signs of muscular disturbances, such as muscular weakness, incoordination in the pelvic limbs, reluctance to move, sternal or lateral recumbence, and death. Some animals show depression, anorexia and weight loss, but it is common for cattle to remain alert while in sternal recumbence eating and drinking normally until a few hours before death. Myoglobin from necrotic myofiber passes through the kidney and imparts brown or reddish-brown color to the urine. In the final stages there is ruminal atony and a steep rise in serum activity of creatine phosphokinase (CK) and aspartate aminotransferase (AST). Cattle may become ill up to two

weeks after their last exposure to the plant. The clinical signs in swine are similar to those described for cattle but diarrhea is uncommon. Differential diagnosis should include diseases that cause necrosis of the myocardium and/or of the skeletal muscles, such as deficiency of Se/vitamin E, poisoning by ionophore antibiotics, and downer cow syndrome (ischemic [compression] muscle necrosis). In cattle poisoned by ionophore antibiotics marked degenerative lesions are usually also observed in the myocardium and those which are absent or rather mild in coffee senna poisoning. Se/vitamin E deficiency (white muscle disease) affects younger stock, the lesions are white opaque due to mineralization of necrotic fibers, and myocardial lesions are part of the pathological findings. Ischemic muscular necrosis due to recumbence are focal well demarcated white opaque lesions, while in senna poisoning the lesions affect several muscles and the white discoloration somewhat fade in with the normal muscle color. Typical clinical signs, epidemiological aspects and pathological findings in cattle associated with the presence of the plant in the pasture with signs of being consumed b cattle should help in confirming the diagnosis.

References and Recommended literature:

Carmo P.M.S., Irigoyen L.F., Lucena R.B., Fighera R.A., Kommers G. & Barros C.S.L. 2011. Spontaneous coffee senna poisoning in cattle: Report on 16 outbreaks. Pesq. Vet. Bras. 31: 139-146.

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Henson I.B. & Dollahite J.W. 1966. Toxic myodegeneration in calves produced by experimental Cassia occidentalis intoxication. Am. J. Vet. Res. 27:947-949.

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