Diagnostic Exercise

From The Davis-Thompson Foundation*

Case #:**226** Month: **December**; Year: **2023**
Answer Sheet

Title: Haemorrhagic diathesis caused by acute *Pteridium arachnoideum* poisoning in a heifer

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Clinical History: A two-year-old Angus heifer showed respiratory distress, nasal bleeding, and fever. These clinical signs started 24 hours before death. This heifer was part of a herd with 70 animals kept in native pastures, in an extensive grazing system. The animal was medicated but died during the night.

Gross Findings: The heifer was in good body condition. The ocular conjunctiva was markedly pale tan. Multifocal hematomas were observed in the subcutaneous tissue. Extending throughout approximately 50% of the omasal serosal surface were multiple ill-defined confluent areas of marked hemorrhage. Multiple ill-defined variably-sized hemorrhages were observed in the mucosa of the omasum, abomasum and multiples organs, such as the intestines. Marked hemorrhage and edema were present in the retropharyngeal region. In the endocardium and epicardium, there were multifocal areas of severe hemorrhage.

Gross and Histological Images:

Figure 1. Marked hemorrhage in the serosa of the omasum.

Figure 2. Omasum. Multifocal areas of marked hemorrhage in the mucosa.

Figure 3. Marked hemorrhage and edema in the subcutaneous tissue and skeletal muscles of the retropharyngeal region

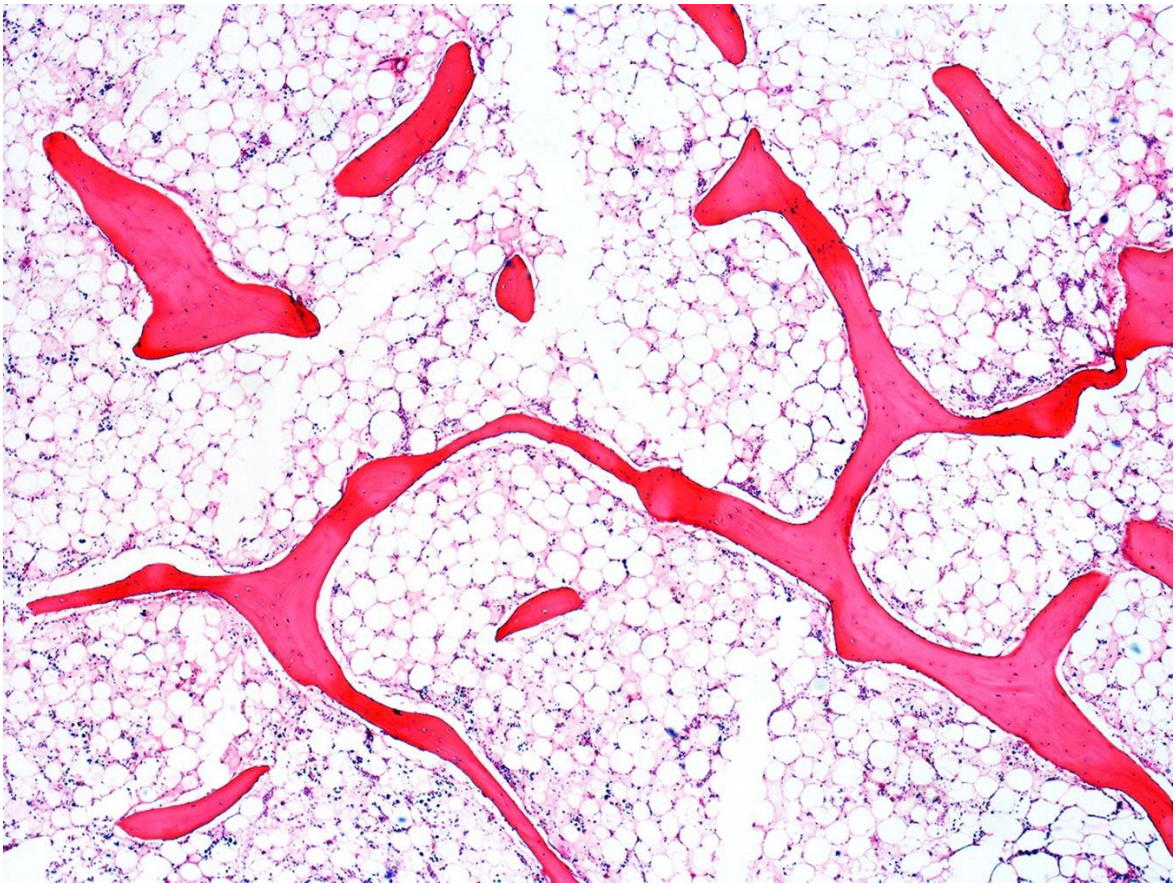

Figure 4: Bone marrow: marked suppression of hematopoietic precursors and replacement by mature adipocytes and erythrocytes. Hematoxylin and eosin stain (H&E), 40X.

Cause: acute *Pteridium arachnoideum* (bracken fern) toxicity.

Toxic compound: Ptaquiloside toxin.

Forms of intoxication: Acute > hemorrhagic diathesis.
Chronic > enzootic hematuria.
Chronic > squamous cell carcinomas (SCCs) of the upper digestive tract (UDT).

Comments: Comments: The diagnosis of acute *Pteridium arachnoideum* poisoning in a heifer was made based on the gross and histologic findings, and the abundant presence of the plant on the pastures that animals grazed. *Pteridium* spp. is present on all continents and grows in acid soil (7,8). In Brazil, two species of *Pteridium* are

described: *Pteridium caudatum* and *Pteridium arachnoideum* (6). These species were previously referred to as varieties of *Pteridium aquilinum* (8). It is estimated that plant toxicities are responsible for 7.4-15.8% of cattle deaths in Southern Brazil (3, 5), and acute bracken fern toxicity has been reported as the fourth cause of death in beef cattle in Southern Brazil (4). Ptaquiloside is the toxic compound found in *P. arachnoideum*. This molecule is a norsesquiterpene glucoside, with radiomimetic activity responsible for the anti-hematopoietic and carcinogenic effects caused by bracken fern toxicity (1,7). The clinical signs vary according to the daily dose ingested and the period of ingestion: hemorrhagic diathesis, enzootic hematuria, and squamous cell carcinomas (SCCs) of the upper digestive tract (UDT). Hemorrhagic diathesis occurs when the bovine ingests 10 to 30g/kg during weeks or months (7). The toxicity is particularly common when cattle are relocated from a plant-free farm to one where *Pteridium* is present, and starving animals are more predisposed to consume the plant. Other conditions that contribute to toxicity include accidental ingestion and diets with low fiber, which may predispose cattle to ingest plants such as bracken fern. Furthermore, addition to bracken fern has been documented in cattle, favouring the occurrence of clinical cases (7). The main clinical signs occur as a result of thrombocytopenia and are acute bleeding and pallor of mucous membranes, along with fever (40-42º) and, occasionally, hemorrhage and edema in the retropharyngeal region, leading to respiratory distress. Anemia, neutropenic leukopenia, and thrombocytopenia are also observed. Clinical signs manifest 3 to 8 weeks after the ingestion. At necropsy, multifocal petechiae, ecchymosis and suffusions are seen in serosa and mucosa of multiple organs, mesentery and omentum. The main histologic finding is marked reduction of hematopoietic precursors and replacement by mature adipocytes and erythrocytes in the bone marrow (1,2,7). No treatment is available; however, soil liming, and herbicide use are recommended for prevention (2,7). Acute *Pteridium arachnoideum* poisoning is an important cause of death in cattle in Brazil and is a major differential diagnosis in cases of acute hemorrhagic diathesis.

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