

Bracken Fern Toxicity in Animals: Rival to Livestock Farming

Mridul Soni, Rakesh Kumar*, Sahil Choudhary and Rajesh Kumar Asrani

Department of Veterinary Pathology, Dr. G.C Negi College of Veterinary and Animal Sciences, CSK Himachal Pradesh Agricultural University, Palampur-176062 (Himachal Pradesh), India



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*Corresponding Author

Mridul Soni, Rakesh Kumar*

E-mail: rkvetpath@gmail.com

Article History

Received: 29.07.2021

Revised: 9.08.2021

Accepted: 14.08.2021

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INTRODUCTION

Bracken fern (*Pteridium aquilinum*) is a cosmopolitan fern found in temperate and subtropical regions throughout the world, belonging to the family Dennstaedtiaceae (Fig. 1). It is normally found in moorland environments and in north England and commonly known as “Moorland Scrub”. It is normally found in all parts of the world except the continent Antarctica. It is consumed as food delicacy by humans and used as animal forage around the world. It is considered to be the 5th most common toxic plant known to cause tumors in animals. The whole plant material is toxic, but the newly emerged fronds of bracken fern are about five times more toxic than the whole plant. The toxic compounds found in bracken fern include ptaquiloside, thiaminase, aplastic anemia factor and quercetin. Thiaminase leads to deficiency of thiamine by splitting the thiamine into thiazole and pyrimidine. Deficiency of thiamine leads to increased pyruvate levels and abnormal energy metabolism due to inadequate ATP production. The aplastic anemia factor ptaquiloside, causes death of precursor cells of bone marrow which affects production of newer blood cells. There also occurs thrombocytopenia and granulocytopenia leading to susceptibility for infections and spontaneous hemorrhages. Long term consumption of bracken fern leads to tumors of urinary bladder due to conversion of ptaquiloside in alkaline urine of cattle to dienone an active carcinogen, which causes alkylation of DNA leading to tumor formation in the urinary bladder. The compound quercetin act as co- carcinogen with papilloma virus, causing malignant tumors in mouth, oesophagus and rumen.

In horses and pigs the signs of thiamine deficiency are more pronounced than cattle because of synthesis of thiamine in the rumen of cattle by normal microflora. Thiamine deficiency leads to polioencephalomalacia in cattle, horses and pigs, however in ovine it leads to neuroepithelium degeneration.

Clinical signs in bracken fern toxicity includes pyrexia, epistaxis, melena, anorexia and hyphema. Consumption of bracken fern for longer time results in chronic enzootic hematuria characterized by intermittent hematuria and death due to anemia. The affected animals are seen voiding red-colored urine which over a long period of time leads to anemia and death.

Hemangioma, hemangiosarcomas, papillomas, fibrosarcomas, transitional cell carcinomas and variety of tumors have been associated with bracken fern toxicity. Post mortem findings in acute poisoning includes multiple hemorrhages throughout the carcass and in chronic cases urinary bladder contains multiple hemorrhages along with tumors and dilated blood vessels.

Diagnosis - Diagnosis is made from history, clinical signs and lesions. Decreased blood thiamine levels (from 8.5 µg/dl to 2.5 µg/dl) and increased pyruvate levels (from 2 mg/dl to 8.5 mg/dl) are also indicative of bracken fern toxicity.

Treatment –

Non- ruminants

1. Thiamine (0.1%) soln. @ 5mg/kg bw. I.V for several days. Oral supplementation may also be required for additional 1-2 weeks.

Ruminants-

1. DL- Batyl alcohol is given 1g in 10 ml olive oil for 5 days through S.C route.
2. Antibiotics should be given to prevent secondary bacterial infections.
3. Blood transfusion from healthy donor may be appropriate.

Prevention-

1. Keep the animals away from bracken fern pastures, especially during dry periods.
2. Do not use bracken fern hay for infested meadows for feeding and bedding.
3. Eliminate all bracken fern from pastures and animal grazing areas.

Thus, bracken fern serve as potent carcinogen and its consumption by livestock leads to economic losses to farmers interms of huge mortality caused by this fern. Studies have also shown the increased incidences of human esophageal and gastric cancer in human beings with the history of milk consumption from milch animals exposed to chronic intake of this deadly fern.