Laminitis in a mature elk hind (*Cervus elaphus*)

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Abstract — Laminitis should be considered as a differential diagnosis in elk presenting with shifting leg lameness, reluctance to move, recumbency and hoof wall ridging. Eliminating the underlying cause and corrective trimming lead to a good prognosis for recovery.

Résumé — Fourbure chez une femelle wapiti adulte *(Cervus elaphus)*. La fourbure devrait être prise en considération comme diagnostic différentiel chez le wapiti présentant des signes se boiterie avec déviation du membre, répugnance à bouger, décubitus et paroi du sabot striée. L'élimination de la cause sous-jacente et une taille corrective conduisent à un bon pronostic de guérison.

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A 6-year-old, elk hind (*Cervus elaphus*) was presented to the Western College of Veterinary Medicine (WCVM) for chronic lameness. The owners first noticed that the hind was having difficulty ambulating while she was on pasture and had unrestricted access to an oat grain ration. During this time, 2 weanling calves from the same farm were presented and treated at the WCVM for grain overload. The owners noted similar clinical signs 6 mo later when the hind again appeared lame in all 4 limbs and spent an increased amount of time lying down. The lameness appeared to worsen over the following 2-week period. The hind was then seen by the referring veterinarian, who observed recumbency, a "camped out" stance, and a shifting leg lameness. She was tentatively diagnosed with laminitis, treated with phenylbutazone (Butequine; Vetrepharm Canada, London, Ontario), 1 g, PO, and referred to the WCVM for further evaluation.

On distant examination, the hind spent most of her time lying down. She was bright, alert, and responsive. When coaxed to rise, the hind seemed restless, would intermittently lift each of her feet, and constantly shift her weight. She was reluctant to move but did so by taking short steps. General anesthesia was required in order to perform a thorough physical examination. The animal was anesthetized by using 2 mg/kg of tiletamine-zolazepam (Telazol; Fort Dodge Animal Health, Fort Dodge, Iowa, USA) mixed with 1 mg/kg of xylazine (Rompun, 100 mg/mL injectable; Bayer, Etobicoke, Ontario) and maintained on isoflurane (IsoFlo; Abbott Laboratories, Saint-Laurent, Quebec) inhalant anesthetic. The hind was in good body condition. Blood was drawn for a complete blood cell (CBC) count and serum chemistry panel. All hooves were grossly overgrown. There was an obvious disruption and separation of the hoof wall around the entire circumference, approximately 1 to 2 cm distal to the coronary band, on all 8 claws, giving a thimble claw-like appearance. Straw and dirt were packed into the areas of separation. Horizontal ridges were present on the dorsal wall, which diverged at the abaxial wall and heel area. The dorsal margin appeared buckled and concave. The sole was flattened and abnormally broad.

Figure 1. Radiograph of claws of front leg showing a distinct gas line between dorsal hoof wall and the 3rd phalanx, a break in the hoof wall, overgrowth of the hoof wall, and dirt impaction.

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Lateral radiographs of each digit, taken under the same anesthesia, were examined for evidence of osteomyelitis and rotation of the 3rd phalanx (P3). No bone or joint abnormalities were detected. A gas line was clearly visible between the dorsal hoof wall and P3 on all 8 claws (Figure 1). The results from the CBC and biochemical profile were within reference ranges for elk.

Hoof trimming revealed an area of new horn growth extending distad for 1 to 2 cm from the coronary band. On the 4 medial claws, most of the hoof wall was separated from the laminae, apart from a small area, 1 cm in diameter, at the dorsal tip of P3. On all 8 claws, excess horn growth and the separated hoof wall were removed. The dermal laminae in the area of separation did not bleed and appeared necrotic. No abscesses were found.

After trimming, there was a significant clinical improvement in the hind as shown by her spending more time standing and having greater comfort of movement. One month following presentation, the elk was ambulating without signs of lameness.

A farm visit was made to determine if any of the other animals had clinical signs of laminitis. Forty elk were examined, of which 20 had typical laminitic horizontal ridges on their claws. In addition, 2 bulls and 1 hind were lame. One bull stood with his front feet crossed over and was reluctant to move. Another lame bull and hind appeared to have separation of the hoof wall from P3 on the right and left front lateral claws. The owners declined work-up and treatment. It was recommended that all grain be eliminated from the diets. There have been no further complaints of lame elk on the farm in the last 12 mo.

Laminitis is defined as inflammation of the corium of the claw, usually involving one or more digits (1). This disease was described in horses over 2000 y ago by Aristotle and Homer, and in cattle in 1839 (1). Laminitis has been reported in horses, cattle, sheep, goats, and pigs (1,2). To the authors' knowledge, this is the first case report of laminitis occurring in farmed elk.

Laminitis has been identified as a primary or secondary condition. It has been postulated that secondary laminitis occurs due to the release and absorption of toxins from diseased sites, such as the gastrointestinal tract following carbohydrate overload, or the uterus with periparturient endometritis-metritis (1,3–5). It has been hypothesized that these toxins may directly affect the vasculature of the foot or indirectly cause laminitis through the local release of vasoactive substances (1,6). Vasoconstriction, vasodilation, microthrombus formation, and arteriovenous shunting have each been implicated in the pathogenesis of this disease; however, research into these areas has failed to obtain consistent results (1,6–8).

The changes in the hoof wall seen in this hind are consistent with those described in other species with chronic laminitis (1,4,5). The clinical signs of pain in this hind may be explained by the changes seen in the dorsal hoof wall. Movement of the separated hoof wall along with the hoof overgrowth most likely put pressure on the area of attachment at the tip of P3, causing a mechanical lameness. A lack of abscessation, osteomyelitis, fracture, or rotation of P3 contributed to the good prognosis and rapid recovery. The trimming of the hoof was important to remove the debris that was packed in along the separated hoof wall and to reestablish a more normal hoof pastern-axis through shortening of the overgrown dorsal hoof wall.

Diet should be evaluated in cases of laminitis in elk, and grain rations discontinued in clinically affected animals. Recumbency, stomping of hooves, shifting weight with limbs camped out in front and under behind, crossed limbs, reluctance to move, and hoof wall ridging with separation are all clinical signs indicative of laminitis in elk. Prognosis for recovery appears to be good, if the cause is corrected, the hooves are trimmed appropriately, and the underlying tissues are healthy.

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