

「CASE REPORT」

## Progressively gangrenous limbs in Korean indigenous calves

Bum-Seok Kim<sup>1</sup>, Gerry Amor Camer<sup>2</sup>, Dace Berzina<sup>2</sup>, Irina Chekarova<sup>2</sup>,  
Muhammad Zeeshan<sup>2</sup>, Irina Borisova<sup>2</sup>, Ivar Blank<sup>2</sup>, Sohail Ejaz<sup>2</sup>,  
Hee-Jin Park<sup>2</sup>, Jung-Kee Kwon<sup>2</sup>, Chae-Woong Lim<sup>2,\*</sup>

<sup>1</sup>*Department of Medicine, Stanford University School of Medicine, CA 94305 USA,*

<sup>2</sup>*Bio-Safety Research Institute, Chonbuk National University, Jeonju, 561-756, Korea*

(Received 29 September 2006, accepted in revised form 11 November 2006)

### Abstract

This study investigated cases of progressively necrotizing limbs in Korean indigenous calves. The recent case (Case 1) involved a 3-month old, male calf in Jeonbuk province that presented a visibly dry form of gangrene affecting joints of the forelimbs and the hind limbs. Radiograph revealed osteoarthritis possibly resulting from pressure of disrupted joint skin, fasciae, deeper underlying musculatures and tendon. Histopathology of affected tissue showed necrotizing; severely thrombosed dilated blood vessels with rechanneling microvasculatures. The lack of substantial infectious inflammatory exudates in the vital organs and the inability to respond to antimicrobial treatment bolstered the notion that the observed thromboembolic and vascular lesion was attributed to possible vasoconstrictive effects of ergot alkaloids. Case 2: A previously encountered similar case in a 4-month old, male calf showing gangrene of hind limbs and posterior ataxia was likewise presented. These two cases were impressed as probable ergotism. Ergotism may be uncommon or underreported in Korea. Future isolation of ergot alkaloids in feeds or in pasture is highly suggested.

---

Key words : Ergotism, Gangrene, Histopathology, Korean indigenous calf

---

\*Corresponding author

Phone : +82-63-270-3788, Fax : +82-63-270-3780,

E-mail: lcw@chonbuk.ac.kr

## Introduction

Feed consumption contaminated with ergot alkaloids is known to cause terminal gangrene due to vasoconstrictive effect of the toxin<sup>1-4</sup>). Outbreaks of gangrenous necrosis involving extremities of young cattle has been reported elsewhere<sup>1-3, 5-7</sup>). The principal agent of ergotism is *Claviceps purpurea*, although a number of *Claviceps* species has now been identified<sup>4, 7-9</sup>). The fungus invades cereal grains and pasture grasses under high-moisture conditions. Ergot alkaloids may be extracted in suspect ground grain meals<sup>4, 9</sup>). These cases investigated occurrence of progressive gangrene in the limbs of 2 calves in Jeonbuk province.

## Symptoms

**Case 1 signalment :** Korean indigenous cattle, 3-month old, male.

**Gross pathology :** The limbs were variably swollen and dry gangrenous with localized discontinuity of skin and underlying connective tissues (Fig 1a). Patchy hair loss was visibly seen on skin areas of the flank, ears and near the eyes. The calf presented with severe progressive gangrene of the forelimbs and hind limbs (Fig 1b). The calf had received treatment for diarrhea and antimicrobial medication. Feeding consisted of pasture, rationed concentrated feedstuffs and unmilled rice. Following prolonged failure to treat the condition, the owner requested for animal euthanasia. Radiograph was taken. Hazy bone ends and lack of space between joints that is characteristic of

osteoarthritis were seen (Fig 2a). Histopathology showed severely thrombosed arterial vessels (Fig 2b). This case of probable ergotism was morphologically diagnosed as terminal dry gangrene with polyarthritis.

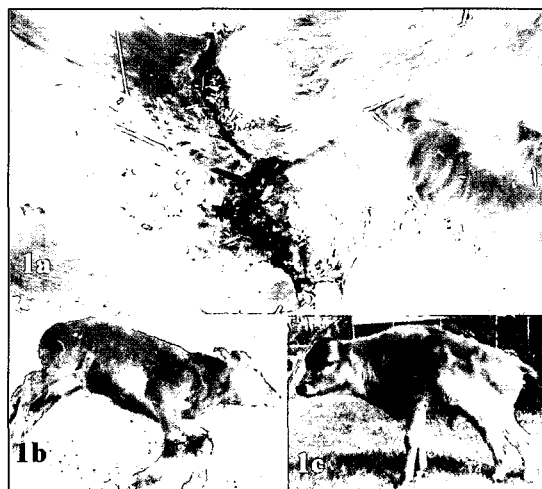


Fig 1. 1a: Limb discontinuities due to gangrene. 1b: A calf where all limbs is necrotizing. 1c: Note the recumbent posture due to loss of hooves in this calf



Fig 2. 2a: Radiograph showing narrowed joint space characteristic of osteoarthritis 2b: Severe thrombosis seen in section taken from hind limbs (H&E, 100X). 2c: Plantar view of detached gangrenous hooves

**Case 2 signalment :** Korean indigenous cattle, 4-month old, male (Fig 1c). The

calf presented lameness and posterior ataxia due to swollen gangrenous hindlimbs (Fig 2c). The calf had received treatment for respiratory infection and responded. Diet consisted of pasture, rationed concentrated feedstuffs and unmilled rice. Antibiotic treatment failed to heal joint swellings. The calf subsequently died. This case was likewise impressed as probable ergotism.

## Discussion

Ergotism may be uncommon or under reported in Korea. These cases were impressed as probable ergotism as clinically evidenced by terminal gangrene, lack of antimicrobial response and lack of inflammatory exudates in vital organs of the viscera<sup>1, 4, 6</sup>). Differential diagnosis include: ergotism, *Salmonella dublin* infection, bacterial and viral polyarthritis<sup>4</sup>). The principal agent of ergotism is *C purpurea*. Other potential producers include *C paspali*, *C cinerea*, *C fusiformis*, and *C cyperi*<sup>5, 8, 9</sup>). These fungi invade cereal grains and pasture grasses under high-moisture conditions. The developing hyphae produce sclerotia that fill the florets and protrude being 2–20 mm long with a distinct purple-black color. The sclerotia contain any ergot alkaloids. Some of these are derivatives of lysergic acid. Ergot alkaloids may be extracted in suspect ground grain meals<sup>4, 8</sup>). Ergot causes vasoconstriction by direct action on the muscles of the arterioles (repeated dosages injure the vascular endothelium) followed by reduced blood flow and thrombosis leading to complete stasis with terminal necrosis of the extremities

resulting to gangrene<sup>3, 4, 7</sup>). The calves in this case may have consumed this fungus infested and ergot alkaloid laden feeds either in feed ration or while grazing. A similar condition has been reported elsewhere<sup>3, 6</sup>). Palliative treatment is available for ergotism and hence, preventive measures such as ensuring ergot alkaloid-free feeds and identification of pasture areas known to be contaminated with ergot must be treated or avoided. These cases demonstrated coherence with lesions of ergot poisoning. Isolation of ergot alkaloids to more conclusively document occurrence of ergotism in cattle in Korea is highly suggested.

## References

1. Oliver JW, Abney LK, Strickland JR, et al. 1993. Vasoconstriction in bovine vasculature induced by the tall fescue alkaloid lysergamide. *J Anim Sci* 71 (10) : 2708–2713.
2. Coppock RW, Mostrom MS, Simon J, et al. 1989. Cutaneous ergotism in a herd of dairy calves. *J Am Vet Med Assoc* 194(4) : 549–551.
3. Holliman A, Barnes J. 1990. Ergotism in young cattle. *Vet Rec* 127 (15) : 388.
4. Kahn CM, Line S. 2005. The Merck Veterinary Manual. 9 eds. Merck & Co. Rahway, NJ, USA.
5. Botha CJ, Naude TW, Moroe ML, et al. 2004. Gangrenous ergotism in cattle grazing fescue (*Festuca elatior* L.) in South Africa. *J S Afr Vet Assoc* 75(1) : 45–48.
6. Fraser DM, Dorling PR. 1983. Suspected ergotism in two heifers. *Aust*

Bum-Seok Kim, Gerry Amor Camer, Dace Berzina, Irina Chekarova, Muhammad Zeeshan, Irina Borisova, Ivar Blank, Sohail Ejaz, Hee-Jin Park, Jung-Kee Kwon, Chae-Woong Lim

- Vet J* 60(10) : 303-305.
7. Schneider DJ, Miles CO, Garthwaite I, et al. 1996. First report of field outbreaks of ergot-alkaloid toxicity in South Africa. *Onderstepoort J Vet Res* 63(2) : 97-108.
8. Porter JK. 1995. Analysis of endophyte toxins: fescue and other grasses toxic to livestock. *J Anim Sci* 73(3) : 871-880.
9. Naude TW, Botha CJ, Vorster JH, et al. 2005. *Claviceps cyperi*, a new cause of severe ergotism in dairy cattle consuming maize silage and teff hay contaminated with ergotised *Cyperus esculentus* (nut sedge) on the Highveld of South Africa. *Onderstepoort J Vet Res* 72(1):23-37.