CLINICAL FLUOROSIS IN CAPTIVE GERENUK AND BONGO ANTELOPE

Christopher Lloyd[1] & Mark F. Stidworthy[2]

[1]Nad Al Shiba Veterinary Hospital, PO Box 116345, Dubai, United Arab Emirates. [2]International Zoo Veterinary Group, Keighley Business Centre, South Street, Keighley, West Yorkshire, BD 21 1AG, United Kingdom.

A persistent acute lameness with swellings of the metacarpal and metatarsal were noticed in 2 adult female bongos *(Tragelaphus eurycerus eurycerus)* from a herd of 2 males and 4 females. Similar swellings were subsequently observed on the legs and ribs of one adult male bongo in the same enclosure and multiple adult gerenuk *(Litocranius walleri)* throughout the farm. Body condition scores dropped and the animals were observed to spend less time standing, feeding and suckling their calves. All animals were fed a locally produced browser pellet together with fresh browse, alfalfa hay, locally grown grass, a mineral lick and water with added mineral and vitamin supplement. The animals had been receiving the pellet for 3 months at the time clinical signs manifested. Clinical examination of bongo under sedation revealed hard, warm, bilateral swellings on the mandible, ribs, metatarsus and metacarpal. Dental examination was normal. Radiography of the distal metacarpus showed marked periosteal proliferation. Blood samples showed a mild anaemia with a normal leukocyte count and increased tissue enzymes.

A surplus male gerenuk exhibiting clinical signs was euthanased. Post mortem revealed a marked proliferative periosteal hyperostosis of the metatarsals and metacarpal bones (Figure 1 and 2). Histological samples (International Zoo Veterinary Group Pathology department, Leeds, UK) confirmed the presence of marked periosteal proliferation while the kidneys and parathyroid glands were normal. A working diagnosis of fluorosis was made and samples of tissue, water, feed and supplements were collected for analysis. Turnaround times were 3 weeks for feed samples and 3 months for tissue samples. The results of bone and feed analysis are summarized in Table 1. It was recommended to change all feed sources during this time period. Unfortunately while all grasses and browse sources were changed the concentrate pellet was fed at lower levels due to poor availability of an alternative concentrate source. In addition to dietary changes, clinically affected animals were treated with boron and non steroidal anti inflammatories. Despite treatment and dietary changes one female bongo died. The carcass was submitted to another veterinary surgeon for a second opinion; however, metacarpal bone samples were obtained by the author for fluoride quantification. Once a diagnosis had been made to the satisfaction of zoo management the pelleted diet was removed. The animals' lameness improved rapidly over 7 days with subsequent weight gain and increased activity levels.

There are few reports of fluorosis in free ranging non domestic species (Clarke 2006, Schultz 1998) and none affecting zoological animals. Radiographic, haematological and histological findings in both species were consistent with those described in other animals (Thompson 2007,Suttee 1972, Bharti 2007, Hoogstratten 1965). Bone biopsy and urine fluoride levels could have been used to aid diagnosis in this case, however, lack of local lab facilities made their use impractical. Histopathology and clinical findings led to a presumptive diagnosis which was confirmed on receipt of feed analysis and finally tissue analysis. Unfortunately satisfactory dietary changes were not made in line with advice and the animals' condition deteriorated. Treatments such as the use of boron in the diet had no major effects on clinical condition. This is unsurprising given the severity of the clinical signs and the levels of fluoride in the diet which were 6 times higher than those fed experimentally to buffalo calves on boron treatments (Bharti 2007)

Levels of fluoride in bone samples analysed were extremely high. Normal values for cattle are considered to be 400—1200 ppm while levels in cattle affected by chronic fluorosis are 3000- 5000 ppm. Factors that affect the levels of fluoride required to produce toxicity include the amount of fluoride ingested, duration of exposure, bioavailability of fluoride, species, age and diet of species concerned (Thompson 2007). Fluoride absorption from the digestive tract is dictated in part by the chemical form in which it is ingested. Sodium fluoride has traditionally been used in toxicity studies and is up to 5 times more biologically available than fluoride compounds commonly found in feed or environmental sources. Traditionally most toxicity studies have used sodium fluoride and suggested that in cattle, levels above 10ppm in the diet can lead to subtle dental changes (Suttie 1980) while levels over 50ppm can lead to gross periosteal hyperostosis. While it is not known which fluoride compound was present in the browser pellet it is clear that levels of 730ppm greatly exceeded safe levels of even the least

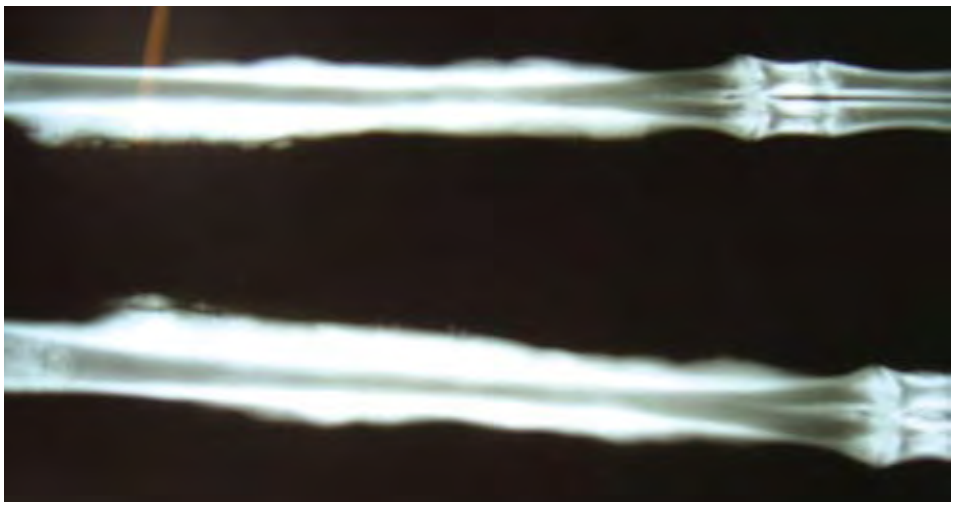

Fig1. Dorso-ventral radiograph of metacarpus from a gerenuk *(Litocranius walleri)* antelope showing periosteal proliferation

Fig2. Post mortem appearance of metacarpus from a gerenuk *(Litocranius walleri)* antelope showing periosteal proliferation

biologically available compound. Sources of excess fluorine in processed foods normally result from contaminated raw materials (D. Salmon, Mazuri foods, pers comm.) or vitamin and mineral premixes that may be contaminated or added in the wrong proportions.

This case highlights the importance of quality control in the production of pelleted foods for animal consumption.

Acknowledgements

Thanks to John Edwards from the Veterinary Laboratories agency for his help in facilitating the fluoride analysis on bone samples and Dave Salmon from Mazuri foods for his insights into food manufacturing.

References

Full references are available on the website www.wmenews.com

Table 1: Summary of results for fluorine levels in diet and bones of gerenuk and bongo affected by suspected clinical fluorosis.

Sample	Fluoride levels ppm Dry matter
Browser pellet[1]	730
Bongo metacarpus[2]	6000
Gerenuk Metacarpus[2]	8900
Gerenuk Mandible[2]	7500

[1]Eurofins Laboratories Ltd, Woodthorne, Wolverhampton, WV6 8TQ, UK.
[2]Veterinary Laboratories Agency Shrewsbury, Kendal Road, Harlescott, Shrewsbury. SY1 4HD