

Periodontal disease in black rhinoceros (*Diceros bicornis*)

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Periodontal disease is a common condition in domestic horses that often goes undetected due to inadequate and infrequent examination of the oral cavity. It is likely that this is also the case for the zoo-based Rhinocerotidae due to the logistical challenges inherent in physical and radiographic examination of rhinoceros orodontal structures. Periodontal disease in the horse, a grazing hypsodont, is generally considered to be attributable to abnormal shearing forces upon the periodontia generated by altered chewing patterns imposed by abnormal patterns of dental wear (eg points, hooks etc). Conversely, the pathophysiology of periodontal disease in zoo-based black rhinoceros, a brachydont herbivore with a browsing ecology, is unknown. In one zoo-based, black rhino group, periodontal disease was notable for the absence of dental wear patterns typical of similar disease in horses and for the presence of hypercementosis, which is not a feature of periodontal disease in domestic equids. Periodontal disease has significant potential to impact the health and welfare of zoo-based rhinoceros, undermining the goals of cooperative conservation breeding programs. Potential sequelae include pain, maldigestion and systemic bacterial infection. Additionally, it is possible that the chemical mediators associated with undetected chronic periodontal inflammation play a role in female subfertility and in cryptic diseases of zoo-based black rhinoceros including excessive iron uptake. A better understanding of the prevalence, causes, pathophysiology, management and prevention of periodontal disease in zoo-based rhinoceros is required.

Management of tusk fractures in captive elephants.

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Elephant tusk fractures are common in captive elephants and their prevention and treatment poses significant challenges. 10,000 African elephant photos across the southern African region were studied. The incidence of tusk fractures were recorded and correlated to the annual rainfall of different areas. There appeared to be a West to East reduction in the incidence of tusk fractures in contrast to an increase in annual rainfall. The Etosha game reserve in Namibia was the only natural habitat where African elephants had a higher incidence of fractures when compared to previously published data on captive elephants in North American zoos. The causes of tusk fracture in the wild have not been well studied, but we suggest desiccation of the tusks and the increased social activity around waterholes/springs may play a role in Etosha. Rainfall may also account for differences in nutrients, however we postulate that if indeed this is the cause other teeth, not only tusks, should have been affected, not to mention the teeth of other species. In Etosha per se animals such as warthogs also have exposed tusks, but the incidence of fractures is minimal. If indeed dry air does play a role in predisposing tusks to fractures, the fact that warthogs spend several hours per day underground in Aardvark burrows where the humidity is higher may partially explain the lack of fractures in this species. Management of elephants in captivity to reduce the incidence of tusk fractures should be the ultimate goal of any facility housing these megaherbivores. Common causes of tusk fractures in captivity include:

- the use of metal bars and doors to separate individuals and funnel them,
- the use of low cement walls to separate individuals,