

A Complex Picture of Dental Pathology in a Moose Population on the Seward Peninsula, Alaska

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Teeth are key organs for mastication and prehension of food in conjunction with jaws, masticatory muscles, lips, and tongues. Tooth wear affects herbivore digestive efficiency which in turn determines an individual's productivity. Tooth wear patterns are influenced by type of forage consumed and tooth anatomy which is strongly influenced by the quality of prenatal and post-gestational nutrition, genetics, and overall animal health. A mysterious tooth breakage and wear syndrome has been reported from the moose population on the Seward Peninsula. The disease is characterized by excessive breakage and wear of incisiform teeth, however no complete periodontal examination of the teeth and associated bone structures has been performed. The aim of this study was to document and describe the periodontal health of the affected moose population and to investigate associations among periodontal health indicators and age, tooth wear, and breakage.

We conducted an exhaustive assessment of the dental pathology of incisiform teeth and jaws in 55 moose killed by hunters in autumn 2002. The dental assessment included obtaining x-ray radiographs of each adult jaw (≥ 2 years old) to determine the prevalence of osteoporotic lesions and to investigate the extent of bone loss. We also measured pocket depth of each tooth, noted the presence of micro and macro fractures on teeth, and quantified the extent of staining and pitting of tooth enamel. Levels of heavy metals and fluoride were quantified in 10 representative jaws.

The teeth and jaws of adult moose on the Seward Peninsula can be classified as moderately to exceedingly diseased from a dental pathologic perspective. Seventy-four percent of the examined jaws exhibited signs of bone loss. Fifty-nine percent of the jaws had both facial and lingual fractures whereas only 18% had neither. The first incisor (I1) was permanent bilaterally in all yearlings whereas the eruption pattern of I2, I3, and I4 was variable. The amount of fluoride found in 10 moose jaws was normal and not correlated with the extent of brokenness of teeth ($r = 0.03$). Zinc (Zn) and lead (Pb) were correlated with tooth score ($r = 0.74$ and 0.58 , respectively) and together explained a significant amount of the variation in tooth brokenness ($R^2 = 0.79$; $F = 13.31$; $p = 0.004$; Brokenness = $-8.16 + 0.39Pb + 0.10Zn$).



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