

PATHOLOGICAL FINDINGS IN CAPTIVE RHINOCEROSSES

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INTRODUCTION

The purpose of this paper will be to review pathological findings in captive African and Asian rhinoceros species by disease category. The source of the information is from rhinoceros mortalities at the National Zoological Park, from other zoos participating in the SSP and from the literature^{15, 16, 26, 34, 36, 37, 38, 41}. A cutaneous ulcer syndrome in the black rhinoceros and other diseases of the integument will be covered in this proceedings by Dr. Linda Munson.

INFECTIOUS DISEASES

Few viral diseases are reported; encephalomyocarditis (EMC) was isolated from a neonatal black rhinoceros in Florida with cardiomyopathy. Pox-like lesions are reported in both black and white rhinoceros from German zoos from which orthopoxviruses were isolated and compared with poxvirus from elephants and okapi^{11, 31}.

Reports of bacterial diseases in rhinoceroses are sporadic³ and include systemic infections with *Salmonella* and *Clostridia*^{25, 32, 39}. Leptospirosis has been considered as an etiologic possibility for the fatal hemolytic anemia syndrome of black rhinoceroses²². Fatal colibacillosis occurred in a premature black rhinoceros neonate in St. Louis with typical septicemic lesions with disseminated intravascular coagulation (DIC) also described in another neonatal black rhinoceros²⁷.

Tuberculosis due to *M. bovis* occurred in a pair of black rhinoceros at the National Zoo in 1980¹⁸ and has been reported elsewhere¹³. Caseocalcareous pulmonary lesions were more typical of bovine rather than the sarcomatoid-type found in equines.

Black rhinoceroses appear to be quite susceptible to pulmonary and systemic mycoses associated with *Aspergillus* sp. and zygomycetes. Cases of mycotic disease have occurred in at least four North American zoos. Reports of mixed *Aspergillus* and *Absidia* infections were also reported in two black rhinoceros in a German zoo⁹.

Parasites found in rhinoceroses that can be perpetuated in captivity include mainly intestinal nematodes and cestodes²⁹. Two Indian rhinoceroses at the National Zoo have had periodic infections with anoplocephalid tapeworms, and a microscopic intestinal nematode, *Crossocephalus* sp.³⁵, both of which appear to be of low pathogenicity. Parasites in recently imported rhinoceros can be a threat, like *Amblyomma hebraeum*, the tick vector of heartwater (*Cowdria ruminantium*) which were recovered from black rhinoceroses introduced into Texas⁴². Gastric myiasis (stomach bots) due to *Gyrostigma conjugens* was reported in two black rhinoceros in Berlin, and *G. pavesii* in white rhinoceros elsewhere⁴⁰. These bots are usually innocuous and no more pathogenic than their equine counterparts. Blood-borne parasites like hematozoa and trypanosomes are usually self-limiting as they require vectors indigenous to native habitats.

NONINFECTIOUS DISEASES

Hemosiderosis particularly of the liver, is a common finding in black rhinoceroses and has been related to the hemolytic syndrome common in this species^{2, 7, 8, 12, 19, 20, 28, 30}, but

other causes of iron storage conditions are possible and have not been ruled out. The hepatic pigment is strongly positive with iron stains and has been confused for bile pigment leading to erroneous conclusions. Another idiopathic condition reported is encephalomalacia which was fatal for three young female black rhinoceroses housed at three different zoos^{21, 23}.

Myopathy and leiomyometaplasia (lipofuscinosis) of smooth muscle has also been observed histologically in black rhinoceros in which recent evidence indicates that vitamin E deficiency may occur in this species in captivity^{5, 6, 10, 14, 17}.

The National Zoo incurred a death in a female Indian rhinoceros associated with gastric impaction with duodenal torsion. Congenital unilateral aorta was reported in a black rhinoceros⁴; pericarditis sicca occurred in a female white rhinoceros³³, and calcinosis of the endocardium in a black rhinoceros¹, both in German zoos.

Vaginal leiomyomas (fibroids) appear to occur as an entity in the Indian rhinoceros probably associated with hyperestrogenism²⁴. Four animals with these vaginal tumors, all originating from different zoos, had abnormal estrous cycles with no births occurring after the tumors were discovered. Only a few malignant neoplasms have been observed in other rhinoceros species including a hepatocellular carcinoma and a uterine adenocarcinoma.

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