

## ACTINOMYCES PYOGENES INFECTION IN EXOTIC BOVIDAE AND CERVIDAE: 17 CASES (1978-1986)

Joseph C. Zulty, B.A., and Richard J. Montali, D.V.M.

**Abstract:** Seventeen cases of *Actinomyces pyogenes* infections occurred in six species of captive Bovidae and Cervidae from 1978 to 1986. Infected animals included two yellow-backed duikers (*Cephalophus sylvicultor*), one white-bearded wildebeest (*Connochaetes taurinus albojubatus*), one scimitar-horned oryx (*Oryx dammah*), eight dorcas gazelles (*Gazella dorcas*), three Reeve's muntjacs (*Muntiacus reevesi*), and two reindeer (*Rangifer tarandus*). *Actinomyces pyogenes* was isolated exclusively from external abscesses (mandible, hoof, and other cutaneous sites) in 12 animals and from urine, blood, and abscesses of the kidneys, lungs, and liver in five animals.

**Key words:** *Actinomyces pyogenes*, abscess, Bovidae, Cervidae.

### INTRODUCTION

*Actinomyces pyogenes*, formerly classified as *Corynebacterium pyogenes*, are bacteria commonly isolated from suppurative lesions in cattle, sheep, goats, and swine. Occasionally it is found in other domestic animals, and only rarely in man. Infections are usually sporadic and commonly the result of opportunistic invasion of devitalized tissue by the *A. pyogenes* organisms inhabiting the skin and mucous membranes. Hematogenous spread with metastatic abscessation of lungs, kidneys, heart, joints, and other body sites may also occur.<sup>2-7</sup>

To our knowledge there are no previous reports of *A. pyogenes* infections in nondomestic ruminants. The purposes of this study were to document the occurrence of such infections in nondomestic bovid and cervid species at the National Zoological Park (NZIP) and to describe associated lesions.

### MATERIALS AND METHODS

Animals in the study include yellow-backed duikers (*Cephalophus sylvicultor*), white-bearded wildebeest (*Connochaetes taurinus albojubatus*), scimitar-horned oryx (*Oryx dammah*), dorcas gazelles (*Gazella dorcas*), Reeve's muntjacs (*Muntiacus reevesi*), and reindeer (*Rangifer tarandus*).

From the Department of Pathology, National Zoological Park, Smithsonian Institution, Washington, D.C. 20008.

They have been or are currently part of the ungulate collection at the National Zoological Park in Washington, D.C. (NZIP-DC) and at the zoo's Conservation and Research Center (NZIP-CRC) in Front Royal, Virginia. Herd sizes at both locations were determined from year-end status reports obtained from animal inventory records.

Case selection was based on the identification of *A. pyogenes* from records maintained by the clinical pathology laboratory at NZIP. With the exception of a repeat culture (April 1986) in a white-bearded wildebeest, the National Veterinary Services laboratories (Ames, Iowa) confirmed *A. pyogenes* in specimens from March 1983 through December 1986. Prior to this time, diagnosis of *A. pyogenes* was made by the zoo laboratory based on key differential tests for presumptive identification of gram-positive nonspore-forming anaerobic bacilli.<sup>1</sup> Pathology records from 10 animals that had died or were euthanized and medical records on all 17 animals provided additional information about the lesions and tissues cultured.

### RESULTS

On 24 separate occasions during a 9-yr period from 1978 through 1986, *A. pyogenes* was cultured from 17 individuals of six species of Bovidae and Cervidae. Specific sites from which the organism was isolated are listed in Table 1. Monomicrobial isolation of *A. pyogenes* occurred on 15 oc-

**Table 1.** *Actinomyces pyogenes* isolated from exotic Bovidae and Cervidae at the National Zoological Park.

Species	Animal no.	Date	Site cultured
<b>Bovidae</b>			
Yellow-backed duiker	1	2/83	subcutaneous abscess
	2	2/86	foot abscess
White-bearded wildebeest	1 (N) <sup>a</sup>	3/86	mandibular abscess
		4/86	mandibular abscess
Scimitar-horned oryx	1 (N)	2/83	liver and lung abscesses
Dorcas gazelle	1 (N)	11/80	gluteal abscess
		6/84	mandibular abscess
	2 (N)	2/82	mandibular abscess
	3	8/83	foot abscess
		11/85	mandibular abscess
	4 (N)	9/83	radius-ulna fracture site abscess
	5 (N)	12/83	mandibular abscess
		4/84	mandibular abscess
	6 (N)	3/86	urine
		6/86	blood
	7	6/86	blood
	8 (N)	1/83	foot abscess
		3/83	kidney abscess
<b>Cervidae</b>			
Reeve's muntjac	1 (N)	6/78	mandibular abscess
		3/85	flank abscess
	2	12/83	subcutaneous abscess
	3 (N)	8/85	lung abscess
Reindeer	1	1/83	subcutaneous abscess
	2	8/84	subcutaneous abscess

<sup>a</sup> (N) = necropsied.

casions, whereas cultures from eight different isolations of *A. pyogenes* from seven animals yielded mixed bacterial populations.

Review of zoo records from the 10 animals that died or were euthanized indicated that lesions associated with *A. pyogenes* were most widespread in dorcas gazelle #8 (Table 1). The necropsies of four other dorcas gazelles (#1, #2, #5, and #6) revealed evidence of a nephropathy which was nonpyogenic and was proven histologically to be medullary amyloidosis.

The distribution of animals with *A. pyogenes* over the 9-yr period appeared to be sporadic (Table 2). The species with the highest frequency of *A. pyogenes* was the dorcas gazelle in 1983; also in 1983 there was at least one case of *A. pyogenes* in five of six of the ruminant species studied. The

species with the greatest number of cases of *A. pyogenes* over the 9-yr period was also the dorcas gazelle. Year-end herd sizes ranged from zero for the reindeer in 1985 and 1986 to 44 for the Reeve's muntjacs in 1984. Prevalence rates were not calculated because of the relatively small number of actual cases of *A. pyogenes* reported in most species.

## DISCUSSION

As a normal inhabitant of the skin of domestic animals, *A. pyogenes* can opportunistically invade damaged superficial tissue, particularly that of the mandible and foot, and result in local and distant visceral suppuration.<sup>2-4,6</sup> It is likely that *A. pyogenes* infections develop in exotic bovines and cervids in a similar manner. This was

**Table 2.** Nine-year distribution of cases of *Actinomyces pyogenes* in exotic Bovidae and Cervidae at the National Zoological Park.

Year	Species					
	Yellow-backed duiker	White-bearded wildebeest	Scimitar-horned oryx	Dorcas gazelle	Reeve's muntjac	Reindeer
1978	4 <sup>a</sup>	7	20	16	(1) <sup>b</sup> 21	16
1979	3	6	28	16	27	13
1980	3	5	15	(1) 21	31	12
1981	4	7	25	22	24	16
1982	3	8	26	(1) 19	31	13
1983	(1) 3	8	(1) 35	(4) 25	(1) 35	(1) 13
1984	3	8	36	(2) 20	44	(1) 14
1985	3	6	26	(1) 16	(2) 37	0
1986	(1) 2	(1) 5	25	(2) 19	35	0
Case total	(2)	(1)	(1)	(11)	(4)	(2)

<sup>a</sup> Numbers represent year-end species inventory.

<sup>b</sup> Numbers in parentheses represent numbers of *A. pyogenes* cases. Animals with repeat cultures in the same year were reported as one case for that year.

particularly evident in dorcas gazelle #8 with the widespread pyogenic lesions. Deep foot abscesses infected with *A. pyogenes* leading to vegetative endocarditis and subsequent embolism to lungs and kidney is the most likely pathogenesis; in this case, it was severe enough to have caused death of the animal.

The occurrence of *A. pyogenes* infections within each of the six exotic ruminant species was sporadic over the 9-yr period studied. Most of the cases probably occurred in the dorcas gazelles because of their confinement in a smaller area at NZP-DC as compared with the large pastures available at NZP-CRC for herds of the scimitar-horned oryx and Reeve's muntjac. This allowed for a greater risk of contact injuries and subsequent *A. pyogenes* lesions in these gazelles. However, the overall low morbidity of *A. pyogenes* in the dorcas gazelles as well as in the other five species illustrates the sporadic nature of the disease, a spectrum also common to domestic hoofstock populations.<sup>2,4</sup>

The renal medullary amyloidosis observed and its possible association with *A. pyogenes* infection in the four dorcas gazelles is of current interest at NZP, as renal

failure has been observed clinically in a number of these affected gazelles.

#### LITERATURE CITED

- Allen, S. D. 1985. Gram-positive nonspore-forming anaerobic bacilli. In: Lennette, E. H. (ed.). Manual of Clinical Microbiology, 4th ed. American Society of Microbiology, Washington, D.C. P. 461.
- Ayers, J. L. 1981. Corynebacterial infections. In: Kirk, R. W. (ed.). Current Veterinary Therapy I: Food Animal Practice. W. B. Saunders Co., Philadelphia. Pp. 658-659.
- Blood, D. C., O. M. Radostits, and J. A. Henderson. 1983. Veterinary Medicine. A Textbook of the Diseases of Cattle, Sheep, Pigs, Goats and Horses, 6th ed. Pitman Press Ltd., Bath, U.K. Pp. 512-513.
- Gillespie, J. H., and J. F. Timoney. 1981. Hagen and Bruner's Infectious Diseases of Domestic Animals, 7th ed. Cornell Univ. Press, Ithaca, New York. Pp. 226-229.
- Hago, B. E. D., and T. A. Mukhtar. 1980. Head and neck abscesses in sheep caused by *Corynebacterium pyogenes*. Zentralbl. Veterinaermed. Reihe B 27: 823-825.
- Jubb, K. V. F., P. C. Kennedy, and N. Palmer. 1985. Pathology of Domestic Animals, 3rd ed., Vols. 1, 2, and 3. Academic Press, Inc., New York.
- Karkiuki, D. P., and J. Poulton. 1982. Corynebacterial infection of cattle in Kenya. Trop. Anim. Health Prod. 14: 33-36.

Received for publication 15 October 1987.