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## DEMODICOSIS IN AFRICAN BUFFALO (*Syncerus caffer caffer*) IN BOTSWANA

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**Abstract:** *Demodex cafferi* causes a nodular skin disease in African buffalo (*Syncerus caffer caffer*) resulting in eczematous lesions in severely affected animals. Average prevalence in 193 animals was 28%, infection rates being highest in animals 1 to 3 years old and equal in both sexes. A granulomatous reaction occurred in the lumina of infected hair follicles with numerous mites developing in the follicles and associated sebaceous glands. The *Demodex* in buffalo probably is not transmitted to cattle.

### INTRODUCTION

Dräger<sup>2</sup> studied some of the skin diseases endemic in cattle in the Chobe District of Botswana. These included demodicosis, dermatophilosis and besnoitiosis. During a study of the epidemiology of foot-and-mouth disease virus in native buffaloes, *Syncerus caffer caffer* (Sparrman, 1779), all immobilized animals were examined for skin lesions. In this paper demodicosis in African buffalo is described and compared with the bovine disease.

### MATERIALS AND METHODS

Buffalo were immobilized with M99<sup>□</sup> using the procedure described by Dräger *et al.*<sup>3</sup> While immobilized, all animals were examined visually and by palpation for lesions of demodicosis and other skin conditions. A few nodules were excised and preserved in 10% formol-saline. Contents of other nodules were expressed by digital pressure and collected in 70% alcohol. Mites were dehydrated and cleared and mounted in Hoyer's medium. Tissues were sectioned at 5 µm thickness and stained with haematoxylin-eosin and Verhoeff-van Gieson.

Because of the nature of this exercise, it was practicable to biopsy only a few

nodules for histopathology. Nodules were kept in formalin solution for two years before sectioning could be done and had become very hard; thus great difficulty was experienced in obtaining sections suitable for examination. The discussion in this paper of the histological changes is, therefore, only tentative.

Ages of the buffalo were estimated by Pienaar's<sup>10</sup> criteria.

### RESULTS

A total of 193 buffalo was examined, 131 at Savuti in the Chobe National Park and 62 at Khwai in Ngamiland. Lesions were found in 31 (24%) of the buffaloes at Savuti and in 23 (37%) of those at Khwai, giving an overall prevalence of 28%. The prevalence of demodicosis in animals of different age groups is given in Table 1. Sex prevalence was calculated for all animals up to 6 years old as 25 of 58 females (43%) and 20 of 47 males (43%).

Lesions consisted of intradermal nodules in all but a few severely affected animals. Nodules were 5 to 20 mm in diameter and were covered by normal epithelium with hairs. Areas affected were the head, neck, shoulders and upper part of the forelegs. The severity of the disease was graded (Table 2) according to

□ Etorphine hydrochloride (M99) (Reckitt), Reckitt and Colman South Africa (Pty.) Ltd., Capetown.

TABLE 1. Prevalence of demodicosis in buffalo by age.

Age (years)	Savuti			Khwai			Total		
	Animals in group	Infected No.	%	Animals in group	Infected No.	%	Animals in group	Infected No.	%
Up to 1	8	0	0	2	1	50	10	1	10
Over 1 to 3	43	17	40	17	14	82	60	31	51
Over 3 to 6	24	9	38	11	4	36	35	13	37
Over 6	56	5	9	32	4	13	88	9	10
Totals	131	31	24	62	23	37	193	54	28

the number of nodules found. In a few severe cases, hundreds of nodules in close proximity had caused hyperplasia of the dermis and the development of thick folds of skin. Alopecia was present in these areas, the exposed surfaces being dry with whitish scabs but the skin lining the folds was moist and secondarily infected. All animals were in good condition with the exception of one severely affected young buffalo at Savuti that was poor in comparison with other members of its herd.

The nodules examined in this study had all developed in hair follicles, causing oval to rounded enlargements of the follicles up to 5 mm diameter. The epithelial cells of the external root sheath were hypertrophied, forming the walls of the nodules. Increased vascularity was evident in the hypertrophied layer and the nuclei of the epithelial cells were elongated and flattened, many becoming pyknotic and granular. The nodules

caused compression and displacement of surrounding tissues.

The interior of the nodules was filled with the products of generative processes. These consisted of inflammatory cells together with mites in all stages of development. The cells included lymphocytes, histiocytes and multinucleated giant cells in a matrix of collagen fibres. As nodules aged the cells and parasites in the core underwent necrosis, forming an amorphous mass, and the epithelial cells became keratinized.

Mites also were found in sebaceous glands opening off infected follicles, stimulating an inflammatory reaction with increased vascularization and an accumulation of inflammatory cells including acidophilic granulocytes. Nutting and Guilfoyl<sup>9</sup> found a few instances in which mites had penetrated the epithelium. It would appear that the normal habitat of buffalo demodicids is

TABLE 2. Severity of demodicosis in buffalo.

Degree of involvement	Number of buffalo affected	
	Savuti	Khwai
Less than 10 nodules	19	16
Between 10 and 50 nodules	8	5
Severe cases with more than 50 nodules, some with eczematous lesions	4	2
Totals	31	23

the hair follicle and sebaceous glands which they reach by way of the ducts.

## DISCUSSION

Bovine demodicosis in Botswana has been seen only in areas grazed by buffalo and cattle. Thus the possibility that both hosts were infected by one species of *Demodex* was considered, although Nutting<sup>7</sup> considered demodicids to be the most host specific of all parasitic mites.

Buffalo range over the greater part of northern Botswana. They require a wooded habitat in the vicinity of water and will move onto open grassland or floodplains at night.<sup>11</sup> Such areas also provide good grazing for cattle. As buffalo and cattle normally avoid one another (Patterson, L., 1979, pers. commun.), transfer of mites by direct contact between the two host species would be unlikely.

Wetzel<sup>12</sup> stated that the best opportunity for transmission of *Demodex* occurred during the suckling period. Fisher<sup>4</sup> and Fisher *et al.*<sup>5</sup> have shown that calves delivered from infected cows by caesarian section were free of *Demodex*, and that naturally born calves could acquire infection from their dams during the first few days of the suckling period. Nutting<sup>8</sup> stated that close contact of hosts for an extended period would assist transfer of parasites, although once the mites reached the skin surface transfer must occur quickly because they are rapidly killed by desiccation. Contact between dam and calf would provide the conditions for transfer of parasites.

The majority of the mites obtained from buffalo in this study conformed to the description of *Demodex cafferi* by Nutting and Guilfooy.<sup>9</sup> A few mites appeared to differ from *D. cafferi* but

further work is necessary to determine whether a second, synhospitalic species parasitizes *S. caffer*. Mites from Chobe cattle were identified as *D. bovis* (Stiles, 1892) Desch and Nutting, 1971.<sup>1</sup> It therefore appears that demodicosis in buffalo and cattle in northern Botswana are caused by two distinct species of mites and that cross-infection does not occur.

Clinical demodicosis in buffalo is normally nodular, eczematous lesions occurring only in a small proportion of the severely affected animals. Nodules are limited to the skin of the head, throat, neck and upper forelimbs. In these respects the disease resembles that seen in Chobe cattle. Further study is needed to see if the udder, or adjacent areas of the dam touched by the calf whilst suckling, are infected with mites.

It has not been possible to follow the course of demodicosis in individual buffalo. The prevalence of infection was highest in animals between one and three years old, slowly diminishing as the population aged. Infection may have been subclinical in animals below one year old. No information was obtained on the presence or absence of infection in animals without visible lesions.

Unlike the situation recorded for cattle by Nemeséri and Székely,<sup>6</sup> who found a higher prevalence in cows than in bulls, the sex prevalences in buffalo were identical. The average prevalence of 28% of 193 buffalo is higher than the rates of 4.8 to 6.7%<sup>2</sup> and 6.3%<sup>6</sup> recorded in cattle.

Dräger did not find any evidence that the prevalence of demodicosis in Chobe cattle is significantly affected by season, tick activity or other factors, but comparable data for buffalo are not available. This study was done during the latter part of the cooler, dry season.

## Acknowledgements

One of the authors (ND) was the first to find demodicid mites in African buffalo. While a description of the parasite was being prepared it was learned that Nutting and Guilfooy<sup>9</sup> had already completed a description of this new species from specimens

collected from buffalo in the Kruger National Park and sent to them by Dr. F. Zumpt, South African Institute for Medical Research, Johannesburg, South Africa. We thank Dr. Nutting for the loan of some of his sections of demodectic nodules from buffalo in Kruger Park.

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