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Evidence of Trichuriasis in albino black buck (*Antilope cervicapra*)

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Abstract
Intestinal endoparasites, especially roundworms, are commonly found in many wild herbivores in free range and captivity. The prevalence of roundworms was estimated in the blackbuck at Balasaheb Thackeray Gorewada International Zoological Park, Nagpur. A total of twenty faecal samples were collected from blackbucks from herbivore safari. The samples were processed by the direct mount method. Three samples were found positive. An overall prevalence of 15% was found in the samples examined. No other intestinal worms, larvae or eggs were found in the samples examined. Four animals that were presented for post-mortem examination were also examined for intestinal worms. One animal was found positive for trichuris spp. The worms were recovered and preserved for further examination.

Keywords: Trichuriasis, Black buck, Wildlife, Parasitic infection

Introduction
The intestinal endoparasites are a significant menace in zoo animals, and regular monitoring for assessing the worm load of the animal is critical in wildlife health management. Under captive conditions, most of the variables are controlled by the management, with the advent of safari parks where the animals are provided with larger spaces to extend comfort and well-being. However, there are certain complications in allowing greater freedom to animals, as herbivores are often allowed to interact with other species of animals in safari parks. Also, access to water and pastures that can be contaminated may add infection to the herd. The management of parasitic infections in herds that are under limited interventions is also challenging. Some animals may not be accessible to the protocols like vaccination and deworming. Some infected animals may continue to act as a reservoir of the infection.
Among the antelopes, several helminthic infections have been reported from India's captive and free-range animals. Trichuriasis is a very commonly reported roundworm from India (Bulbul *et al*., 2020) [1]. The worm is commonly called a 'whipworm' due to its morphology. The worm has been reported in humans as well as animals. The worm is commonly found in the caecum and colon of animals, and its high infestation leads to anaemia, diarrhoea and loss of condition in the long term. The infection is by contaminated feed, i.e., by the faecal-oral route. The prevalence of the Trichuriasis in deer species has been reported from 3.3% to 5% in deer. In domestic animals like sheep, the prevalence has been 6.25% to 27.42%, indicating the wide prevalence of the nematode across the species (Jones, 2021). There has been a report of the parasite in many deer species indicating the impact that the parasite can have on captive animals.
In the current study, an effort was made to identify the parasites in black bucks of Balasaheb Thackeray Gorewada International Zoological Park, Nagpur.

Material and Methods
In the current study, the samples of newly transported albino black bucks were collected from the Balasaheb Thackeray Gorewada International Zoological Park, Nagpur. A total of 20 samples were collected from Blackbucks immediately after the droppings were voided. The samples were identified and transported to the laboratory. An effort was made to identify the parasites by direct mount method. The sample was examined under the microscope, and the eggs, if any, were observed and photographed. In the animals presented for post-mortem, an attempt was made to screen for the presence of worms or their eggs. The worms recovered from PM samples were preserved in warm formalin and alcohol for further identification.

All the animals were dewormed with Fenbendazole @ 15 mg/ Kg (Panacur® Tablets) dose rate. The medication was fed and laced in wheat dough balls as per the animal's weight. The samples were collected three weeks later and checked for the parasitic infection. The contamination of the pasture is a concern in the case of the safari management systems. The possibility of resting the entire enclosure is remote and impracticable. Thus regular monitoring and deworming were followed in the herd for the three preceding quarters.

Results

Of the twenty samples screened, three were found positive for trichuriasis; no other sample was positive for any other parasite. No coinfection was noted in the blackbucks screened for the endoparasites. The overall positivity rate for the infection was 15% for the current study. In one of the animals that had tested positive in the screening, worms were recovered at post-mortem examination and preserved in formalin.

Table 1: The results of faecal sample screening for parasites by direct mount method

Sr. No.	Animal ID	Result	Remark
1	BB1	Negative	
2	ABB2	Negative	
3	BB3	Negative	
4	BB4	Negative	
5	BB5	Negative	
6	ABB6	Positive	Eggs found in the faecal sample
7	BB7	Negative	
8	BB8	Negative	
9	BB9	Positive	Eggs found in the faecal sample
10	ABB10	Positive	Eggs found in the faecal sample
11	BB11	Negative	
12	BB12	Negative	
13	ABB13	Negative	
14	BB14	Negative	
15	ABB15	Negative	
16	BB16	Negative	
17	ABB17	Negative	
18	BB18	Negative	
19	ABB19	Negative	
20	BB20	Negative	
21	APMBB6	Positive	Adult worm recovered from the caecum.
22	PMBB11	Negative	
23	PMBB14	Negative	
24	PMBB17	Negative	

Discussions

The black buck is an elegant species marked as endangered and protected under schedule I of the Wildlife Protection Act 1972. The species is under threat due to hunting for meat and horns. The efforts to conserve the species by creating subpopulations in various zoos in India have been a priority for the conservation of the species. The species is hardy and adaptable to central India's dry and hot weather. However, the primary threat to the species under captivity is parasitism, majorly roundworms. There are many reports of parasitic infection in the blackbuck from India, including, There is a significant challenge in limiting the impact of the parasites on the species as the resources are shared under captivity. Albino blackbuck are mutants lacking melanin pigment and are considered disadvantaged due to compromised camouflage abilities. Very little is known about the innate immunity and response to pathogens. In the current study, the albino black bucks were more prone to trichuriasis than the usual black bucks. Though the observation may not be conclusive, the need to investigate the impact of the mutation on immunity is essential.

The evidence of Trichuris in antelopes is crucial for captive wildlife health (Swain *et al*., 2017) [4]. In a safari park, managers have little control over the variables affecting wildlife health. Managing the endoparasites in herbivores is complicated as the animals share space and resources in the large enclosures. Thus, in herding animals, the chances of the spread of the infection cannot be ruled out. Also, the young ones that are raised by the herd pick up the infection early in life. A significant tolerance to parasitism is exhibited by wildlife (Brglez & Senk, 1969) [3]. Healthy animals maintain low levels of infection without any clinical signs. Stress associated with tourism, heat or cold stress, and other environmental extremes can flare up the infection (Mason, 1994) [5]. The recent history of transportation is yet another stressor that can have an impact on parasites. Thus, deworming after a week of transportation is suggested to minimise the impact of parasites.

There are various treatment regimes in the treatment of Trichuris sp. The broad anthelminthic is often used in captive settings. Fenbendazole (5-20 mg/kg) has been reported to eliminate the infection in a single dose completely (Davidson *et al*., 1985) [7]. In the current study, the animals found positive were found to be negative during the follow-up. The combination was found to be effective in treating the infection. The follow-up did not reveal a recurrence of the infection in the herd after the said episode. Trichuriasis infection is widespread among herbivores, and its management is crucial for herd health. The current report highlights the prompt detection and treatment of the herd for the infection, followed by regular follow-up through faecal sample examination.

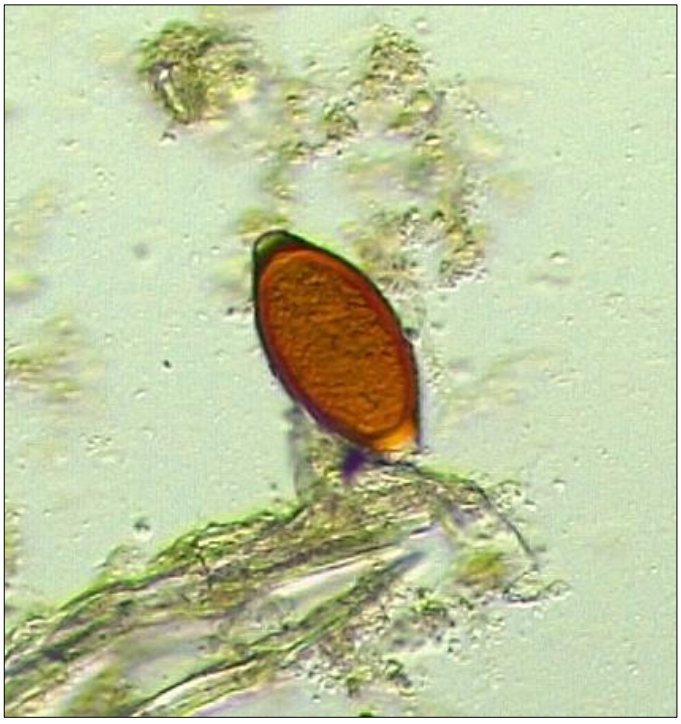

Fig 1: Egg of trichuris spp. In the faecal sample (40X)

Fig 2: Presence of eggs in the uterus in adult worm (40X)

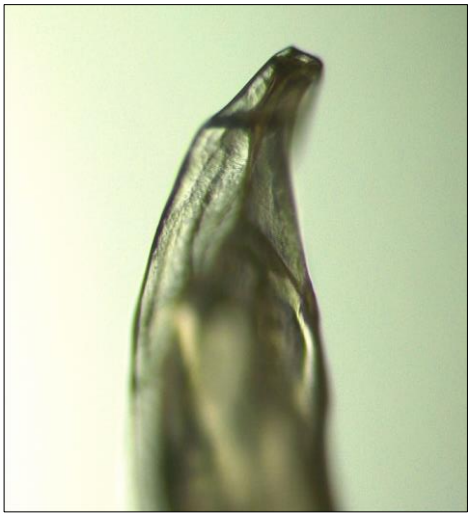

Fig 3: Mouth parts of adult worm (2X)

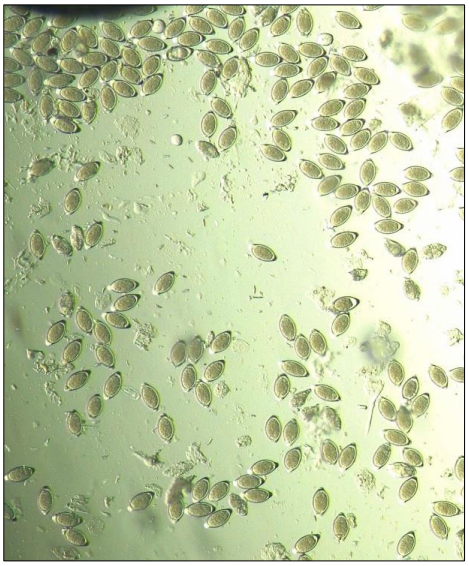

Fig 4: Eggs released from the uterus after dissection (10X)

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