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Post-parturient changes in faecal helminths egg and coccidian oocyst counts of a bushbuck (*Tragelaphus scriptus*), Queen Elizabeth National Park, south western Uganda

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Summary

This paper reports on changes in helminths egg and protozoan oocyst output per gram of faeces, per day of bushbuck for the first time. Faecal analysis followed the standard McMaster technique. Egg counts of all helminth groups and *Eimeria* sp. oocyst rose in the 3.5th week, decreasing during the 6th and 7th week until a minimum infection was reached in the 7.5th – 9th week. A second but smaller rise in strongyle and *Strongyloides* sp. egg output occurred in the 13.5th week.
The infection level of all taxa investigated, three to four weeks after parturition, was found to be significantly higher than during that of the 7.5th, 8.5th and 9th week of the post-partum period (Kruskal-Wallis One Way Analysis of Variance, $P < 0.05$). However, the faecal egg and oocyst counts were generally very low by McMaster standards when compared with counts made by Woodford (1976) on other wild antelopes in Queen Elizabeth N.P.
Larvae from faecal cultures revealed that *Trichostrongylus* sp. formed the majority of strongyle eggs in the 2.5th week, while *Oesophagostomum* was dominant in the 3.5th week. The significant differences in the counts above suggest a possible lapse in the immune status of the female.

Key words: bushbuck; post-partum; helminths; protozoa; Uganda

Introduction

The phenomenon of post-partum rise in nematode eggs in faeces has been intensively investigated in domestic animals especially in ewes, she-goats and cows (Taylor, 1935; Crofton, 1954; Brunsdon, 1964; Ageyi *et al.*, 1991; Hammerberg and Lamm, 1980). It was recognised that, the rise which occurs during spring in temperate zones and in rain season in tropical regions, involved animals of all age groups and both breeding and non-breeding females. The cause is attributed either to the resumption of the development of arrested larvae within the host (Brunsdon, 1967) and /or (especially lactating females) to a reduction in the immune status as a result of the endocrine changes accompanying parturition (O'Sullivan and Donald, 1970). While so much about post-partum rise in faecal nematode eggs of domestic animals has been documented, no information is available for wild animals, particularly for bushbuck.
In this study, we give the picture of changes in faecal helminth egg and protozoan oocyst counts from the 2.5th to the 13.5th week post-partum. Until the time of data collection, the female, which was already habituated and being studied for other purposes, went out of sight and as a result the peri-parturient and /or non-lactation faecal worm egg counts could not be established. Data of this kind is very hard to obtain under natural condition, given the fact that this antelope prefers to inhabit dense vegetation and is a very secretive animal.

Materials and Methods

Study area
Field work was done in Queen Elizabeth National Park (QENP), south western Uganda, between 0° 15' N and 0° 35' S, and 29° 35' E and 30° 20' E. The park, which lies in the floor of the western branch of the African Great Rift Valley, covers an area of 1978 km^2 of grassland, bush (thicket), swamps and forest. However, in the Mweya peninsula, the area of the study, the dominant type of vegetation is bushland-grassland and the plant communities are *Sporobolus pyramidalis* grassland interspersed with *Capparis tomentosa* thicket clumps (Zandri and Viskanic,

1992). The altitude rarely rise above 1100 m above sea level.
The climate is equatorial, with little annual fluctuations in day length (12 hours) or temperatures (monthly mean 22 – 25°C; Deutsch, 1992). Relative humidity is highest during the wet season and lower in the dry season (65.9 – 77.5 %). The dominant rainfall pattern is of two dry and two wet seasons a year. The annual rainfall varies from about 400 mm to 1400 mm depending on the locality. During this investigation, the annual rainfall of the study area was 680 mm.

Data collection
By continuously monitoring the female from the 2.5th – 13.5th week post-partum, faecal helminths egg and coccidian oocyst output per gram of faeces, per day, were established. Data collection took place during the wet season (25.10.2001 – 10.01.2002). Faecal droppings were collected soon after the focal animal had left the scene. Faecal samples from each sampling sequence, also called a block, were investigated. Each block lasted between 12 – 96 hours (for detail, see Fig. l). Since the animal was followed continuously throughout each block, together with the help of efficient and reliable facilities (e.g. a wide-beam night search light, radio tracking equipment, and a light intensive binocular), all faeces including those dropped at night were certainly visible and collected.

Preparation and examination of the faecal emulsion
Five grams of fresh faecal pellets were ground using suitable apparatus to fine particles and mixed with 70 ml of saturated sodium chloride solution (the sodium chloride crystals were dissolved in fresh tap water). The mixture was filtered through a tea strainer to remove the coarse faecal materials. Well mixed sub-samples from the filtrate were transferred into the McMaster egg counting chambers, filling each chamber at a time. The nematode and cestode eggs and coccidian oocysts that floated on the solution were identified and counted. Eggs were counted under the magnification x10 and oocysts under x 40. The number of eggs and oocysts per gram (epg/opg) was then obtained by multiplying the total counts, of each type of parasite egg or oocyst, from both chambers, by 50. The number of eggs /oocysts per gram of faeces were divided by the total number of hours each sampling sequence lasted to arrive at the counts per day. Identification, done partly in the field and at the Faculty of Veterinary Medicine, Makerere University, Uganda, followed the keys provided by Hansen and Perry (1990), the Ministry of Agriculture, Fisheries and Food, United Kingdom (1971), Soulsby (1968) and Bürger and Stoye (1968). The taxonomy followed Woodford (1976), Round (1968) and Soulsby (1968). Attempts were made to culture faeces to establish the different nematode generic groups whose eggs contribute to the strongyle eggs. The larval culture, isolation and identification method followed that described by Hansen and Perry (1990).

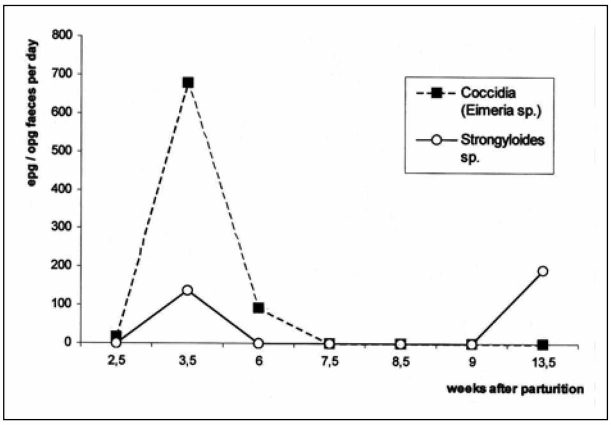

Fig. 1. Post-partum changes in faecal *Strongyloides* sp. egg and *Eimeria* sp. oocyst counts in bushbuck, N = 2 (block I); N = 3 (block II); N = 4 (block III); N = 4 (block IV); N = 6 (block V); N = 5 (block VI) N represents the number of faecal samples collected at different times within each block sampling

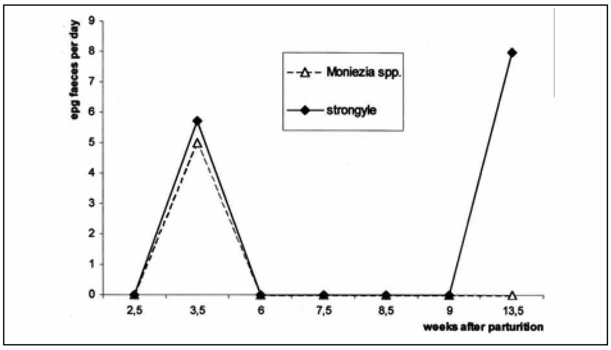

Fig. 2. Post-partum changes in faecal strongyle and *Moniezia* spp. egg counts in bushbuck, (N is the same as in Fig. 1)

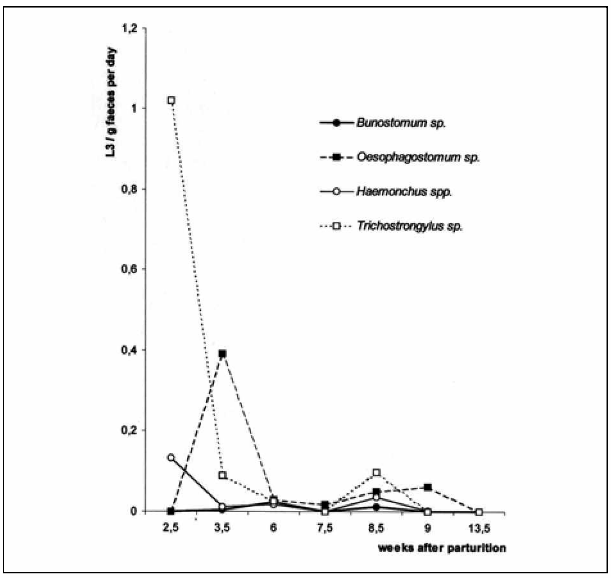

Fig. 3. Post-partum changes in the composition of nematode generic groups (in strongyle egg count) established using larvae from faecal cultures in bushbuck, (N is the same as in Fig. 1)

Results

Changes in faecal strongyle, Strongyloides sp. Moniezia spp. egg, Eimeria sp. oocyst and larvae counts.

A pronounced rise in mean egg (all helminth groups) and *Eimeria* sp. oocyst production occurred in the 3.5th week after parturition, dropping in the 6th week until they reached a non-detectable stage in the 7.5th – 9th week post-partum. A second but smaller rise in only strongyle and *Strongyloides* sp. egg output occurred in the 13.5th week.

The daily mean egg and oocyst output recorded during the first peak involved: 5.7 eggs/g of faeces (strongyle); 137 eggs/g faeces (*Strongyloides* sp.); 5 eggs/g faeces (*Moniezia* spp.) and 679 oocysts/g faeces (*Eimeria* sp.). During the second peak, the values were 8 eggs/g faeces (strongyle) and 192 oocysts/g (*Strongyloides* sp.). (Figs. 1, 2). The parasite load of each block was tested pair wise against each other. Significant differences in faecal egg and oocyst counts were seen between the 3.5th and 7.5th; 3.5th and 8.5th; 3.5th and 9th weeks but not between other pairs of weeks (Kruskal-Wallis One Way ANOVA, $P < 0.05$).

Changes in the composition of nematode generic groups were established using larvae from faecal cultures. Results showed that larvae from *Trichostrongylus* generic group formed the majority of strongyle eggs in the 2.5th week, while *Oesophagostomum* was dominant in the 3.5th week (Fig. 3)

Discussion

However, the faecal egg and oocyst counts were generally very low by McMaster standards when compared with counts made by Woodford (1976) on other wild antelopes in Queen Elizabeth N.P.

The significant differences in the egg and oocyst counts between the 3.5th and the 7.5th; 3.5th and 8.5th; 3.5th and 9th weeks after parturition provide evidence of a lapse in the immune system of the female at this time, resulting to the inability to restrain the activities of parasites in the gut. The consequence was an increase in egg and oocyst production. In ewes, she-goats and cows, increase in faecal worm egg counts shortly before parturition and during lactation has been well documented and is attributed to the production of prolactin, which lowers the resistance of the female to infections (Angus, 1978).

As a result, majority of the infective nematode larvae acquired from pasture as well as emergent hypobiotic larvae, which would be rejected for most part by the non-pregnant or non-lactating female, have an extended life and become more successful in the female (Angus, 1978). At the same time, female worms take advantage of the reduced immunity of their host to improve their reproductive potentials (Angus, 1978). But if the host-parasite system has reached an equilibrium and if the female experiences no nutritional stress, both factors which were present during this study, then hormonal changes accompanying parturition have little effect on the immune status of the female and so with the gut worm burden. That is probably the reason why the overall worm burden was very low. Additionally, bushbuck are selective, concentrate feeders who mainly browse on shrubs and woody herb species and parts (Apio, 2003) of higher nutrition values than grasses, enhancing their immune capabilities and increasing the capacity to fight infections. Also, bushbuck were found to prefer browsing on vegetation at heights well above the ground where the risk of infection with larvae of gastrointestinal tract nematodes is very low (Apio, 2003).

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