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Coccidia oocysts in the faeces of farmed ostrich (*Struthio camelus*) chicks in Botswana

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ABSTRACT

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Coccidia oocysts were demonstrated in the faeces of 53 (about 34%) of 156 apparently healthy ostrich chicks. Young chicks had the highest proportion of infestation while those more than 9 weeks old had no oocysts at all in their faeces. These coccidia may be considered non pathogenic since the infected chicks grew normally without any evidence of diarrhoea.

Keywords: Coccidia, *Eimeria,* ostriches

INTRODUCTION

Coccidia are intracellular protozoal endoparasites which usually multiply in the digestive tract of mammals and birds (Soulsby 1986). *Isospora struthionis* has been described from an ostrich in a Russian Zoo (Yakimoff 1940). Unnamed *Eimeria* species have also been reported from ostriches in North America (Beavers 1990). Outbreaks of coccidiosis in farmed ostriches have been occasionally suspected in South Africa but they have not been confirmed by the demonstration of oocysts in the faeces (Huchzermeyer 1994). Coccidia oocysts have also been demonstrated in the faeces of healthy ostriches in Zimbabwe (Foggin 1992). In the host-parasite list of pigeons, doves and ostrich the protozoa of the digestive tract include *Eimeria columbae, E. columbarum, E. labbeana and E. tropicalis* (Soulsby 1986).

We report on the demonstration of coccidia oocyts in the faeces of apparently healthy ostrich chicks in Botswana.

MATERIALS AND METHODS

Fresh faecal samples were collected from the pens of ostrich chicks in a commercial ostrich farm in the Lobatse district in Botswana. The faecal samples were transported in a thermos flask containing ice blocks in order to prevent the hatching of worm eggs and sporulation of oocysts. The chicks were hatched from eggs laid by ostriches which had been on this farm and may be considered a second generation of domestication. There were no wild-caught ostriches on this farm. The ostrich chicks were raised on concrete pens which were carefully cleaned twice a day. The floors were scrubbed with water containing Virkon disinfectant. On the second day after hatching each chick was given 5 mℓ of yoghurt per os to supply lactobacilli with the aim of populating their hind guts. The chicks were fed on commercial ostrich starter mash to which chopped lucerne was added. Water, to which vitamins, minerals and trace elements contained in a commercial stress pack was added,

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was provided *ad libitum*. At 2 weeks of age, they were drenched with an anthelmintic (Panacur).

The faecal samples were examined after floatation in a saturated NaCl solution in a modified McMaster slide (Soulsby 1986). Some oocysts were measured to determine their morphometric dimensions using a calibrated ocular micrometer. Sporulation was attempted in petri dishes using 2% potassium dichromate at room temperature.

RESULTS

The study was carried out over two ostrich breeding seasons. In the initial study (June 1996 to February 1997) oocysts were demonstrated in the faeces of 12 out of 36 samples giving an incidence of 33,3% (Table 1). There was a mean oocyst count of 90 with a range of 50–250 (Table 1). Oocysts could only be detected in the faeces of chicks less than 8 weeks old, and they failed to sporulate after incubation for 2 weeks. Helminth worm eggs were not detected.

In the following ostrich breeding season (June 1997 to February 1998) faecal samples were collected each week from 10 chicks. Oocysts were demonstrated in 41 out of 120 samples giving a prevalence of 34,16% (Table 2). The overall prevalence for the two breeding seasons was 53 out of 156 giving a prevalence of 33,97%. Coccidia oocysts were seen for the first 9 weeks and none thereafter (Fig. 1). One-week old chicks had the highest mean oocyst count, and the count decreased with age. During the 2 years of the study period faecal abnormalities such as fluid faeces were not detected, and the chicks were in very good condition.

The oocysts appeared colourless and varied in shape, from spherical to ellipsoidal. Thirty oocysts were ellipsoidal (Fig. 2a) and had a size range of 27–30 x 22–22,5 µm, with an average size of 28 x 22 µm.

TABLE 1 Coccidia oocysts in ostrich chicks: June 1996 to February 1997

Age in weeks	Proportion positive	Mean oocyst count	Range
3	1/3	50	50
4	5/7	110	50–250
5	2/3	100	100
6	4/7	100	100
8	0/6	–	–
10	0/10	–	–
Total	12/36	360	–
Mean	33,3	90	–

TABLE 2 Coccidia oocysts in ostrich chicks: June 1997 to February 1998

Age in weeks	Proportione positive	Mean oocyst count	Range
1	10/10	140,0	50–250
2	8/10	125,0	50–250
3	7/10	135,0	50–250
4	4/10	125,0	50–200
5	4/10	112,5	50–200
6	3/10	100,0	50–150
7	2/10	75,0	50–100
8	2/10	50,0	50
9	1/10	50,0	50
10	0/10	–	–
11	0/10	–	–
12	0/10	–	–
Total	41/120	787,5	–
Mean	34,16	87,5	–

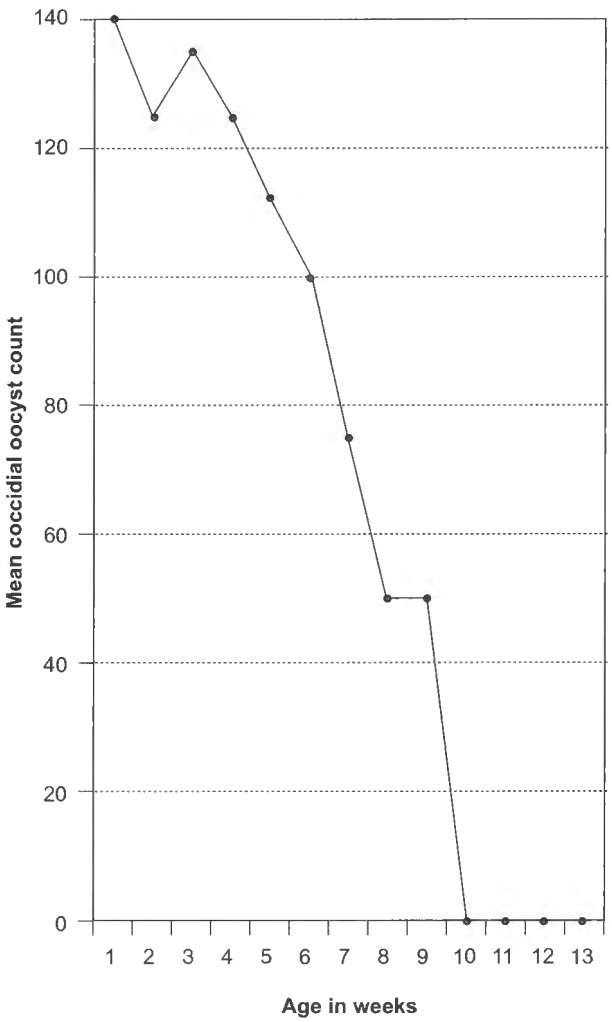

FIG. 1 Weekly coccidia oocyst counts from ostrich chicks

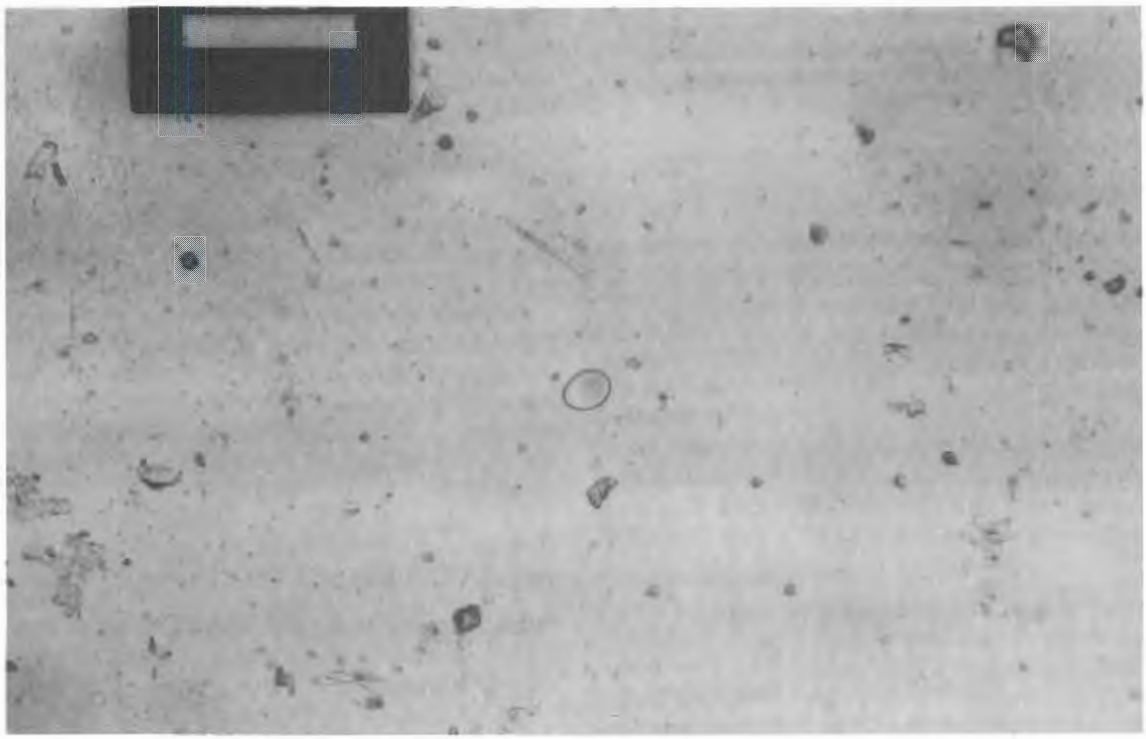

FIG. 2a Ellipsoidal oocycst, x 200

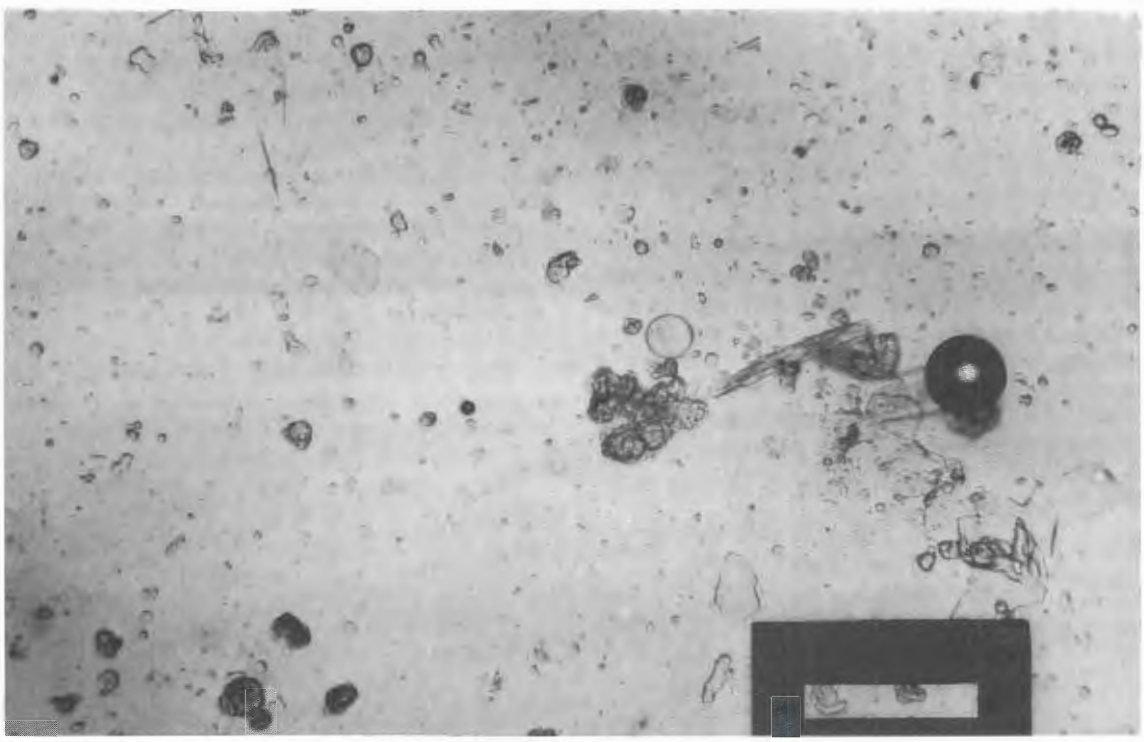

FIG. 2a Spherical/subspherical oocycst, x 200

They had discernible micropyles. Thirty-two oocysts were spherical/subspherical (Fig. 2b) and had a size range of 18 x 18–22,5 x 22,5 µm with an average size of 21 x 21 µm.

DISCUSSION

Coccidia oocysts were demonstrated in the faeces of about 34% apparently healthy ostrich chicks. Such oocysts have also been found incidentally on faecal examination of ostriches from at least three farms in Zimbabwe (Foggin 1992). Since no clinical disease nor pathology was associated with these coccidia oocysts it may be considered that these coccidia are apathogenic for ostriches. Generally coccidia show varying pathogenicity in most hosts (Soulsby 1986). The pathogenicity of the coccidia found in ostrich chicks requires further experimental investigations.

The lack of pathogenicity could be due to the fact that only low oocyst counts were obtained ,whereas high coccidia oocyst counts are found in the faeces of animals suffering from disease induced by pathogenic strains of coccidia (Soulsby 1986). This could also be a character of this strain. Young chicks had the highest proportion of infection and similarly, the oocyst counts were highest in the young chicks. It seems probable that the chicks over 2 months old had developed some acquired resistance to the coccidia. Generally coccidia show host specificity and there is an immune dependant rejection in a foreign host (Kogut 1990).

In this study the source of the oocysts was not determined but the chicks were raised on concrete floors maintained in a good hygienic condition. The possibility that the chicks were hatched with the coccidia infection, also requires further investigation for vertical transmission in birds has not been reported .

The spherical/subspherical oocysts resembled those of *Eimeria tropicalis* in size and shape. *E tropicalis* has been reported in pigeons, doves and ostriches as being spherical to subspherical with a size of 19–24 x 18–23 µm (Soulsby 1986). Pigeons were seen in the ostrich pens and since they are the true hosts of *E. tropicalis* and that through coprophageal ingestion of such droppings they could be a possible source. However it is not known whether *E. tropicalis* occurs in southern Africa. The common dove/pigeon coccidia is *E. labbeana* with oocysts much smaller (Soulsby 1986) than those measured in this report. The identification of the ellipsoidal oocysts, on the other hand, could not be relegated to any coccidial species. Failure to sporulate hampered their identification but they were different from the cryptosporidial oocysts found in the faeces of ostriches exported from Botswana to Canada (Gajadhar 1993). A cryptosporidium species was seen in sections of the bursa of Fabricius of ostrich chicks in South Africa (Allwright & Wessels 1993). Although the oocysts were not associated with diarrhoea, the possibility that they could predispose the chicks to prolapse of the cloaca should be considered (Allwright & Wessels 1993).

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