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Prevalence of endoparasites in ostriches (*Struthio camelus*) raised in selected states of northern Nigeria

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Introduction

Ostrich farming has become an extended activity in places where these birds did not exist previously. However, little is known about the diseases that may affect these animals (MARTINEZ-DIAZ ET AL., 2001) that are also known to be host to a number of parasites (MCKENNA, 2001). Also, large sums of money are being invested in ostrich farming and a high return is expected. Therefore, early attention to the control of potentially costly infectious disease is essential (LISTER, 2003).

Ostrich diseases and parasites reported in Africa include anthrax, tapeworm, nematodes, ophthalmia, lice and ticks (DAVIS, 1998). Mortality and health problems diagnosed mainly in chicks and juveniles include starvation and malnutrition, intestinal obstruction, leg abnormalities and coliform infections. Other problems include improper brooding or nutrition, stress, improper handling, and genetics. On health, welfare and economic grounds, therefore, it is obvious that the ostrich industry must operate on the basis of prevention being better than cure (LISTER, 2003).

Today ostrich farms are considered to be among the most profitable agricultural projects (SHANAWANY, 1994). Ostrich feathers are used to clean fine machinery and equipment as well as for aesthetics and in the fashion industry (SHANAWANY, 1994). The demand for ostrich meat in the international market has been due to its low cholesterol level (SHANAWANY, 1994). Research in ophthalmology points to the possible use of ostrich eyes in corneal transplant (SHANAWANY, 1994). Ostrich brain produces a substance that is being studied for the treatment of Alzheimer's disease and other types of dementia (SHANAWANY, 1994). Furthermore, the tendons of the ostrich leg are used to replace torn tendons in human leg (SHANAWANY, 1994). However, all these benefits can be derived from the ostrich only when production techniques are enhanced, chief amongst them being the bird's state of health and wellbeing.

This paper, therefore, looks at the prevalence of endoparasites of farmed ostrich in selected states of northern Nigeria with a view to suggesting ways of controlling them to enhance the growth of this important emerging industry.

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Materials and Methods

This study was carried out on seven ostrich farms in three states of northern Nigeria, namely Kaduna, Kano and Plateau States. On each farm, faecal samples were collected at random in the early hours of the morning using clean polythene bags and later transferred into a plastic container with 5 ml of 10 % formalin to preserve the eggs. A total of 135 ostrich faecal samples were collected.

All samples collected were labeled serially. The seven ostrich farms were identified as I to VII. Faeces were collected during farm visits between May and September 2004. Parasitological examination was performed on fresh faeces using floatation and sedimentation methods of SOULSBY (1965). Out of the 135 faecal samples subjected to parasitological examination, only results from 121 samples were analyzed using descriptive statistics. The remaining 14 samples were not included in this study due to cases of mixed infection.

Results and Discussion

The distribution of endoparasites according to farm is presented in Table 1. Nematodes were recorded in all farms except farms I, III and IV. All farms recorded *Eimeria* oocysts with the exception of farm V. Mites were seen in samples from all the farms except farm III. all farms recorded samples that had no endoparasites to a varying degree with farms I, II and III having a higher frequency of negative samples when compared to others. However, caution must be exercised when interpreting this result because samples taken from individual farms were not equal in size. This phenomenon was a major limitation of the work. Irrespective of this limitation, reasons for high isolation of endoparasites could be due to lack of reliable history of strategic anthelmintic medication as well as poor sanitary conditions and faulty management practices in private farms (IBRAHIM ET AL., 2006).

The distribution of endoparasites according to age of ostriches is presented in Table 2. Samples from chicks revealed no nematode eggs but a little below half (43.5%) of them had *Eimeria* oocysts. Less than one-fifth (17.1%) of samples from adults showed some nematode eggs while 6.7% of them revealed *Eimeria* oocysts. The wet season creates conducive environment for hatching of viable nematode eggs which sustain infection within the pen for long period of time. Coprophagic behaviour of ostriches during the rainy season coupled with lack of proper supplementation by producers makes them more vulnerable to various endoparasites. The presence of grass in pens during the rainy season makes adult birds prone to infection with infective stage 3 larvae of *Libyostrongylus douglassii* which is negatively geotactic and tends to climb to the tip of blades of grass in film of moisture (ANDERSON, 1992). The absence of nematode eggs in samples from chicks could be due to the rearing system practiced on the farms whereby the young are kept indoors in a confined shelter and fed on commercial feed reducing their chances of contracting nematode infection. Coccidian oocyst, on the other hand, is said to be a common finding in chicks (SUSAN, 1998). This could be a result of early contamination in the incubator or exposure through feed and water. The chick rearing facility is usually a shelter that has a source of heat and it opens into an elongated space conducive for oocyst to sporulate at a temperature of 21 to 31^{o}C with adequate moisture and oxygen.

Table 1. Distribution of endoparasites according to farm

	Number and rate of isolation				
Farm	Nematode	*Eimeria*	Mites	Negative	Total
I	0 (0.0)	3 (12.5)	1 (4.2)	20 (83.3)	24
II	3 (7.1)	6 (14.3)	4 (9.5)	29 (69.0)	42
III	0 (0.0)	2 (16.7)	0 (0.0)	10 (83.3)	12
IV	2 (25.0)	1 (12.5)	2 (25.0)	3 (37.5)	8
V	2 (33.3)	0 (0.0)	1 (16.7)	3 (50.0)	6
VI	0 (0.0)	1 (9.1)	3 (27.3)	7 (63.6)	11
VII	11 (61.1)	1 (5.6)	3 (16.7)	3 (16.7)	18
Total	18 (14.9)	14 (11.6)	14 (11.6)	75 (62.0)	121

Figures in parenthesis are percentages

Table 2. Distribution of endoparasites by age

	Number and rate of isolation				
Age group	Nematode	*Eimeria*	Mites	Negative	Total
Chicks	0 (0.0)	7 (43.8)	2 (12.5)	7 (43.8)	16
Adults	18 (17.1)	7 (6.7)	12 (11.4)	68 (64.8)	105
Total	18 (14.9)	14 (11.6)	14 (11.6)	75 (62.0)	121

Figures in parenthesis are percentages

The most interesting part of this study is the finding of mites in ostrich faecal samples. WERNECK ET AL. (2007) reported unexpected microscopic oval structures in human clinical stool samples in Brazil and surprisingly these structures were identified as mite eggs, sometimes accompanied by adult mites. The pathogenic significance of finding adult mites and mite eggs in human faecal specimens is not fully understood and there are very few studies on the subject (WERNECK ET AL., 2007). OLD ET AL. (2006) reported the isolation and identification of the fur-clasping mite *Myocoptes musculinus*, from the faeces of the Spinifex Hopping mouse (*Notomys alexis*). They propose that ingestion of mites due to grooming may explain their occurrence in faecal matter. Adult and mite eggs may, in theory, contaminate unused specimen containers before they are filled (WERNECK ET AL., 2007). Mites were also observed at colonoscopy of symptomatic human patients in China, strengthening the hypothesis of intestinal acariasis (LIU ET AL., 2003). SOULSBY (1982) also highlighted the possibility of mites to naturally infect intestinal organs of animals.

Type of endoparasite eggs and their frequency of isolation are presented in Table 3. *Eimeria* oocysts, trichostrongylid, strongylate and *Amidostomum* eggs were isolated in this study. The presence of trichostrongyloid-type and strongylate-type nematode eggs could provide some circumstantial evidence for the existence of *Libyostrongylus douglassii*.

Table 3. Types of endoparasite eggs and their frequency of isolation

Egg type isolated	Number of cases	Frequency (%)
Trichostrongylid – type	8	25.0
Strongylate – type	5	15.6
Amidostomum eggs	5	15.6
Eimeria oocysts	14	43.8
Total	32	100.0

Conclusion and Recommendations

The results from this study show that ostriches in northern Nigeria are susceptible to endoparasites which if not looked into could lead to losses to the producer and the emerging ostrich industry. To avoid this, regular anthelmintic prophylaxis for both chicks and adults should be practiced by producers and management practices should be improved especially with breeders. There is tendency for mite eggs to be incorrectly classified as helminth eggs and this submits the bird to unnecessary costly treatments to be shouldered by the owner. Laboratory staff should, therefore, be trained to recognize and differentiate mite eggs from those of helminths when performing ova and parasite examinations. Finally, more comprehensive studies should be carried out to highlight different aspects of parasitism in this bird and its impact on the bird and the emerging ostrich industry in northern Nigeria.

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