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Identification of Internal Parasite Causing Chicks Mortality on Ostriches and Parasite Surveillance on Great White Pelican in Abijata-Shalla Lake, Oromia Region, Ethiopia

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Abstract: Ostriches (*Struthio camelus*) are big flightless birds, very good runners, scientifically called ratites because of the absence of the keel of the breastbone. They rely on strong legs with two clawed toes used for running and kicking. Parasitism is considered as a potential health problem hindering the development of ostrich production resulting in economic losses. A study was carried out in Abijata-shala lakes National Park sits in the southern Oromia region and east of the batu-shashmane highway, Ethiopia, from October 22, 2021 to November17, 2021 to identify the main internal parasites that cause young ostriches chick mortality and great white pelican. A total of 32 fresh faecal samples purposively 15 from captive ostriches and 17 from great white pelican (GWP) were collected to identify endoparsites. Parasites were identified using flotation and McMaster techniques. Out of 15 fecal samples that were examined for internal parasites libyostrongylus eggs 15 (100%) prevalence with the severe infection of ostriches were recorded. From 17 great white pelican ascaridia 8 (47%) and other mixed infection 8 (47%) were detected respectively. The overall prevalence of white pelicans were 16 (94%). The total prevalence of the parasite were 31 (97%) recorded in both species. The finding indicated that all samples from ostrich were identified a parasite egg of Libyostrongylus nematodes. Female ostriches 4 (50%) were found to be high in parasite burden and 8000-10, 800 egg per gram were recorded while most of the male ostriches are found to be low parasite burden compared to the female ostriches. The park had significant prevalence levels of the common and pathogenic libyostrongylus nematodes. Further molecular research is required to identify the species and genotype levels of nematodes and related risk factors in Ostriches.

Key words: Ostriches · Great White Pelican · Internal Parasites · Abijata-Shala Lakes

INTRODUCTION

Ostriches (*Struthio camelus*) are big flightless birds, very good runners, scientifically called ratites because of the absence of the keel of the breastbone [1]. They rely on strong legs with two clawed toes used for running and kicking. Male are black with white wings and tail feathers, while females are brownish-gray. They are resourceful and adaptable grazers. They feed on grasses, shrubbery, berries, seeds and succulents. They are also eat insects and small reptiles. The ostrich industry is considered as a multi-processing business producing a number of commodities as feathers, leather and meat [2].

They are classified in to two species as common and Somali ostriches. Common ostriches are again classified into four sub-species namely: *Struthio camelus camelus (S. C. camelus), Struthio camelus australis (S. C. australis), Struthio camelus massaicus (S .C. massaicus)* and *Struthio camelus syriacus (S. C. syriacus)* this last subspecies was formerly found Arabian Peninsula, in Syria and Iraq till it became extinct in 1966. The other species Somali ostriches *Struthio camelus molybdophanes* (*S. c. molybdophanes*) have recently recognized as a full species. The wild common ostrich population has declined drastically in the last 200 years, the North African ostrich (*S. C. camelus*) has declined to

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the point where it now is included on cites appendix I and some treat it as critically endangered [3]. Currently the two main sub- species of ostriches are found in Ethiopia (the North African ostrich (S. C. camelus) and Somali ostriches (*S. c. molybdophanes*). The quality of the chick breeding depends on the health and nutrition of the parent bird health, nutrition of chicks and veterinary sanitary conditions in which the chicks are bred [4].

Both internal and external parasites affect ostriches. Usually careless management, high bird density as well as poor hygiene contribute to parasitic infection. The wireworm (stomach worm) - *Libyostrongylus douglassii*, a parasite of the digestive system causing libyostrongylosis (gastric verminosis, "rotten stomach"), is the economically most significant gastrointestinal parasite of ostriches, causing serious losses. It belongs to a genus of nematodes in the family Trichostrongylidae. The most frequently reported species have been among helminthes, *Libysotrongylus douglassii*, *Houttunia struthionis* and *Codiostomum struthionis* [5].

In ostrich farming is difficult to obtain the necessary production, economic and conservation results without protection of bird health. For successful breeding of ostriches, first of all, it is necessary to have sufficient knowledge about their vital activity. Only then is it possible to reduce the risk of their morbidity to a minimum. The key to success in this area is three factors: a complex of veterinary preventive measures, a high-quality feed base, strict adherence to the technological process. One of the most common problems in captive breeding of ostriches is the fight against parasitic diseases [6]. The most pathogenic worm that can parasitize ostriches is the wire worm (*Libyostrongylus douglassii*) [7]. This species is a hematophagous nematodes found in the proventriculus and ventriculus of ostriches. Cases of Libyostrongylus associated proventriculities, with the lining of the stomach had a moth eaten appearance [8]. Scientific knowledge of ostrich disease is incomplete and very fragmented, with specific details on technical aspects of diagnostic and or screening tests completely absent in most cases. *Salmonella* Typhymurium is common in multi species collections and causes mortality in chicks younger than 3 months [9]. Avian influenza is another cause of mortality in ostriches. The 1st highly pathogenic sub-types affecting ratites was reported during the 2000 epidemic of H7N1 in Italy. Low pathogenic sub types were isolated in South Africa from1991 to 2004 [10].

Great White pelicans (*Pelecanus onocrotalus*) breed in Africa, Europe and Asia from Greece to Vietnam. In Africa, the Western Cape is probably the only place in the world where pelican numbers have shown a sustained increase over the past few decades. Nothing is known regarding the prevalence of pathogens present in these population [11].

Currently Africa is the only place where ostriches are found in the wild. Ethiopia hosts this species in different parts of the country. Abijata-Shala lakes national park is one of these kinds of places where about 20 ostriches are kept. It was established to keep and save some ostriches from potential threat during war in the country. There are different studies that have been conducted in this farm but none could address the issue related with the health of this ostriches. And the management of the ostriches in the park has never assessed. Therefore, this study is to identify internal parasite that causes young stock mortality in ostriches found in this park and also to assess the general management status of the farm.

MATERIALS AND METHODS

Study Area: The study was conducted in Abijata-shala lakes National Park which is found 237 km west of Addis Ababa. The park is placed in 243 s. q kilometers of which the farm accounts 40 s. q km of the total park area. The habitat is mainly grass land with semi-arid and annual rainfall of 2500mm.

Study Population: The study was conducted on ostriches and great white pelicans that were inhibiting the Abijata-shala lakes national park. Fifteen of the nineteen ostriches were used in this study.

Study Design, Sampling and Sample Collection: A correctional study was conducted on ostriches and great white pelican to determine the cause of young chicken mortality at Abijata-shala lakes national park. Purposive sampling was used among the 19 ostriches on the farm. Marking the distinct resting area for each bird helps to avoid double sampling. And 17 fecal samples were collected from great white pelicans from the resting site on the shore of the lake Abijata. Each fecal sample was collected using universal bottle and preserved using potassium permanganate to avoid egg hatching and distortion. Ice box was used to keep the cold chain.

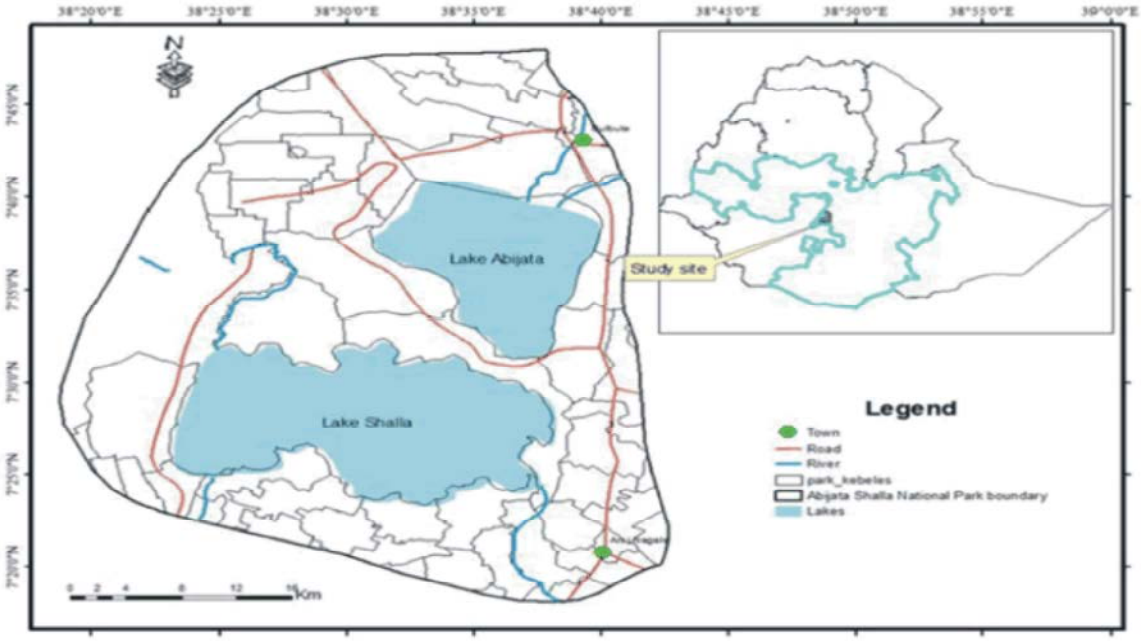

Fig. 1: Map of the study area by Hamera *et al*. [12]

The McMaster technique was used to count eggs, while the flotation technique was used to identify helminth ova and oocyst [13]. Fresh Fecal sample was collected and submitted to animal health institute for parasite examination. Site visit and discussion with the park management and park experts was also held to get an overview of the general farm management status.

Data Management and Analysis: The collected data were edited, filtered, coded and entered into Microsoft Excel® 2013. The proportion of each internal parasite in the total Ostriches and Pelican were determined by using descriptive statistics. For the purpose of analysis the infections of the parasites were classified as low (< 500 EPG < 500 EPG), moderate (500-2000 EPG 500-2000 EPG) and high (> 2000 EPG > 2000 EPG) as described by Obonyo *et al*. [1].

RESULTS

A total of 15 fecal samples of ostriches were examined and the overall prevalence was 15 (100%) with the predominant nematodes were Libyostrongylus eggs were detected. 17 Great white pelicans were examined for internal parasite the overall prevalence 94% of which 9 (53%) were Ascaridia eggs, the rest were 7 (41%) were mixed nematode parasites were recorded. The overall prevalence of the ostriches and great white pelicans were 31 (97%) recorded (Table 1). On the other hand all samples from ostrich were identified a parasite egg of libyostrongylus nematodes (Table 2).

The female ostriches were found high in parasite burden. 4 out of 8 females have a record of high egg count least with 8000 eggs per gram and highest 10, 800 EPG while the male ostriches are found low in eggs per gram. One sample from male ostrich has a high burden of eggs.

DISCUSSION

Although there are few studies recorded on parasites of farm ostriches globally, little or no studies have been conducted in Ethiopia this might be due to the presence of ostriches more in the wild than kept for ostrich products in farms. The 100% prevalence of gastrointestinal helminthes infection in Ostriches in Abijata-Shala lakes national park shows that farmed ostriches have a high vulnerability to parasite infections unless the feeding, housing and health management of the farm is not well addressed. This agrees with the findings of Elsayed [15] who identified almost a similar prevalence level of gastrointestinal helminthes in farmed ostriches in Egypt. Similarly, Lybyostrongylus was detected in three departments of Colombia [16]. From 17 GWP fecal samples tested for the presence of parasite,

Table 1: Prevalence of parasite on ostriches and great white pelicans

Species tested	No. of samples	Number of positive	Prevalence (%)
Ostrich	15	15	100
Great white pelican	17	16	94
Overall prevalence	32	31	97

Table 2: Parasite species identified from ostriches and great white pelicans

	Types of parasite				
Bird species	Ascaridia	Libyostrongylus	Negative	Other nematode	Grand Total
GWP	9		1	7	17
Ostrich		15			15
Grand Total	9	15	1	7	32

Table 3. Parasite burden of ostrich in Egg per gram count

	Burden of a parasite			
Sex	High	Moderate	Low	Total
Female	4 (50%)	2 (25%)	2 (25%)	8 (100%)
Male	1 (11%)	2 (22%)	4 (44%)	9 (77%)

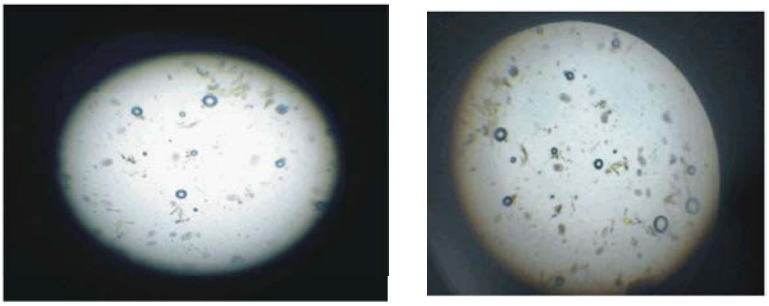

Fig. 2: Lybostrongylus eggs from microscopic field view at helminthology laboratory in AHI

resulted 16 samples were positive for a parasite eggs while one sample is negative for any parasite egg. The overall prevalence of the parasite was 31 (97%). Similar types of parasites of GWP with a different level of prevalence have been revealed by Kinsella *et al.* [17] who identified different species of nematodes in Florida USA. There was also a report from Brazil in Lelis *et al*. [18] with the average egg per gram count was 4631 and 587 in two farms where the overall highest values of egg pergram were associated with the rainy season on both farms. But further study is necessary to find out factors related with the burden of the parasite.

The management of ostrich farm in Abijata shala lakes national park, all aspects of it are not well organized and hence not properly efficient. The feeding system lacks providing of nutritious feeds and hence ostriches are left to forage outside of the farm. These may causes the ostriches to acquire parasites infections from the feed they consume outside. The egg and chicken management also lack proper organization and arrangement to keep the ostrich in good health, these have also been revealed in Girma *et al*. [19]. In conclusion, this finding, internal parasites harbour the population of the ostriches in park with a range from low-high parasite burden with pathogenic. Lybostrongylus nematodes. Great white pelicans have also examined for the presence of parasites. But there is no evidence that the parasites are shared between ostriches and pelicans as the laboratory examination resulted with distinguished types of parasites for each species of bird.

Generally, internal parasites has related with production loss and compromised immune system. Hence, the decreased production rate of ostriches in the park can be related with the high burden of parasites along with poor feed supply. Chick management was also found very poor witnessed through the presence of disturbance to the newly hatched chicks and agitated parents. The park management put disturbance as a major cause for a chick mortality and egg distortion. Veterinary sanitary and health follow up has found poor indicated by the high

burden of parasites examined from ostriches. Absence of record keeping protocol inhibits the information flow of a historical data. Therefore the feed was prone to get spoiled from poor handling like mold and fungi. Most of ostriches found burdened by internal parasite infestation (Libostrongylus). This probably influences the production, elevate the stress level, affect the body condition and suppress the immune system and chicken mortality in general. Therefore, the ostriches should get supplementary feed based on scientific data on feed that could fulfill the proper nutrition requirement, an independent good farm management should be established that solely works on the farm and there should be a proper chick management that forms a conducive environment for an egg to hatch till it gets to a full grown bird. Chick must be handled with a good care and any disturbances that could agitate the parents should be avoided since it raises the stress level of the birds and suppresses the immune system. Based on the laboratory findings all ostriches should get anthelminthic and regular deworming.

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