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Parasitic Infections of Commercial Quails in Southwest Nigeria

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Abstract
This study on the epidemiology of parasitic infection in commercial quail was carried out in the six south western states of Nigeria. Twenty-five commercial quail farms were sampled between the months of April to October 2014. Pooled faecal samples were collected from the quail farms and examined for gastrointestinal parasites while blood samples were collected and examined for presence of haemoparasite. On each farm visited, the farmers were interviewed to obtain vital information concerning their flock. Type of housing and the condition of the houses, the environment of the farm, presence of other birds in the farm and presence of other epidemiological factors in the farm that may support parasite development and transmission were recorded. The samples collected from each of the farm were brought to the laboratory for parasitological analysis. Out of the twenty-five farms sampled, 23 were positive for parasite infection. Four genera of parasites identified were *Capillaria* sp, *Ascaridia galli*, *Heterakis* sp, and *Eimeria* sp. 100% prevalence was recorded for farms raising the birds on deep litter and there was a significant difference compared with farms on cage system. Age, housing, management system and presence of other animals are identified as predisposing factors for parasitic infections in commercial quail. This could be as a result of exposure through litter to the infective stages or shared parasitism. It is therefore advisable to raise quail in cages to reduce the prevalence of parasitism. A follow-up after four years revealed that only 28% of the farms surveyed were still rearing quail. However, the contribution of parasitism and other factors to the failure of the farms could not be determined.

Infections parasitaires des cailles commerciales dans le sud-ouest du Nigeria

Abstrait
Cette étude sur l'épidémiologie de l'infection parasitaire dans les cailles commerciales a été réalisée dans les six États du sud-ouest du Nigéria. Vingt-cinq fermes de caille commerciales entre les échantillons ont été tirés mois d'Avril à Octobre 2014. Échantillons fécaux ont été prélevés dans les fermes de caille et des parasites

gastro-intestinaux ont été examinee alors qu'il y a d'autres sang prélevés et analysés pour la présence de hémoparasites. Dans chaque ferme visitée, les agriculteurs ont été interrogés pour obtenir des informations essentielles sur leur troupeau. Le type de logement et la présence d'autres oiseaux dans la ferme et la présence d'autres facteurs épidémiologiques dans l'exploitation susceptibles d'appuyer le développement et la transmission des parents ont été enregistrés. Les échantillons prélevés dans chacune des exploitations ont été amenés au laboratoire pour analyse parasitologique : sur les vingt-cinq fermes échantillonnées, 23 étaient positives pour l'infection parasitaire. Quatre genres de parasites identifiés étaient *Capillaria* sp, *Ascaridia galli, Heterakis* sp et *Eimeria* sp. Une prévalence de 100% a été enregistrée pour les fermes élevant les oiseaux sur une litière profonde et il y avait une différence significative par rapport au système de fermes en cage. L'âge, le logement, le système de gestion et la présence d'autres animaux sont identifiés comme des facteurs prédisposant aux infections parasitaires dans les cailles commerciales. Cela pourrait être dû à une exposition à des stades infectieux ou à un parasitisme partagé. Il est donc conseillé d'élever les cailles dans les cages pour réduire la prévalence du parasitisme. Un suivi après quatre ans a révélé que seulement 28% des exploitations étudiées faisaient encore de la caille. Cependant, la contribution du parasitisme et d'autres facteurs à la défaillance des exploitations agricoles n'a pu être déterminée.

Introduction

Quail belongs, along with chickens, pheasants and partridges to the Family Phasianoidae of the Order Galiformes in the class Aves of the Animal Kingdom (Shim,2000).There are two important species, the Japanese quail (*Cortunixcortunix japonica*) originating from Eastern Asia and Bobwhite quail (*Colinusvirginianus*) from the United States. Their domestication reportedly began in the fourteenth century (Shemshadi *et al*.,2014).

Quail farming as an alternative poultry enterprise is usually embarked upon for the excellent meat and egg characteristics of the birds and the numerous nutritive and economic benefits (Onyewuchi *et al.*, 2013; Odigbo, 2004).

Quail was introduced into Nigeria on 16 December, 1992. (Musa *et al.,* 2007). Quail farming has since spread to many parts of Nigeria including the south western states (i.e., Ondo, Ekiti, Oyo, Osun, Ogun and Lagos). Apart from the economic benefits, and high generational interval, which drive the increase in interest in quail farming, the perceived health benefits (Tunsaringkarn *et al.,* 2013), lower cholesterol level (Carrie, 2010), high content of Vitamins A, B and antioxidant(Omoniyi and Ekwumego,2014) have further encouraged the farming of quail in Nigeria. Farmers, in quail farming, have employed different rearing methods and in some instances, backyard poultry co-exist while in others, only quails are reared. Various parasites have been reported in quail including Lice (Nursel, 2010 *Cryptosporidium, Toxoplasma*, *Raillietina* (Raafat *et al.,* 2011; Mohamed *et al.,* 2011; Gamra *et al.,* 2015); *Haemoproteus* and Plasmodium (Pacheco *et al.,* 2011; Mohamad, 2012); *Eimeria* (Bruno *et al.,* 2013; Mohamad 2012) and *Capilaria* (Nagarajan *et al.,* 2012). Also, with reported shared parasitism between avian species (Pacheco *et al.,* 2011) and the paucity of information on parasitic infections of quail in Nigeria through a systematic and extensive study, it becomes very necessary to determine the parasitic infections present and the factors of management that may be associated. Information obtained from this research will be a reliable tool in the control of parasites of quail in Nigeria.

Materials and Methods

Study Area

The survey was conducted in the six (6) southwest States of Nigeria, Oyo, Ogun, Ondo, Osun, Ekiti

and Lagos. The area lies between longitude 2^0 31^1 and 6^0 00^1 East and Latitude 6^0 21^1 and 8^0 37^1N (Agboola,1979) with a total land area of 77,818 km^2 and a projected population of 28, 767, 752 in 2002 (NPC, 2002). The study area is bounded in the East by Edo and Delta states, in the North by Kwara and Kogi states, in the West by the Republic of Benin and in the south by the Gulf of Guinea.

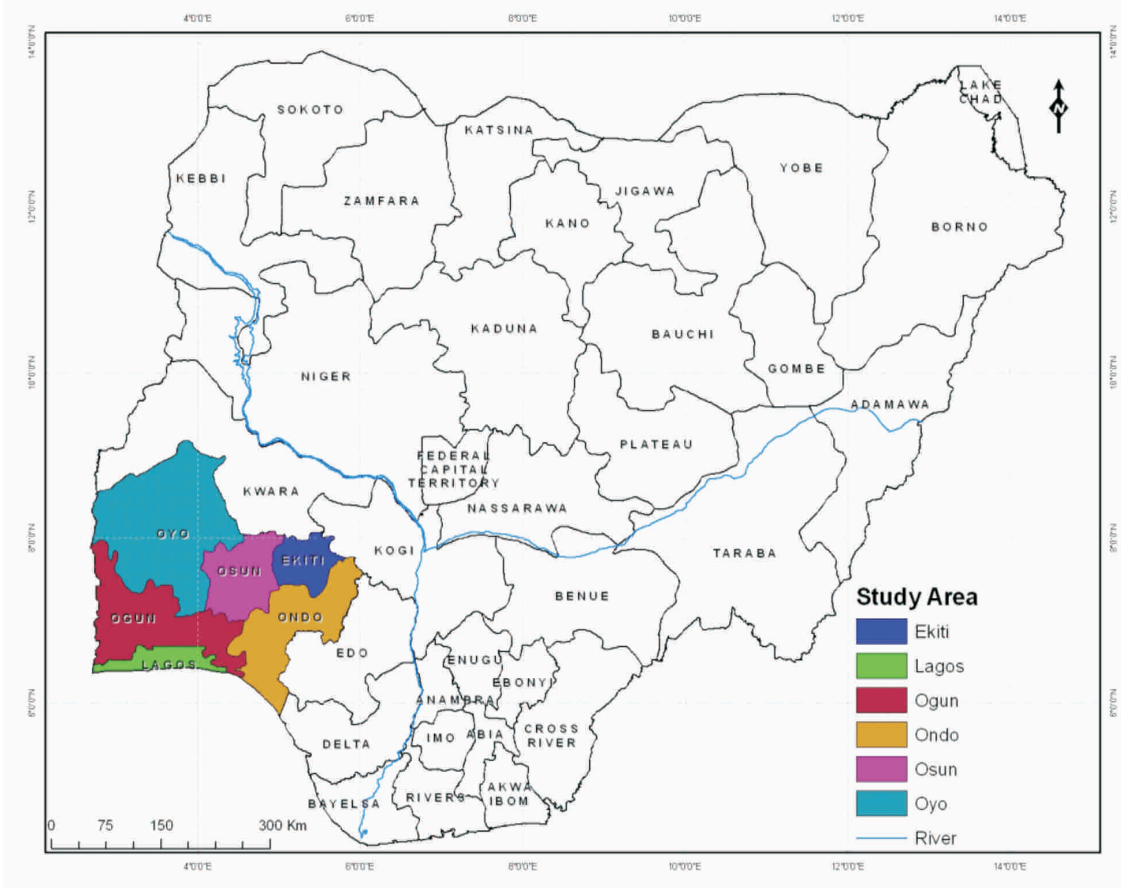
Farm Record and Management

Quail farms were purposively sought out through personal contacts and veterinary practitioners in the states. Identified farmers also served as link to others. All identified farms were selected for the study.

History of farm and flock were accessed through farm records and oral interview and management systems were observed and recorded. Records assessed included date foundation flock were brought to the farm, age of the flock, laying and hatching records, type of feed, mortality records. The type of management, deep litter versus cage was recorded and the type of housing, regular poultry house design or roofed cage system as well as the presence of other animals or poultry were also observed and recorded. Questions were asked from the owners on the knowledge of and use of medication such as anticoccidial, anthelmintics and antibiotics to treat the birds. The questions were structured to obtain a yes or no answer. Details of last treatments were requested depending on the answer.

Collection of Faecal Sample

The collection of faecal samples from the quails was by pooled sample method (Thienpoint *et al*., 1979). Samples from different age groups were obtained separately. In order to obtain fresh faecal samples from the quail, polythene sheets were laid on the litter on the floor in case of birds on deep



Map of Nigeria outlining the six southwest states (Agboola, 1979)

litter, and under the cage in the case of those in cage. After an hour, the sheets were removed and faecal droppings on them were scraped with a spatula. The faecal samples were kept in small cellophane bags and transported on ice packs in a cooling box to the Veterinary Parasitology research laboratory of the University of Ibadan. The samples were stored in a refrigerator at 4° C until processed.

Processing of Samples

Test tube Flotation method

3g of faeces was added to 15mls of water. This was agitated with a spatula and passed through a 0.5mm mesh sieve. The filtrate was poured into a test tube and centrifuge at 2000rpm for five minutes. The supernatant was discarded and 15 ml of saturated sucrose solution mixed thoroughly with the sediment and filled up to the brim with the saturated sugar solution. A clean glass cover slip was placed on the test tube for five minutes after which it was carefully removed with the drop of solution attached to it and placed on a clean glass slide. The slide was viewed at x10 magnification of the light microscope. Identification of the helminths and protozoan was through morphological characteristics of their ova and cyst using the keys provided by Thienpoint *et al.,* (1979).

Sedimentation method

3g of faeces was placed in a container and 45ml of water added. The faeces and water was mixed properly with a spatula. The suspension was poured through a 0.5 mm mesh sieve. 10mls of the filtrate was poured into a test tube and centrifuged for five minutes at 2000 rpm. The supernatant was poured off. A drop of the sediment was placed on a microscope slide, covered with a cover slip and viewed under the x10magnification of the light microscope. Identification of parasites ova and cyst was through morphological characteristics of the ova, using the keys supplied by Foreyt (2001) and Thienpoint *et al.,* (1979).

Collection and Processing of Blood Samples

Blood samples were obtained from the wing vein of randomly sampled quail from each farm. A thin blood smear was made on glass slides, fixed and examined microscopically.

Statistical Analysis

Chi square test was used to verify the significance of the epidemiological factors management systems, presence of other birds, and use of anthelmintics in parasite infection of commercial quail.

Follow-up

All the farms involved in the survey were contacted after four years for a follow up survey.

Results

A total of 25 quail farms were sampled. Fourteen reared quail alongside other livestock while 11 reared only quail. Twelve farms practised deep litter system and all the farms except two had been established for over 18 months. Oral interview with the managers/owners revealed that anthelmintic use was not common practise in quail farming. Only two farms practised routine deworming, although all the farm owners had knowledge of anticoccidial, anthelmintics and antibiotics drugs. Records of mortality on the farms ranged from 0–2 birds per week.

Three helminths,*Capillaria* species, *Heterakis gallinarum*, *Ascaridia galli* and one protozoan *Eimeria* species were encountered during the survey (Table 1). *Eimeria* occurred more frequently on the farms, followed by *Capillaria*, *Ascaridia* and *Heterakis*. The highest prevalence and diversity of parasitism was observed in active layers aged seven weeks to twelve months (Table 2). More farms had mixed infections with *Eimeria* and *Capillaria*, followed by farms with combined infections with *Eimeria*, *Capillaria* and *Ascaridia (*Table 3). Four farms were not positive for any gastrointestinal parasite. Farm records showed that two of the farms recently dewormed the birds while the other two were new farm sites (Table 4). The difference in prevalence of parasites between farms that used anthelmintics and farms that did not treat was significant. Presence of other animals on the farm and prior use of farm site for raising quails was a strong factor for higher parasite

infection and prevalence and diversity, however the difference was not statistically significant. All the farms raising the birds on deep liter were positive for gastrointestinal parasites while only eight out of the 12 farms on cage system were positive (Table 4). The difference in the parasitic status of birds in cage versus deep litter system was significant. All the birds sampled were negative for haemoparasites.

Table 1: Summary of Distribution of Parasitic Infection in Quails in Farms in the Six States of Southwest Nigeria

State	No. of Farm Sampled	No. of Quail	No. of Farm Positive for Identified Parasite			
			Eimeria	*Capillaria*	*Heterakis*	*Ascaridiagalli*
Ondo	7	957	4	2	2	3
Ekiti	4	2490	1	1	0	0
Osun	4	1585	2	3	0	0
Ogun	4	1353	4	1	0	0
Oyo	4	2845	4	2	0	1
Lagos	2	1246	2	2	0	1
Total	**25**	**10476**	**17**	**11**	**2**	**5**

Table 2: Age Distribution of Parasite Infection of Quails in Southwest Nigeria

Age of Birds	Population	Parasite			
		Eimeria	*Capillaria*	*Heterakis*	*Ascaridiagalli*
0-6.9wks Young	980	+	Nil	Nil	Nil
7wks-12mths Active layers	8,450	++	+	+	++
> 12mths Old layers	1,686	+++	++	Nil	+

Table 3: Prevalence of Gastrointestinal Parasites in Commercial Quail Farms in Southwest Nigeria

Parasite	No. of farms examined	No. of farms infected	% Prevalence
***Eimeria* sp.**	25	17	68
***Capillaria* sp.**	25	11	44
Heterakisgallinarum	25	2	8
Ascaridiagalli	25	5	20
Mixed infections			
E+A.galli	25	2	8
Cap.+A.galli	25	1	4
Cap.+E	25	5	20
E.+Cap.+A.galli	25	3	12
H.+E	25	1	4

E= *Eimeria*; Cap= *Capillaria*; H= *Heterakis*

Table 4: Effect of Epidemiological Factors on Parasitic Infection of Quails in Southwest Nigeria

	Mgt. System		Status of site		Presence of other animals		Use of anthelmintics	
	Deep litter	Cage	Old	New	Quail only	Quail, Poultry/ Rabbits	Used	Not used
No. of farms Examined	13	12	23	2	11	14	2	23
No. of farms Infected	13	8	21	0	8	12	0	21
% Prevalence	100	66.7	91.3	0	72.7	85.7	0	91

Mgt.= Management

Discussion

The result from the survey showed the presence of four gastrointestinal parasitic infection in twenty three out of the twenty five commercial quail farms sampled in Southwest Nigeria. This agrees with the study conducted by Kumar *et al.,*(2003) in India were he established presence of six specie of parasite in commercial quail in India. It however differs from report of several species of parasite by Willaim *et al.,* (1980), Jill *et al.,* (1989) in their work on wild California quail. The most prevalent of the four parasite species identified from the quail in this study *Eimeria* sp was also reported by Umar *et al.,* (2014) in Zaria. This might be due to improper management of litter in quail houses which provide a good environment for multiplication of *Eimeria* spp and acquisition of infection by the birds. Many of the farms recorded some mortality, this might be as a result of infection with subclinical level of *Eimeria* spp in the quail. The age distribution of the parasite infection indicates that younger quail (age 0-6.9weeks) had *Eimeria* as the only gastrointestinal parasite infection, while older birds (7weeks and above) are parasitised by all the species of parasite encountered. On the overall, the mortality recorded on the farms were lower than that reported by Gamra *et al.,* (2015) in their case report of cestode infection in a commercial quail farm. *Capillaria* spp, a common parasite encountered in a good number of the farms was also reported by Jill *et al.,* (1989) as one of the common nematodes of quails. The impact of management system on parasitic infection was seen in the higher prevalence of parasitic infection in farms practising deep litter system. Of the four farms that did not record infestation; two have recently dewormed the birds while the other two were farms on a new site, which may suggest that administration of anthelmintics will enhance the health of quail birds. Farms that reared other animals along with quail recorded higher incidence of parasitic infestation, which may be as a result of cross infection when animals sharing common parasites are reared together. Farms that were sited on virgin land had no parasitic infection as against those on old farm sites.This shows the possibility of endemicity of infection on the already established farmlands which can serve as source of contamination to newly introduced birds. This justifies the need for thorough cleaning and disinfection of a poultry house before the introduction of new stock to a pen.

Conclusion

This study has provided evidence of presence of parasitic infection of commercial quail in southwest Nigeria. It has also provided a base line data on parasitic infection in commercial quail in southwest Nigeria. Four species of parasite were identified in quails, out of which *Eimeria* spp had the highest prevalence. Certain epidemiological

factors were equally found to contribute to the prevalence of parasitic infection in the quails. They are the management system used (Deep litter/ Cage system), the status of the farm (Old site/ new site), the use of anthelmintics and the rearing of other animals especially birds in close proximity to quails.

In view of these, quail farmers are advised to ensure they maintain proper hygiene practices such as antiseptic dips for entrants into the houses and prevention of access by other livestock on the farm. In siting quail farms, it should not be in close proximity to other birds like chicken, duck, so as to prevent cross parasite infection. In farms where other birds are housed in proximity to quails, attendants should be strictly assigned to quails. There should be routine administration of anthelmintic to quails to ensure they are free from gastrointestinal parasite infection. On a final note, the authors' contact with the farms four years later revealed that only seven of the original 25 farms were still rearing quail. From the findings of this work, the contribution of parasitism may not be ruled out in the decimation of the quail farms. Hence appropriate chemotherapy is recommended for commercial quail farming.

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