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THE PREVALENCE OF GASTROINTESTINAL PARASITES IN LOCAL CHICKENS SOLD AT GARKAWA TOWN IN MIKANG LOCAL GOVERNMENT AREA, PLATEAU STATE, NIGERIA

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ABSTRACT

The study was conducted to detect and isolate gastro- intestinal parasites of local chickens (Gallus gallus domestica), sold at Garkawa market in Mikang Local Government Area, Plateau State, Nigeria. 112 chicken organs (such as gizzard, proventriculus, intestines etc.) were collected from 16 local Chickens and subjected to coprology tests Comprised 7 males (43.75%) and 9 females (56.25%)all from normal feathered, naked neck, frizzled feather and dwarf chickens. The result revealed 100% prevalence of Eimeria species, 68.75% prevalence of nematode species such as Ascari ahamulo (6.25%), Ascari diagalli (6.25%), Capillaria species (6.25%), Cyclopora species (18.75%), Gongylonemmaingluvicola(18.75%), Heterakis gallinarum (12.5) while cestode species had 25% which include Choanatamia infundibulum (6.25%), Echinostama species (6.25%), Hymenolepsis species (6.25%) and Strongyloids avium (6.25%). 9 of which 3 (18.75%) were males and 6(37.5%) were females. Prevalence rates among male and females chickens were 43.75% and 56.25% chickens between breeds were 31.25%, 25%, 25% and 18.75%prevalences of gastro intestinal parasites in the study area. Further studies to assess the prevalence and impact of gastrointestinal parasites on the health and productivity of chickens in the study area with larger sample size are recommended.

Key Words: Prevalence, gastrointestinal parasites, Garkawa Town, Mikang LGA
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INTRODUCTION

Poultry has been known for thousand years to provide meat and egg (USDA, 2011). Poultry applies to a variety of species of birds which include chickens, turkeys, geese, swans, guinea fowl, pigeons, pea fowl, ostriches, pheasants, quails etc (Banerjee, 2005). Nigeria has a poultry population of 180 million birds. Out of which 44.4% (80 million) of the population are local chickens (FAO, 2019). About 90% of poultry in developing countries are reared under the extensive system. Local poultry represent 80 to 90% of the total numbers of poultry in rural areas (Sonaiya and Siran, 2004). Poultry industry plays an important role in the provision of animal protein to human and also has a vital role in income generation in rural and national economy (Nnadi and George, 2010). Ishrat *et al.* (2021) quoted Ojok (1993) that, the major poultry production constraints are diseases from bacterial, viral and parasitic origins. Domestic or local chickens usually consume a variety of foods such as grains, fruits and insects which may contain eggs or larval stages of some helminth parasites, exposing them to different parasitic illnesses, most commonly, gastrointestinal parasites (Oniye *et al.,* 2001). Gastrointestinal parasites cause considerable damage leading to economic losses due to malnutrition, low feed conversion ratio, weight loss, decreased egg production, less resistance to diseases thus, aggravating any existing disease condition(s) and subsequently, death (Puttalakshmamma *et al.,* 2008; Garry and Richard, 2012).

The major gastrointestinal parasites of poultry include cestodes, nematodes and protozoa. (Belete and Addis, 2015). The most common cestode species of poultry in the tropics are: *Raillietinaechinobothrida (R. Chinobothrida)*,*Raillietinatetragona*, *Raillietinaestricillus*, *Davaineaproglotina*, *Choanotaeniainfundibuhim*, *Amoebotaeniacuneata*, *Hymenolepsis carioca*, and

*HymenolepsisCaritaniana (*Dennis *et al.,*2015). Among the Nematode species are: *Ascariadiagalli*, *Heterakisgallinarum*, *Capillaria species*, *Subulurabrumpti, Syngamus trachea* (Beyene *et al.,* 2014). *Eimeria species* are protozoan parasites which cause coccidiosis and these include: *Eimeriaacervulina (E. acervulina), E. brunette, E. maxima, E. mitis, E. necatrix, E. Preco, E. tenella (*Negash *et al.,* 2015).

Several studies conducted in different parts of the world have shown a high prevalence chicken infection with gastrointestinal parasites which are regarded as a common cause of ill health and decreased productivity (Ajala *et al.,* 2007). Studies in the prevalence of gastrointestinal parasitic infection in local chickens close to 100% and individual birds may harbour more than one parasite (Permin *et al.,* 2002; Phiri *et al.,* 2007). Shifaw *et al.* (2021) have reported that prevalence of gastrointestinal parasite species in chickens varied among species and ranged from 30 to 100%.

Gastrointestinal parasites are of economic importance in the decline of local chicken's welfare (Singh and Nama, 2018). The parasitic diseases poses difficult management and they also limit productivity by affecting growth rate of the chickens causing organ malfunctioning and subsequently death. Poultry raised in rural scavenging system, face many hindrances among which helminthiasis plays an important role (Ajala *et al.,* 2007). Poor housing, sanitation and management operations are predisposing factors to parasitic diseases in local chickens. Helminthes are important cause of low productivity in poultry (Ajala *et al.,* 2007). They cause a significant economic impact thus, causing decrease in productivity. Helminthes also promote transmission of deadly infectious diseases which reduce the effectiveness of the immune system in birds (Kerroucha *et al.,* 2022).

Furthermore, there is a knowledge gap about gastrointestinal parasites that infect local chickens in the study area. Good knowledge of the GI parasites of chickens, species composition and predilection site is essential for prompt diagnosis and treatment.

This study aimed to determine the prevalence of gastrointestinal parasites in local chickens with the specific objectives as follows:

1. To determine the prevalence and types of the parasites in the gastrointestinal tract (GIT) of chickens.
2. To determine the strain of chicken that is more prevalent to GIT parasites
3. To determine the sex of chickens that is more prevalent to GIT parasites

MATERIALS AND METHODS

The Location of the Study Area: Garkawa town is situated in the southeast of Mikang Local Government Area (LGA) in Plateau State, Nigeria. It is found on the geographical coordinates 8^0 58' 0"North and 9^0 49' 0" East. It is bounded in the North East by Langtang North, Southeast by Langtang South and South by Nshar and West by the Lalin Section of Tehl (https://www.projectclue.com>ape

Study Stock: 112 chicken organs (such as gizzard, proventriculus, intestine etc.) from 16 chickens (7 males and 9 females) were taken to National veterinary Research Institute Central Laboratory Vom and were subjected to cropology tests in order to detect prevalent parasites according to McMaster Laboratory technique, (1939). The step entailed:

Floatation Test: The chicken tissues were cut into pieces and put into porcelain mortar containing some saturated solution of industrial sodium chloride. The tissues were ground and titrated in the solution with the aid of a pestle. The contents of the mortar are then poured into a funnel containing a mechsiever into a sample (Plastic) bottle. The extract solution inside the sample bottle is topped up, forming a convex meniscus (for curvature); up which a clean slide is gently placed, avoiding air bubbles. This apparatus is left to stand for 15 minutes, after which the slide is removed in a circular motion. A cover slip or glass in then placed over the portion of the slide-where the surface touched the solution in the sample bottle. The sample is then subjected to microscopy (under the x10 and x40 objectives of the microscope).

Sedimentation Test: This method is a continuation of the above flotation method and aimed towards detection of parasite eggs with operculation (windows) which are heavier and sediment at the bottom of the sample bottle. Three-quarters of the fluid extract is decanted and the remainder

extract is topped-up with water and left for 10 minutes. This process is repeated two more times before finally decanting almost the entire fluid column, leaving behind a little layer at the bottom. This is then mixed using a Pasteur pipette. Two of three drops of this bottom fluid is ten dropped on a clean slide. A cover glass is placed upon it and this is viewed under x10and x40 objectives of the microscope for parasites detection and identification.

Data Analysis: The data collected, were tabulated and analyzed using basic statistical techniques such as percentages.

RESULTS AND DISCUSSION

The study determined the prevalence of GI parasites in Garkawa. Out of the 16 local chickens, all were found to be infected which accounted for 100% prevalence. The highest prevalence in the present study agrees with the reports of Gadzama (2011), Negbenebor and Ali (2018) who reported 91% and 82.3% in Borno and Kano states of Nigeria respectively. The high incidence of GI parasites in the present study might be due to continuous exposure of chickens to free range conditions which favour infection as a result of chickens searching for their nutrient requirements by moving from place to place, trying to find their feed in the soil which is often contaminated with living organisms such as insects, worms and also human and animal wastes which are the intermediate hosts for parasites that infect poultry (Gadzama, 2011).

The difference in the prevalence of GI parasitism in chickens may be as a result of differences in geographical location, breed, seasonal variation, management and biosecurity, sample size, veterinary facilities (Waktole *et al.,* 2019).The prevalences 25%, 68.75% for cestodes and nematodes respectively recorded in this study (Table 4) are higher than the 10% and 60% recorded for cestodes and nematodes reported by Kerroucha *et al.* (2022). According to Bush *et al.* (1997), species with a prevalence <30% are considered as rare species, those with a prevalence >30% as common and those with a prevalence >50% as the most spread.

The high rate of infection with nematode species in this study, may be due to factors such as the accumulation of infective stages of larvae or eggs in the environment, the presence of the intermediate hosts and the individual susceptibility of the final host (Magwish *et al.,* 2002) and the climatic conditions such as temperature and humidity which promote larval development and transmission (Dube *et al.,* 2010; Ola-Fadunsin *et al.,* 2019). Also, the establishment of nematodes in the gut, especially *Ascaridiagalli,* is influenced by the stage of the infective eggs, the sex of the chickens and the diet of the host (Anders *et al.,* 1988). Infection with nematodes leads to weightless and it correlates with an increased parasite load (Kerroucha *et al.,* 2022).

The prevalence of 25% recorded for cestode species in this study is much lower than the 65% reported by Javid and Syed (2013) and slightly lower than 34.88% recorded by Razad *et al.*(2016). The prevalence of cestodes in the gastrointestinal tract (GIT) of free-living birds may be due to infected intermediate hosts such as earthworms, grasshoppers, cockroaches and beetles which are easily accessible in poorly managed stocks. Cestodes infection in poultry results into retarded growth, diarrhoea, entritis, haemorrhages and hypovitaminosis B. In addition, heavy infections may lead to mortality in young birds and low egg production in the adult (Javid and Syed, 2013).

The prevalence of 100% of *Eimeria species* (Table) in the present study, appears to be higher when compared to the findings of Ahmed *et al.*(2012), Jatau *et al.*(2012), Dakpogen and Salifon (2013), Grema *et al.*(2014), Agishi *et al.* (2016) and Lawal *et al.* (2016). The probable reasons for these disparities may be attributed to the difference in the virulence of the *Eimeria species* at different management systems (Lawal *et al.,* 2016).

Higher prevalence of GI parasites in extensive poultry management is expected, as the birds are reared for longer duration and are allowed for scavenging for most of the days and thus, are more frequently exposed to infective stages of larvae and infected intermediate hosts of parasites (Kumar *et al.,* 2015).

The prevalence of GI parasites among local chickens between sex are presented in (Table 4).The result indicated that out of the 16 chickens examined, all were found to be infected with one or more parasites. Higher prevalence rate found among females (56.25%) than the males (43.75%)

chickens. This could be by chance or may be due to their feeding habits. Due to the voracious nature of the females during egg production may lead to them being exposed to some of these GIT parasites.

The observed high prevalence (31.25%) of parasites in the normal feathered chickens (Table 4) compared to other phenotypes (breeds); naked neck (25%), frizzled feather (25%) and dwarf (18.65%) chickens, may not have a specific underlying cause. This may not be attributed to the phenotypic differences of the birds, but may mean that normal feathered chickens were more exposed to the intermediate hosts such as grasshoppers, cockroaches and earthworms (Neakor *et al.,* 2021).

The different GI parasites and their location in the chickens examined, are indicated in (Table 4).In the result, it was observed that *Eimeria species* were more in the oesophagus through caecum than any of the parasites identified with the intestines having high concentration. The more concentration of *Eimeria species* in the intestines may be due to the unique conditions of the intestinal lumen such as pH, enzymes, mucous, metabolites, concentration of nutrients, microbes etc. (Augustin, 2001). This also proves the fact that *Eimeria species*are themajor cause of intestinal infections (Coccidiosis) (Abdullahi *et al.,* 2023). There were cestodes and nematodes present in various locations but with less number of birds infested as indicated in Table 4.

The study revealed that 56.25% (9) of the chickens in the study area, harboured multiple (more than one) species of helminth parasites in which their devastating effects on the host may have negative impact on productivity among adults (Nnadi and George, 2010).

Also, in Table 4 it was recorded that male chickens with prevalence of 18.75% and females with 37.5% prevalence presented mixed infections. The prevalence variations observed among chickens could partly be associated with the chance of chickens to pick intermediate hosts from the ground (Nnadi and George, 2010).

CONCLUSION

The study has demonstrated unequivocally that helminthes and protozoan infections are prevalent in the local chickens in the study area. The high prevalence rate of *Eimeria species* and nematode species could be a silent economic loss for extensive management. Sex and breed were identified to be important risk factors in the prevalence of gastrointestinal parasites in the study area.The current study shows that free range chickens are considered as reservoirs for *Eimeria species,* nematodes and cestodes.

This study therefore suggests the need for a sustainable control strategy to improve extensive management system conditions such as habitat (housing), feeding and periodic pest control towards healthy production of local chickens for human consumption and economic empowerment.

Further studies to assess the prevalence and impact of gastrointestinal parasites on health and productivity of local chickens in the study area with larger sample size are recommended.

Table 1. Overall Prevalence of Gastrointestinal (GI) among Chickens

Species of GI Parasites	Number of positive birds and prevalence %
Nematode species	11(68.75)
Ascariahamulosa	1(6.25)
Ascaridiagalli	1(6.25)
*Capillaria*species	1(6.25)
*Cycloporas*pecies	3(18.75)
Gongylonemmaingluvicola	3(18.75)
*Heterakis*species	2(12.5)
Cestodes species	4(25)
Choanatamia infundibulum	1(6.25)
*Echinostama*species	1(6.25)
*Hymenolepsis*species	1(6.25)
Strongyloidsavium	1(6.25)

Numbers in parenthesis represent percentages

Table 2. Prevalence of GI parasites among Chickens based on sexes of the chickens

GI parasites In both Sexes (%)	No. of positive birds and prevalence		Total
	Male (n=7)	Female (n=9)	
Eimeriaspp	7(43.75)	9(56.25)	16(100)
Nematodes	3(18.75)	8(50.0)	11(68.75)
Ascariahamulosa	1(6.25)	0(0)	1(6.25)
	0(0)	1(6.25)	1(6.25)
Capillaria species	1(6.25)	0(0)	1(6.25)
Cyclopora species	1(6.25)	2(13.5)	3(18.75)
Gongylonemma Ingluvicola	0(0)	3(18.75)	3(18.75)
Heterakis species	0(0)	2(12.5)	2(12.5)
Cestodes	4(25)		
Chranatamia Infundibulum	0(0)	1(6.25)	1(6.25)

Echinostama species	1(6.25)	0(0)	
Hymenolepsis Species	1(6.25)	0(0)	1(6.25)
Stongyloidsarium	1(6.25)	0(0)	1(6.25)

Numbers in parenthesis represent percentages

Table 3. Prevalence of different GI parasites among chickens between breeds

GI parasites	No. of positive birds and prevalence in different breeds (%)				Total
	Normal feather (nana) (n=5)	Naked neck (NaNa) (n=4)	Frizzled feather(FF) (n=4)	Dwarf(dwdw) (n=3)	
Nematodes:	(31.25)	(25)	(25)	(18.75)	
Ascariahamulosa	1(6.25)	-	1(6.25)	-	2
Ascaridiagalli	-	-	1(6.25)	-	1
Capillaria species	1(6.25)	-	-	-	1
Cyclopora species	1(6.25)	-	1(6.25)	1(6.25)	3
Gongylanemmaingluvicola	1(6.25)	1(6.25)			2
Heterakis species	-	1(6.25)	-	1(6.25)	2
Hymenolepsis species	-	1(6.25)	-	-	1
Cestodes*:*					
Choanatamiainfundubulum	1(6.25)	-	-	-	1
Echinostoma species	-	-	1(6.25)	-	1
Hymenolepsis species					
Strongyloidsavium	-	1(6.25)	-	1(6.25)	2
Eimeria species	5(31.25)	4(25)	4(25)	3(18.75)	16(100)

Numbers in parenthesis represent percentages

Table 4. The different GI parasites and their location

GI parasites	Location	No. of infected birds
Nematodes:		
Ascari ahamulosa	Proventriculus	1
Ascari diagalli	Caecum	1
Capillaria species	Large intestine	1
Cyclopora species	Small intestine	1
Gongylanemma Ingluvicola	Proventriculus	1
Heterakis species	Small intestine	1
	Proventriculus	2
	Caecum	1
Cestodes:		
Choanatamia infundubulum	Small intestine	1
Echinostamia species	Small intestine	1
Hymenolepsis species	Duodenum	1
Strongyloids avium	Proventriculus	1
	Small intestine	1
Eimeria species	Oesophagus	7
	Proventriculus	7
	Gizzard	7
	Small intestine	9
	Large intestine	9
	Duodenum	9
	Caecum	7

Table 5. Prevalence of mixed G.I parasites infection in the Chicken

Mixed infection	Male (n=3)	Female (n=6)	Total 9(56.25)
Total prevalence	7(43.75)	9(56.25)	16(100)

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