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Gastrointestinal Helminthes of Scavenging Chickens in Outskirts of Hawassa, Southern Ethiopia

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Abstract: A study conducted to estimate the prevalence of gastrointestinal helminth of scavenging chicken in villages around Hawassa, Southern Ethiopia, from October 2010 to April 2011. A total of 360 faecal samples and 122 postmortem examination were conducted. The overall postmortem and coproscopic prevalence of scavenging chicken gastrointestinal helminthes (GIT) were 88.5% and 77.8%, respectively. In the examined scavenging chicken about 67.5% and 29.2% of the chickens were positive for nematodes and cestodes species, respectively The postmortem examination revealed 51.6% infection with *Heterakis gallinarum* followed by *Ascarida galli* (45.9%), *Raillietina tetragona* (20.5%), *Raillietina echinobothrida* (17.2%), *Capillaria species* (13.1%), *Raillietina cesticillus* (8.2%) and *Hymenolepis cantanian* (3.3%). There was a significant difference in the overall prevalence of GI helminth parasites observed between male and female and between age groups of chickens ($P < 0.05$ and $P < 0.01$, respectively). Hence, emphasis should be given to control poultry helminthosis both by producers and animal health professionals.

Key words: Helminth · Coproscopy · Scavenging · Poultry · Ethiopia

INTRODUCTION

The dominant poultry production system in Ethiopia is an extensive/traditional type of production. The majorities of these chickens are local breed and are kept mainly in free-range scavenging system where the chickens scavenge around the house during day time. Sometimes they are supplemented with home grown grains and household food leftovers [1]. Animal production in general and chickens in particular play important socioeconomic roles in developing countries [2]. The purposes of chicken production are for income, egg hatching for replacement, consumption, for cultural and/or religious ceremonies and egg production [1]. The Southern Nation Nationalities People Region (SNNPR) of Ethiopia possess about 8.11 million chicken populations of which 97.9% and 2.1% are in rural and urban areas respectively [3]. Poultry productivity is enhanced by application of sound principles of health protection and management [4]. The economic contribution of the sector is not still proportional to the large chicken numbers, attributed to the presence of many productions, reproduction and infrastructural constraints [5]. Hence, in Ethiopia poor management, nutritional deficiency and poultry diseases are the most important factor in reducing both the chickens' population and their productivity [6]. Among poultry diseases helminthosis was considered to be the most important problem of local chickens and major causes of ill-health and loss of productivity in different parts of Ethiopia [7]. There are only few studies conducted in the central [8, 9] and northern parts of the country. Hence, the current study intended to estimate the prevalence and potential risk factors for the occurrence of GIT helminths in scavenging chickens in selected rural villages around Hawassa town, SNNPR, Ethiopia.

MATERIALS AND METHODS

Study Area: The study was carried out from October 2010 to April 2011 in three selected rural villages around Hawassa town, Southern Ethiopia. Hawassa is the capital of Southern Nation Nationalities Peoples Regional State (SNNPR) and geographically lies between 4°27' and 8°30' North and 34°21' and 39°1' East. The study sites were Dato, Chefe-Kotejabesa and Chefe-Kentira PA's.

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Study Population, Sampling and Sample Size: The study population comprised rural scavenging chickens (*Gallus gallus*) around Hawassa owned by smallholder farmers. The chickens were let free during the daytime to scavenge and spend the night at home together with the family. The study chickens were selected by systematic random sampling from both sexes and all chicken above two months of age for coproscopic examination. The animals grouped into two age groups: from two months of age to start of breeding as young and after start of breeding considered as adult. In addition, 122 chickens slaughtered in various hotels and households during the two major holidays (Christmas and Ester) were selected for postmortem examination. The sample size required for the study was calculated according to Thrusfield [10]. As the prevalence of the parasites were unknown the expected prevalence of 50% used to have the maximum sample size. With a desired absolute precision of 5% and 95% level of confidence a sample size of atleast 348 chickens was required. A total of 482 chickens were sampled for the study.

Study Methodology

Coproscopic Examination: Faecal samples were collected in to universal bottle from cloaca where possible or a fresh droppings with spatula from selected chicken. The collected samples were labeled, packed and transported to Hawassa University, School of Veterinary Medicine, Parasitology Laboratory and kept in refrigerator at 4°C. Then all collected faecal samples were analyzed both by sedimentation and floatation techniques as described by Soulsby [11].

Postmortem Examination: The trachea and gastrointestinal tract were removed and placed in a tray. Then opened longitudinally and examined for the presence of parasites. Also the mucosa and contents of intestinal tract were scraped to obtain parasites adhering to the mucosal layer. The scrapping was washed in a 90mm mesh sieve under running tap water and the content on the sieve transferred in to Petri dish and examined for any parasite. All collected helminths were examined under stereomicroscope and identified by using the key described by Soulsby [11] and Ruff and Norton [12].

Statistical Analysis: The prevalence of the parasites was determined as the proportion of the host population that was infected with a specific parasite. For the analysis of associations between prevalence of each parasite species and host sex, age or the three different villages Chi-square (Fisher's exact) test was used. All collected data were analyzed using STATA software version 11.0 statistical (Stata corp., College Station, TX)

RESULTS

Coproscopic Prevalence: From a total of 360 examined scavenging chicken 280 (77.8%) were found positive for gastrointestinal parasite eggs. About 67.5% and 29.2% of the chickens were positive for nematodes and cestodes species, respectively. The association of coproscopic prevalence of gastrointestinal nematodes and cestodes species with the considered risk factors shown in Table 1. There is statistically a significant difference in the overall prevalence of GIT helminth parasites between sexes and age group of chickens ($P < 0.05$ and $P < 0.01$

Table 1: Coproscopic prevalence of gastrointestinal helminths of scavenging chicken

		Helminths			
		Nematodes		Cestodes	
Risk factors	Number examined	Number positive	Prevalence (%)	Number positive	Prevalence (%)
Age *Young	139	100	71.9%	49	35.3%
*Adult	221	143	64.7%	56	25.3%
x^2			2.04		4.06
P-Value			0.15		0.04*
Sex *Male	171	104	60.8%	50	29.2%
*Female	189	139	75.4%	55	29.1%
x^2			6.63		0.01
P-Value			0.01*		0.98
Study sites					
*Chefa-Kentira	120	82	68.3%	30	25%
*Chefa-Jabesa	120	76	63.3%	35	29.2%
*Dato	120	85	70.8%	40	33.3%
x^2			1.60		2.02
P-Value			0.45		0.38

Table 2: Analysis of the overall prevalence of helminthes infection vs. considered risk factors

Risk factors		Number examined	Number positive	Prevalence (%)	OR (95% CI)	P-value
Age	Young	139	119	85.6	2.2 (1.3-3.9)	
	Adult	221	161	72.9	1	0.005*
Sex	Male	171	124	72.5	1	
	Female	189	156	82.5	1.8 (1.1-3.0)	0.023*
Study site	Chefa-Kentira	120	91	75.8	1	
	Chefa-Jabesa	120	93	77.5	1.1 (0.6-2.0)	0.760
	Dato	120	96	80.0	1.3 (0.7-2.4)	0.437

Table 3: Postmortem prevalence of scavenging chicken GIT helminth parasites

	Sex				
Species of parasites	Female (n=33)	Male (n=89)	Total (n=122)	x^2	P-value
Nematode					
Ascaridia galli	63.6%	39.3%	45.9%	5.73	0.02*
Heterakis gallinarum	57.6%	49.4%	51.6%	0.65	0.42*
Capillaria species	15.2%	12.4%	13.1%	0.17	0.68
Total	84.8%	83.1%	83.6%		
Cestode					
Raillietina tetragona	12.1%	23.6%	20.5%	1.95	0.16
Raillietina echinobothrida	12.1%	19.1%	17.2%	0.61	0.43
Raillietina cesticillus	3.0%	10.1%	8.2%	1.62	0.20
Hymenolepis cantanian	3.0%	3.4%	3.3%	0.01	0.91
Total	24.2%	46.1%	40.2%		
Overall	84.8%	89.9%	88.5%	0.6	0.44*

* = Significant difference

respectively). A significantly (x^2=105.9, P <0.01) higher prevalence of nematodes (67.5%) recorded than Cestodes (29.2%). The considered risk factors (age, sex and origin of chicken) analysis is shown in Table 2.

Postmortem Findings: From a total of 122 chicken examined by postmortem 108 (88.5%) were infested with one or more types of adult helminth parasites. A total of 41 (33.6%), 49 (40.2%), 16 (13.1%) and 2 (1.64%) chickens were infested by one, two, three and four types of helminth species, respectively. Detailed result of the postmortem study result shown in Table 3.

DISCUSSION

The result of this study showed a wide range of gastrointestinal parasitic infections among scavenging chicken. The overall Coproscopic and postmortem prevalence of gastrointestinal parasites were 77.8% and 88.5%, respectively. This finding is comparable with some reports from Ethiopia [8, 13] and other parts of Africa [14, 15]. In scavenging African chickens even more higher prevalence (99-100%) of helminth infections reported [16 - 20]. The observed higher prevalence of helminth infection in scavenging chickens could be due to a constant contact with the infective stage and/or intermediate host [21]. The second reason could be the absence of chickens deworming practice by the owners.

Both in coproscopic (30.3%) and postmortem (54.9%) examination multiple helminth species infection observed. This finding is in a general agreement with the report of various investigators from Ethiopia [8, 9] and other areas [15, 19, 22- 26]. Such frequent multiple species infestations could be explained by the free roaming nature of the scavenging chickens, which increase the access to different types of embryonated parasite eggs or infective larvae. Moreover, in the absence or scarcity of feed these chickens could be forced to eat different insects, snails, slugs, dung beetles and earth worms, which are believed to be the intermediate hosts of some nematode and cestodes.

The overall prevalence of nematode was significantly (x^2 =109.5, P <0.01) higher than that of cestodes. According to Ruff [21] nematodes constitute the most important group of poultry helminths, both in terms of species number and the resulting tissues damage.

Since the study areas (chicken origin) experience similar agro-climatic condition, there was no significant variation in the prevalence of helminthosis among the chicken origin. There was significant variation in the overall prevalence of helminthosis between young and adult, between male and female chickens ($P < 0.01$ and $P < 0.05$, respectively). The difference in the overall prevalence of helminthosis among the age group of chickens could be due to their differences in immunity, but the variation that exist between male and female chicken should be investigated further.

The present study revealed that scavenging chicken, kept under poor and low input management system, were exposed to very high prevalence and infestation with multiple helminth species. Hence, emphasis should be given for helminthosis of poultry by producers, animal health professionals and Agricultural Bureau. Poultry should get proper attention in order to be benefited from the sector of poultry production.

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