Study on Gastrointestinal Helminths of Local Chickens in Central Ethiopia

H. ASHENAFI1 and Y. ESHETU2*

SUMMARY

A survey on gastrointestinal helminths was conducted on 190 chickens raised under traditional management system, originated from three selected agro-climatic zones in central Ethiopia, namely Jeldu (Highland zone), Sebeta (Mid-altitude zone) and Awash - Melka - Knotre (Lowland zone). The study indicated that 164 (86.32%) and 144 (75.79%) of the examined chickens were invariably infected by diverse species of cestodes, and nematodes species, respectively. There was a statistically significant difference (P<0.001) in the prevalence rate of helminthes parasites between the different agroecological zones. Parasitic examination revealed the presence of six cestode, and six nematode species. The major cestode species recovered include Raillietina echinobothrida (65.3%), Hymenolopis cantainana (53.7%), Amoebotaenia spp. (37.4%), Raillietina tetragona (35.8%), Raillietina cesticillus (19.0%) and Choanotaenia infundibulum (3.2%). The major nematode species encountered were Ascaridia galli (55.3%), Heterakis gallinarum (32.6%), Subulura spp. (27.4%), Cheilospurura spp. (2.1%), Dispharynx spp. (2.1%) and Capillaria spp. (1.6%).

This work strongly suggested that helminthosis is a very serious problem of backyard chickens in central Ethiopia and appropriate control strategies need to be devised.

KEY-WORDS: Local chickens, helminths, necropsy, Prevalence, Central Ethiopia.

RÉSUMÉ

Enquête sur les helminthes gastro-intestinaux des poulets du centre Ethiopie. Par H. ASHENAFI et Y. ESHETU.

Une étude a été réalisée sur 190 poulets domestiques issus d’un système d’élevage extensif traditionnel et provenant de trois zones agro climatiques de l’Est de l’Ethiopie: Jeldu (haute plateau), Sebeta (Zone de mi-altitude) et Awash-Melka-Knotre (bas altitude). Les résultats montrent que 164 (86.32%) et 144 (75.79%) des poulets examinés étaient infestés par diverses espèces de cestode et de nématode, respectivement. Des différences significatives du taux de prévalence des parasites ont été mises en évidence selon les zones agro climatiques. L’examen des parasites a révélé la présence majoritaire de six espèces de cestodes (Raillietina echinobothrida 65.3%, Hymenolopis cantainana 53.7%, Amoebotaenia spp. 37.4%, Raillietina tetragona 35.8%, Raillietina cesticillus 19.0% et Choanotaenia infundibulum 3.2%) et de six espèces de nématodes (Ascaridia galli 55.3 %, Heterakis gallinarum 32.6%, Subulura spp. 27.4%, Cheilospurura spp. 2.1%, Dispharynx spp. 2.1% et Capillaria spp. 1.6%). Ces résultats montrent l’importance du parasitisme par les helminthes chez les poulets d’élevage traditionnel en centre Ethiopie qui nécessite la mise en œuvre de stratégies de contrôle.

MOTS-CLÉS : Poulet, Helminthe, Nécropsie, Prévalence, Centre d’Éthiopie.

Introduction

The total poultry production of Ethiopia is estimated at 56.5 million [9], of which about 99% are raised under the traditional backyard system of management, while 1% are exotic breeds maintained under intensive management system [2]. The backyard (traditional) poultry production system is characterized by low input, low output and periodic destruction of large proportion of the flock due to disease outbreaks [3].

In Ethiopia, indigenous chickens play an important role in the provision of animal protein for the population, as both poultry meat and eggs are affordable sources [15]. Different poultry diseases have been recorded in Ethiopia, mainly in exotic birds kept under intensive management system. The major causes of economic loss include Newcastle disease, coccidiosis, salmonellosis, chronic respiratory disease (CRD) and nutritional deficiencies [2].

Very few attempts have so far been made to closely study the health and management aspects of backyard chickens. The main constraints to the development of backyard chickens in rural Ethiopia include parasitic diseases, predation, lack of feed, poor housing and management [3, 15].

The available few data strongly suggest that parasites of chicken, both internal and external, are common in Ethiopia. Parasites are common in the tropics where the standard of husbandry is poor yet climatic conditions are favourable for the development of parasites [8]. Of the diseases that reduce productivity of rural poultry, parasitic diseases come first. Even though, parasitic diseases are among the major causes that decrease productivity of chickens, they are often neglected as they are rarely lethal [3, 15].

Helminthosis was considered to be an important problem of local chickens and helmint parasites were incriminated as major causes of ill-health and loss of productivity in different parts of Ethiopia [1, 4, 7, 17].

The aim of this study is therefore, to evaluate the prevalence of gastro intestinal helminths of local chicken, kept under the traditional back-yard system in three different agroecological zones in central Ethiopia.
Materials and Methods

STUDY AREA

The study was conducted in three selected sites, representing different agro-climatic zones in central Ethiopia. These include Jeldu, Sebeta and Awash-Melka-Kontire. Jeldu is located 125 Kms west of Addis Ababa at an altitude of 2880 m.a.s.l. The area is classified as temperate highland or «Dega», with an annual rainfall of about 1650 mm. The mean annual minimum and maximum temperature is 8°C and 19°C, respectively. Sebeta is located 25 Kms Southwest of Addis Ababa at an altitude of 2240 m.a.s.l. The area is classified as mid-altitude zone «Wayna -Dega» climatic zone, with an annual rainfall of about 890 mm. The mean annual minimum and maximum temperature is 15°C and 21°C, respectively. Awash-Melka-Kontire is located some 55 kms southwest of Addis Ababa at an altitude of 1509 m.a.s.l. The area is classified as lowland or «Kolla» climatic zone, with an annual rainfall of about 700 mm. The mean annual minimum and maximum temperature is about 18°C and 27°C, respectively [11].

ANIMALS AND MANAGEMENT

A total of 190 local chickens, apparently healthy including both sexes, of different age group were bought from local open-air markets in the respective study areas. Post-mortem examination was carried out at Sebeta, National Animal health Research Center (NAHRC), and all parasites recovered and conditions observed were recorded. The poultry management pattern involving local chickens in the study sites were entirely free - ranging system.

SAMPLE COLLECTION AND EXAMINATION PROCEDURE

Following euthanasia and evisceration, the viscera separated from the mesentery were detached in to four pieces; the oesophagus and crop in one piece, gizzard with proventriculus, ceaca and the rest of the intestine put in a separate container. Each piece was identified and incised longitudinally, visible worms to the naked eye were picked up using thumb forceps and the content placed in separate beakers containing physiological saline. The mucosae of the intestine were washed to remove any adhering worms and added to the container containing intestinal content. The container was filled up with water and left to settle. The supernatant was decanted and re-filled with tap water. This process was repeated several times. Then the content was sieved, emptied on a petridish and examined under low power microscopy (10X). To facilitate subsequent examination and identification, worms were stained with lacto phenol and examined under higher magnification (40X).

Identification of all parasites was carried out using the characters described by SOULSBY [16].

Data analysis: Variations in the prevalence of gastro-intestinal helminths in relation to the different agro-climatic zones and both sexes were analysed using the Chi-square statistics. In all cases p<0.05 was considered statistically significant.

Results

The present study revealed relatively higher overall prevalence of gastrointestinal helminths in the local chickens examined. These include 164 (86.32%) cestodes and 144 (75.79%) nematodes. There was a statistically significant difference (P<0.001) in the prevalence rates of cestodes and nematodes infection between the different agro-climatic zones.

The difference in prevalence rates of cestodes and nematodes in males (83.33% and 78.89%) and females (89% and 73%) respectively was not statistically significant (P>0.05).

Among the cestodes, the highest infection prevalence was due to Raillietina echinobothrida (65.26%), followed by Hymenolcopis cantainana (53.68%), while Choanotenia infundibulum with (3.16%) were found to be the least frequently recorded cestode species (Table I).

Ascaridia galli (55.26%) was the most prevalent nematode species followed by Heterakis gallinarum (32.63%) while Capillaria spp. (1.58%) was the least frequently recorded (Table I).

Discussion

The present study disclosed a high infection prevalence of endoparasitism in backyard chickens in all the three agro-climatic zones. These findings in general are comparable with previous reports [1, 8, 19], from different regions of Ethiopia. The prevalence rate of gastrointestinal parasites of scavenging chickens was reported to be 100% in Zimbabwe [12].

The high prevalence of endoparasitism (90.21%) in the present study might be a result of continuous exposure of chickens to the range conditions that facilitate infection. Local chickens satisfy their nutrient requirement by roaming from place to place and they usually seek their food in the superficial layers of the soil which is often contaminated with living organisms of all kinds, including various insects or earth worm that serve as paratenic or intermediate hosts for helminths parasites that infest poultry.

There was a significant difference in the prevalence rates of cestodes and nematodes between the different agro-climatic zones. The highest infection prevalence of both cestodes and nematodes was observed in the mid-altitude zone (Sebeta) and low land area (Awash Melka Kontire) than the high land area (Jeldu). This indicates that, the difference in climate influences the life cycle of worms, which might be explained by the presence of favorable microenvironment for the survival and transmission of the infective larval stages and eggs of the parasite.

Parasitic cestodes in poultry are known to cause retarded growth, enteritis, diarrhea and hemorrhages [10]. Heavy infections may cause death of young birds apart from the loss.
of egg production in laying chickens. *Raillietina echinobothrida* and *Raillietina tetragna* are considered to be harmful to chicken [16].

In this study, the existence of six species of tapeworms in three selected agro-climatic zones in central Ethiopia was observed. The prevalence of these cestode species were similar to those reported by ABEBE et al [1], BERSABEH [4], GEDION [8] and TESHOME [19] in different regions of Ethiopia.

The relatively higher prevalence of *Raillietina* spp. can be attributed to the wide spread and ease accessibility of intermediate hosts (dung beetles, ants) to the local scavenging chickens. Dung beetles and ants were very commonly observed in all the three study areas. *Raillietina echinobothrida* induces the formation of nodules in the intestinal wall, which can lead to confusion with lesions of avian tuberculosis [5]. In this study, the presence of *R. echinobothrida* cystic nodular forms of the parasite on the serosa of the intestinal tract, and lungs, can interfere with the normal functioning of the organs. GEDIOIN [8] and BERSABEH [4] also reported similar findings.

The most pathogenic cestode species of poultry, *Davaina proglottina* [20], was not recorded in this study. A prevalence rate of 5.97% in Southern Ethiopia, [18] and 1.12% in the Amhara region, [7] was previously reported. *D. proglottina* has been reported from Tanzania at the prevalence rates of 0.33% and 5.67% in dry and wet seasons, respectively [14].

The most prevalent nematode species encountered in the present study were *Ascaridia galli* (55.26%) and *Heterakis gallinarum* (32.63%), while *Capillaria* spp. (1.58%) was the least frequently recorded. Previous studies indicated high prevalence rates of *Ascaridia galli* (49-67%) and *Heterakis gallinarum* (11-43%) in backyard chicken from different parts of Ethiopia [1, 4, 8, and 19]. The rate of infection by *A. galli* was higher in the lowland and midland areas compared to the highlands. These variations could be due to differences in local environmental conditions, which support larval development and facilitate transmission.

Previous studies on local chicken of Ethiopia by GRABER...
[8] and GEDION [9] showed a high prevalence rate of *A. galli*, 80% and 67.23% respectively. *A. galli* has a major effect on the health of chicken by sharing feed thus causing stunted growth and low productivity, which may be related to damage to the intestinal mucosa [14]. Sometimes the parasite is observed in the abdominal cavity after penetrating the intestinal lumen and causing major irritation and inflammation to the mucosa thus interfering with the absorption of food [20].

All the above studies indicated that Ascaridiosis is a significant parasitosis of local chicken in Ethiopia, hence, firm measures should be undertaken to control this economically important parasite.

*Heterakis gallinaram* (32.63%) was the second prevalent nematode parasite encountered in this study. GORDON [10] ascribed little pathology to be caused by this cecal worm. It can also act as a carrier of *Histomonas meleagridis* in turkeys and chickens [20].

Contrary to the findings of EISA [6] in indigenous local chickens of Sudan, *Subulura* spp. was one of the least frequently detected parasites in local chickens of central Ethiopia. This difference could be attributed to the difference in the distribution and the inaccessibility of the intermediate host.

*Dispharynx* spp. (2.11%), *Chelospurura* spp. (2.11%) and *Capillaria* spp. (1.58%) were the least prevalent nematodes recovered in this study. *Dispharynx* spp. was observed forming nodules in the mucosa of the proventriculus. The mucosa where the parasites were embedded showed reddening and thickening.

In the present study mixed infections (up to six species of helminths parasites) were recorded in all chickens originated from all the three study areas. Mixed infection (up to 7, 10 and 13 species of GI helminths) were reported in Dire Dawa, [8], Addis Ababa, [1] and Debre Zeit, [4], respectively.

The present study clearly indicated that local chickens kept under poor and low input management systems, in the three agro-climatic zones were exposed to a wide variety of internal helminths. This is associated with their indiscriminate scavenging behaviour. Regardless of the absence of any health care and input, whatsoever, village birds supply eggs and meat for household consumption and income generation.

The damage inflicted by these parasites in view of the economic importance of rural poultry production, in a country like Ethiopia will undoubtedly be high. It is therefore, absolutely necessary that prevention and control measures with better management system should receive enough attention so as to exploit the poultry production sector of agriculture.

### References


