Study of gastro-intestinal helminths of scavenging chickens in four rural districts of Amhara region, Ethiopia

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Summary
A total of 267 rural scavenging chickens were examined from October 1998 to August 1999 in four woredas (districts) of the Amhara Region, Ethiopia. Of these chickens, 243 (91.01%) were found to harbour one to nine different helminth parasites and 24 (8.99%) were free of helminth parasites. A significant difference (P < 0.01) was found between the prevalence rates of helminth parasites in the different agro-ecological zones; the highest prevalence was observed in the lowland areas. This suggests that agro-ecology has a major influence on the distribution of helminth parasites. Nematodes recovered included *Heterakis gallinarum* (17.28%), *Subulura brumpti* (17.60%), *Ascaridia galli* (35.58%), *Cheilospirura hamulosa* (0.75%) and *Dyspharynx spiralis* (2.62%). The principal cestode species encountered were *Raillietina echinobothrida* (25.84%), *Raillietina tetragona* (45.69%), *Raillietina cesticillus* (5.62%), *Amoebotaenia sphenoides* (40.45%), *Davainea proglottina* (1.12%) and *Choanotaenia infundibulum* (4.49%).

Keywords

Introduction
In Ethiopia, rural poultry production represents a significant portion of the rural economy, as a source of income for smallholder farmers. In addition, both poultry meat and eggs are affordable sources of protein, hence chickens play an important role in the provision of animal protein for the rural population.

The total poultry population of Ethiopia is estimated at 56.5 million (9) and approximately 99% are raised under the traditional backyard system of management (3). However, the traditional poultry production system is characterised by low input, low output and periodic destruction of a large portion of the flock due to outbreaks of disease.

Among the infectious diseases, Newcastle disease, salmonelloses, coccidioses and sometimes fowl pox are considered to be the most important causes of mortality to local chickens (3), while predators are an additional source of loss.

Traditional backyard poultry husbandry exposes chickens to many types of parasites. Hence, most of the studies conducted in the different parts of Ethiopia have indicated that the proportion of chickens infected by gastro-intestinal parasites is high (4, 5, 6, 12). Therefore, helminths are considered to be an important cause of ill health and loss in productivity, in addition to the losses due to mortality.

The objectives of this research were to study the prevalence of gastro-intestinal helminths of local chickens kept under the
traditional backyard system in four woredas (districts) of the Amhara Region, and assess the significance of agro-ecology in relation to the prevalence of helminths.

Materials and methods

Study area

The study was conducted from October 1998 to August 1999. Four woredas (districts) of the Amhara Regional State were selected to conduct a cross-sectional study on gastro-intestinal helminths of poultry. These districts included Kallu, with an altitude of less than 1,500 metres above sea level (masl), Ambassel and Mecha with an altitude between 1,500 and 2,500 masl, and Dessie Zuria with an altitude of over 2,500 masl, representing lowland midland and highland regions, respectively.

Animals

A total of 267 male and female chickens (both apparently healthy and sick) were bought on market days from selected markets in the selected woredas. The chickens were then transported to Bahir Dar Regional Veterinary Laboratory in the case of Mecha woreda, and to Kombolcha Regional Veterinary Laboratory for the other woredas.

Examination procedure

Thorough clinical examination of each chicken was performed. The chickens were then euthanised and evisceration was undertaken. The alimentary canal, from the oesophagus down, was separated from the other organs and removed from the body cavity. The alimentary canal from each chicken was then opened, from the oesophagus to the rectum, and including both caecal tubes.

All worms visible to the naked eye were removed using thumb forceps. All the adult worms were identified directly under the stereomicroscope using the characteristics described by Soulsby (11) and Troncy (13). Scrapings were also taken from the mucosae of the upper, middle and lower intestine and caecum, and examined under the microscope.

Variations in the prevalence of gastro-intestinal helminths in relation to the different agro-ecological zones were analysed using the Chi-square statistics.

Results

From the total of 267 chickens examined in this study, 243 (91.01%) were found to be infected with gastro-intestinal helminths. The highest infection rate (97.85%) was observed in the chickens examined from Kallu woreda, representing lowland regions. A relatively lower prevalence of infection (74.47%) occurred at Dessie Zuria woreda, which represents highland areas (Table I).

<table>
<thead>
<tr>
<th>Name of woreda</th>
<th>Agro-ecology</th>
<th>Number of chickens examined</th>
<th>Number (%) of chickens with parasites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kallu</td>
<td>Lowland</td>
<td>93</td>
<td>91 (97.85)*</td>
</tr>
<tr>
<td>Dessie Zuria</td>
<td>Highland</td>
<td>47</td>
<td>35 (74.47)</td>
</tr>
<tr>
<td>Ambassel</td>
<td>Midland</td>
<td>64</td>
<td>60 (93.75)</td>
</tr>
<tr>
<td>Mecha</td>
<td>Midland</td>
<td>63</td>
<td>57 (90.48)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>267</td>
<td>243 (91.01)</td>
</tr>
</tbody>
</table>

* P < 0.01

With regards to the number of species of parasite per chicken, most chickens (197 or 73.78%) were harbouring between two and six species of helminth, as detailed in Table II.

Analysis of the percentage distribution of helminths indicated that the prevalence of gastro-intestinal helminths varied significantly (P < 0.01) between the different agro-ecological zones. According to the percentage distribution of each species of helminth recovered, the highest percentage of infection was due to Raillietina tetragona (122 chickens; 45.69%) followed by Amoebotaenia sphenoides (108 chickens; 40.45%), Ascaridia galli (95 chickens; 35.58%) and Raillietina echinobothrida (69 chickens; 25.84%) (Table III).

Discussion

The present study disclosed an overall high prevalence of gastro-intestinal helminths (91.01%) in chickens in four woredas of the Amhara Regional State, Ethiopia. This indicates the importance of gastro-intestinal helminths in poultry farming in the region. The high prevalence of cestodes and nematodes in local chickens is associated with indiscriminate scavenging behaviour.

Table I

The prevalence of gastro-intestinal parasites in 267 chickens from four woredas of Amhara region, Ethiopia

<table>
<thead>
<tr>
<th>Name of woreda</th>
<th>Agro-ecology</th>
<th>Number of chickens examined</th>
<th>Number (%) of chickens with parasites</th>
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</thead>
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<tr>
<td>Kallu</td>
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<tr>
<td>Mecha</td>
<td>Midland</td>
<td>63</td>
<td>57 (90.48)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>267</td>
<td>243 (91.01)</td>
</tr>
</tbody>
</table>

* P < 0.01

Table II

The number of the different species of parasite per chicken examined in four woredas of the Amhara region, Ethiopia

<table>
<thead>
<tr>
<th>Number of species of parasite per chicken</th>
<th>Number of chickens affected</th>
<th>Percentage of chickens affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>1</td>
<td>0.37</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>0.37</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>2.62</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>3.75</td>
</tr>
<tr>
<td>4</td>
<td>31</td>
<td>11.61</td>
</tr>
<tr>
<td>3</td>
<td>65</td>
<td>24.34</td>
</tr>
<tr>
<td>2</td>
<td>84</td>
<td>31.48</td>
</tr>
<tr>
<td>1</td>
<td>44</td>
<td>16.48</td>
</tr>
<tr>
<td>0</td>
<td>24</td>
<td>8.99</td>
</tr>
<tr>
<td>Total</td>
<td>267</td>
<td>100.00</td>
</tr>
</tbody>
</table>
Statistical analysis of the results revealed a significant difference \((P < 0.01)\) between the prevalence rates of internal helminth parasites in the different agro-ecological zones. This indicates that the number of local chickens infested by gastro-intestinal helminths is highly influenced by agro-ecology. At higher altitudes, colder temperatures and a lower level of infestation are observed. This may be because the extreme low temperatures of the highland areas inhibit the development and survival of the early infective larval stages and hence limit access to the intermediate or final hosts. Hence, the free larval stage of the gastro-intestinal helminths has difficulty in surviving the colder environmental conditions of the highland areas of Tebasit at Dessie Zuria woreda, whereas the warmer temperatures of the lowland areas create conducive conditions for the survival and transmission of the parasites.

The most prevalent cestode recorded in the area was Raillietina tetragona (45.69%). This prevalence is higher than that previously reported in different parts of the country, namely 26.32% in and around Addis Ababa (2), 34.0% in and around Bahir Dar (4), 30.91% in and around Dire Dawa (6) and 22.34% in Arsi zone (5).

In a previous study, R. echinobothrida was found to affect 48.94% of the chickens in Arsi zone (5), a higher rate than that observed in the present study (25.84%). These differences in the prevalence rate of cestodes could be attributed to the differences in the prevailing environmental conditions at the time of sampling.

Although cestodes in poultry are known to cause retarded growth, enteritis, diarrhoea, haemorrhages and hypovitaminosis B, heavy infections may also be associated with mortality in young birds and the loss of egg production in laying chickens. Furthermore, R. tetragona is considered to be harmful to chickens (11).

Cystic forms of R. echinobothrida were observed on the serosa of the intestinal tract, abdomen and lungs, which may interfere with the normal functioning of the organs.

Davainea proglottina, considered to be the most pathogenic species, was recorded at very low prevalence, and hence may have no pathogenic significance.

### Nematodes

The most prevalent nematode in this study was A. galli (35.58%), which was also considered by previous workers to be the most widespread parasite infecting local chickens in Ethiopia (2, 4, 5, 6, 8, 12).

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.

Infestation with A. galli causes reduction in the growth rate and weight loss, which may be related to damage to the intestinal mucosa (10). The parasite was sometimes observed in the abdominal cavity after penetrating the intestinal lumen. This may be accompanied by damage to the intestinal wall, leading to blood loss and secondary infection which could result in loss of weight and reduced production. Ascaridia galli significantly affects the health of chickens by sharing the feed consumed by the host, thus causing stunted growth and reduced egg and meat production (7).
All the above studies indicated that ascaridiosis is a significant parasitosis of local chickens in Ethiopia, hence firm measures should be undertaken to control this economically important parasite.

_Heterakis gallinarum_ was detected in the caecal tubes of 17.28% of chickens. Although Gordon and Jordan ascribed little pathology to this caecal worm (7), experimental infection has caused reductions in body weight gain and feed efficiency (1).

_Cheilospirura hamulosa_ and _Capillaria_ spp. were the least prevalent nematodes, present in 0.75% and 0.53% of the chickens sampled, respectively.

_Dyspharynx spiralis_ was observed forming nodules in the mucosa of the proventriculus. The mucosa in which the parasites were embedded showed reddening and thickening. Experimental infection with _D. spiralis_ was reported to have negative effects on body weight gain, sexual maturity, feed efficiency and egg production (7).

Subulura brumpti was most frequently found in combination with _H. gallinarum_, and had a similar prevalence (17.60%), although the association was not correlated with morbidity. Although up to 200 parasites were recorded per chicken, pathogenicity of the species in chickens has never been documented. Of the ten chickens infested with five different species of parasites, two were carrying _R. tetragona_, _R. echinobothrida_, _A. galli_, _H. gallinarum_ and _S. brumpti_, and this was associated with emaciation and poor body condition.

No trematodes were encountered in this study, although trematodes such as _Prothogonimus_ spp. are known to cause inflammation of the oviduct in laying hens, resulting in the formation of abnormal eggs (11).

In this study, the majority of the local chickens (73.78%) were carrying between two and six different species of parasite. In a country such as Ethiopia, in which traditional management systems constitute approximately 99% of the production systems, and almost all the chickens are infected by one or more parasitic helminths, the impact of these helminths on local poultry should not be underestimated. Therefore, further large-scale studies may be required to devise appropriate prevention and control methods, with improved management systems.

Acknowledgements

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Étude sur les helminthes gastro-intestinaux de poulets détritivores dans quatre districts ruraux de la région d’Amhara, Éthiopie

Y. Eshetu, E. Mulalem, H. Ibrahim, A. Berhanu & K. Aberra

Résumé

Une recherche parasitologique a été effectuée entre octobre 1998 et août 1999 sur un échantillon de 267 poulets détritivores dans quatre districts (woredas) de la région d’Amhara (Éthiopie). Sur ces volailles, 243 (91,01 %) hébergeaient entre une et neuf espèces d’helminthes différentes tandis que 24 poulets (8,99 %) étaient indemnes de ces parasites. Les taux de prévalence des parasites présentaient une variation significative (P < 0,01) selon la zone agro-écologique, les poulets de la région des plaines étant les plus parasités. Ces résultats suggèrent que l’agro-environnement exerce une influence majeure sur la répartition des helminthes. Parmi les nématodes observés figurent _Heterakis gallinarum_ (17,28 %), _Subulura brumpti_ (17,80 %), _Ascaridia galli_ (35,58 %), _Cheilospirura hamulosa_ (0,75 %) et _Dyspharynx spiralis_ (2,62 %). Les principales espèces de cestodes constatées étaient _Rallietina echinobothrida_ (25,84 %),
Raillietina tetragona (45,69 %), Raillietina cesticillus (5,62 %), Amoebotaenia sphenoides (40,45 %), Davainea proglottina (1,12 %) et Choanotaenia infundibulum (4,49 %).

Mots-clés

Presencia de helmintos gastrointestinales en pollos que se alimentan de desperdicios, en cuatro distritos rurales de la región de Amhara, Etiopía

Y. Eshetu, E. Mulualem, H. Ibrahim, A. Berhanu & K. Aberra

Resumen
Entre octubre de 1998 y agosto de 1999 se analizaron un total de 267 pollos de zonas rurales de cuatro distritos (woredas) de la región de Amhara (Etiopía) que se alimentaban básicamente de desperdicios. De todos ellos, 243 (un 91,01%) albergaban entre uno y nueve tipos distintos de parásitos helminticos, y 24 (un 8,99%) estaban libres de infestación. Se observó una diferencia significativa (P<0,01) entre las tasas de prevalencia de las distintas zonas agroecológicas, de las que el índice más elevado correspondía a las zonas de llanura. De ahí cabe deducir que la agroecología influye sensiblemente en la distribución de esos parásitos. Los nematodos detectados fueron: Heterakis gallinarum (17,28%), Subulura brumpti (17,60%), Ascaridia galli (35,58%), Cheilosporum hamulosa (0,75%) y Dyspharynx spiralis (2,62%). En cuanto a los cestodos, las principales especies observadas fueron: Raillietina echinobothrida (25,84%), Raillietina tetragona (45,69%), Raillietina cesticillus (5,62%), Amoebotaenia sphenoides (40,45%), Davainea proglottina (1,12%) y Choanotaenia infundibulum (4,49%).

Palabras clave

References