

Full Length Research Paper

## Occurrence of ectoparasites and gastro-intestinal helminthes infections in Fayoumi chickens (*Gallus gallus Fayoumi*) in Debre Zeit Agricultural Research Center Poultry Farm, Oromia region, Ethiopia

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A study for ectoparasites and gastrointestinal (GI)-helminthes was conducted on 212 Fayoumi chickens raised under semi-intensive management system at Debre Zeit Agricultural Research Center (DZARC) poultry farm from October, 2009 to May, 2010. The results of study indicated that 52 (24.53%), 34 (16.04%) and 5 (2.35%) of the examined chickens were harbouring one species of nematode (*Ascaridia galli*), three species of cestodes (*Raillietina echinobothrida*, *Raillietina tetragona* and *Raillietina cesticillus*) and two species of ectoparasites (*Menacanthus stramineus* and *Menopon gallinae*), respectively. There was no statistically significant difference ( $p > 0.05$ ) in prevalence infection of cestodes between sex (males and females) and age groups. Similarly, there was no statistically significant difference ( $p > 0.05$ ) in prevalence of infection with nematode sex (males and females) and age groups. The present study clearly indicated that Fayoumi chickens kept under semi-intensive management system in DZARC poultry farm were exposed to ectoparasites and GI-helminthes. Due attention is required to the control the parasitism.

**Key words:** Debre Zeit Agricultural Research Center (DZARC) poultry farm, ectoparasites, Fayoumi chickens, gastrointestinal (GI)-helminths, prevalence.

### INTRODUCTION

Poultry production is becoming one of the most highly developed segments of food animal production globally. Accordingly, to gain the maximum profitability out of the industry, greater efforts have been put to make changes in the methods of production (Ensminger, 1992). In developing countries, apart from traditional back yard methods of raising chickens, the more commercialized poultry production is increasingly intensified in large scale (FaBiyi, 1980; Alemu, 1985). Despite the presence of large number of chickens in Ethiopia, contribution to the national economy or benefit exploited for domestic chicken is very limited due to disease and nutritional

limitation (Smith, 1990). The main constraints to the development of indigenous chicken production in rural Ethiopia include diseases, predation, lack of feed, poor housing, and to a lesser extent financial problems and management (Alemu, 1985; Permin et al., 2002). Among the disease of poultry, ectoparasites and gastrointestinal (GI)-helminthes plays an important role in reducing the total poultry production potential of the country.

Parasites are common in tropics, where the standard of poor husbandry practices and climatic conditions are favorable for the development of the parasites (Abebe et al., 1997). Most ectoparasites (for example, lice), stay

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close to the host during their entire life cycle while others move from one host to the next quite frequently as ticks and mites (Yacob et al., 2009). Ectoparasites cause intense pain, irritation, slow weight gain, decreased egg production, and general poor and ill health (Urquhart et al., 1996, Kaufman, 1996). Lice are the most common ectoparasites of poultry, causing major economic loss to the productivity of animals (FaBiyi, 1980; Alamargot et al., 1985). Lice normally eat feather products except *Menacanthus stramineus*, which consumes blood. The virus of equine encephalomyelitis has been isolated from *M. stramineus* while the intracellular bacterium *Chlamydia psittaci* that causes an infection of birds known as orinthisis is isolated from *Menopon gallinae* (Calnek, 1991; Kaufman, 1996).

*Raillietina echinobothrida* and *Raillietina tetragona* are highly pathogenic while other species are not normally harmful unless the infection is extremely heavy, which cause significant decrease in production (Kaufman, 1996). *Ascaridia galli* is the most important nematode species of considerable economic importance. The large size of these nematode parasites may cause intestinal occlusion (Whitman and Brikford, 1989). The objectives of the present study were therefore, to identify the different species of ectoparasites and GI helminths of Fayoumi chickens in Debre Zeit Agricultural Research Center (DZARC) poultry farm.

## MATERIALS AND METHODS

### Description of the study site

The farm is situated in Debre Zeit town which is located at 9°N latitude and 4°E longitudes, at altitude of 1850 m above sea level in the central Oromia region. The area has an annual rainfall of 86.6 mm, of which 84% is in the long rainy season (June to September). The dry season extends from October to February. The mean annual maximum and minimum temperatures are 26 and 14°C, respectively, with mean relative humidity level of 61.3% (National Metrological Service Agency (NMSA), 2011).

### Study design

The study design employed was a cross-sectional type, with the objective of determining the prevalence and level of infection of the major ectoparasites and GI-helminthes of Fayoumi chickens in DZARC poultry farm.

### Study animals and management

A total of 212 apparently healthy and clinically sick and/or dead Fayoumi chickens, between the age of 6 ± 12 months (100) and 12±24<sup>+</sup> months (112), raised under semi-intensive management system, were considered for the study purpose. Any suddenly dead found chicken was also collected and examined. All chickens were allowed for partial scavenging, being protected from scavengers by

open air wire mesh construction. A total of 80 males and 132 females Fayoumi chickens were selected randomly and then transported to the Faculty of Veterinary Medicine (FVM) Parasitology laboratory for detailed parasitological and necropsy examination.

### Examination procedure

The birds were sacrificed by the method of cervical dislocation and subjected to parasitological examination according to the procedure described in Hansen and Permin (1998).

### Postmortem examination

#### Examination for ectoparasites

Immediately after sacrificing, the skin from each individual bird was medially incised and detached from the underlying tegument together with the feathers. The legs and featherless areas of the body with any seborrhea or crustation were scraped for microscopic examination. Visible ectoparasites were collected using thumb forceps. Minute ectoparasites were detected using magnifying glass and collected by scraping from live chickens. The detected external parasites were preserved in 70% alcohol for identification. Collection of ectoparasites from the chickens was carried out by careful examination of the entire external body parts according to method of Yacob et al. (2009).

#### Gastrointestinal parasites isolation and identification

The viscera were detached from the mesentery and the GI tract was separated into smaller pieces. The oesophagus with crop, gizzard with proventriculus, and caeca with the rest of the intestine were kept in three separate containers. Each piece was identified and incised longitudinally. The worms were collected from the different intestinal pieces by washing with physiological saline in separate trays and placed in different beakers containing physiological saline. The parasites were examined in a stereomicroscope. The identification of GI helminths was carried out using the characters described by Olsen (19) and Soulsby (1982). Ectoparasites were identified based on the criteria set by Kaufman (1996), Calnek et al. (1991) and Soulsby (1982).

### Data analysis

Appropriate data were collected from individual birds and stored in Micro Soft Excel spread sheet. Data analysis was carried out by using computer based Statistical package for social sciences (SPSS 11.5 statistical package). Pearson chi-square test was used for comparison of the possible variation between the study areas, and  $p < 0.05$  was considered significant.

## RESULTS

### Ectoparasites prevalence

Out of the total 212 Fayoumi chickens examined from DZARC poultry farm, 2.35% were found harboring two

ectoparasites species: *M. stramineus* was found in three birds (1.41%) and *M. gallinae* was found in two birds (0.94 %). The difference in the prevalence of ectoparasites on the basis of sex (3.75% in males and 1.52% in females) and age groups (3% in 6 ± 12 months and 1.79% in 12 ± 24<sup>+</sup> months), were found to be statistically not significant ( $p > 0.05$ ) (Table 1).

### Nematodes prevalence

The difference in the prevalence of nematode infection (*A. galli*) on the basis of sex (23.75% in males and 12.5% in females) and different age groups (37% in 6 ± 12 months and 13.99% in 12 ± 24<sup>+</sup> months), were not statistically significant ( $p > 0.05$ ) (Table 2).

### Cestodes prevalence

Out of the total 212 Fayoumi chickens examined from DZARC poultry farm, 34 (16.04%) were found harboring different species from genus *Raillietina*. *R. echinobothrida* (8.49%) was the most prevalent cestode species followed *R. tetragona* (7.07%) while *R. cesticillus* (0.47%) was the least (Table 3). The difference in the prevalence on the basis of sex (16.25% in males and 13.36% in females) and age groups (12% in 6 ± 12 months and 19.64% in 12 ± 24<sup>+</sup> months), were found to be statistically not significant ( $p > 0.05$ ) (Table 3).

## DISCUSSION

The present study showed the occurrence of only one nematode parasite, three cestodes species and two different ectoparasites in semi-intensive farm, with prevalence of 24.53, 16.04 and 2.35%, respectively.

In this study, a low prevalence of two ectoparasites species *M. stramineus* (3%) and *M. gallinae* (2%) was seen as compared to the previous findings in backyard chickens (Bersabeh, 1999; Hagos 2000) and scavenging chicken (Yacob et al., 2009). This is mainly because of the difference in management system, where a higher prevalence is expected in backyard scavenging system of production. *M. stramineus* and *M. gallinae* were also reported as the most prevalent and pathogenic arthropod parasites in Nigeria (FaBiyi, 1980). There were no statistically significant differences ( $p > 0.05$ ) in the prevalence of ectoparasite infection between sex. However, the intensity of infection was relatively higher in males than females. The increased contact due to the fact that male chickens mate with several females, may lead to high degree of infestation (Kaufman, 1996). Generally, the result clearly indicated that a very low

prevalence of ectoparasite infection in the study farm was mainly due to the fact that ectoparasites were minimized by thorough cleaning of the house between batches of birds, whole flock replacement, smooth house construction, and use of mesh to keep out wild birds and keeping manure dry.

In this study, only one species of nematode that is, *A. galli* was identified with a prevalence of 24.53% (Figure 1). There was no statistically significant difference ( $p > 0.05$ ) in the prevalence of *A. galli* infection in male (23.75%) and females (25%). However, the difference in the prevalence of *A. galli* in the two age groups (37% in 6 ± 12 months and 13.39% in 12 ± 24<sup>+</sup> months) was found to be statistically significant ( $p < 0.05$ ).

In previously conducted studies mainly involving backyard system of management, the prevalence of *A. galli* was very much higher, ranging between 47 to 67% (Asfaw, 1992; Teshome, 1993; Abebe et al., 1997; Bersabeh, 1999; Hagos, 2000) in different parts of Ethiopia. However, in Zimbabwe, the most prevalent nematode species in chickens was *Allodapa suctorica* (Permin et al., 2002) which was not found in the present study. The effects of *A. galli* on chickens include droppiness, emaciation, diarrhea and sometimes obstruction (Figure 1). In heavily parasitized chicken, it can also easily cause obstruction of intestine (Kaufman, 1996; Urquhart et al., 1996). Other pathological lesions such as pericarditis and pneumonia were also observed during necropsy (Figure 2). Among the three species of cestodes recovered, the most prevalent cestodes was *R. tetragona* (8.49%), followed by *R. echinobothrida* (7.07%) while *R. cesticillus* (0.47%) was the least encountered. There was no statistically significant difference ( $p > 0.05$ ) in the prevalence of cestodes infection between sex (males 16.25% and females 13.65%) as well as age groups [(6 ± 12 months (12%) and 12 ± 24<sup>+</sup> months (19.64%)]. The findings of the present study in terms prevalence of cestodes infection in general agreed with the previous studies in backyard chickens in Ethiopia (Bersabeh, 1999; Hagos, 2000) and in agreement with reports in Zimbabwe by Permin et al. (2002), as well as globally with reports of Permin and Bisgaard (1999). *R. echinobothrida* induces the formation of nodules in the intestinal wall, which can lead to confusion with the lesion of avian tuberculosis (Calnek, 1991; Urquhart et al., 1996). In the present study, similar nodular swellings were observed in the intestinal wall associated with *R. echinobothrida* and *R. tetragona* infection. The control of intermediate host (beetles, snails, slugs and flies) is one of the major tasks in the control of tape worm infection (Yacob et al., 2009).

The present study clearly indicated that Fayoumi chickens kept under semi-intensive management system in DZARC poultry farm (Figures 3; A and B) were exposed to a very low range of ectoparasites and relatively high

**Table 1.** Prevalence of ectoparasites in DZARC poultry farm based on sex and age of the examined birds

Lice species	No. examined	Positive Prevalence (%)	Prevalence in sex (%)		Prevalence in age; months (%)	
			M	F	6±12	12±24 <sup>+</sup>
<i>M. stramineus</i>	212	3 (1.41)	2/80 (2.5)	1/132 (0.75)	2/100 (2)	1 /112 (0.47)
<i>M. gallinae</i>	212	2 (0.94)	1/80 (1.25)	1/132 (0.75)	1/100 (1)	1 /112 (0.47)
Total	414	5 (2.35)	3/80 (3.75)	2/132 (1.52)	3/100 (3)	2/112 (1.79)

**Table 2.** Prevalence of nematode (*A. galli*) infection in DZARC poultry farm based on sex and age.

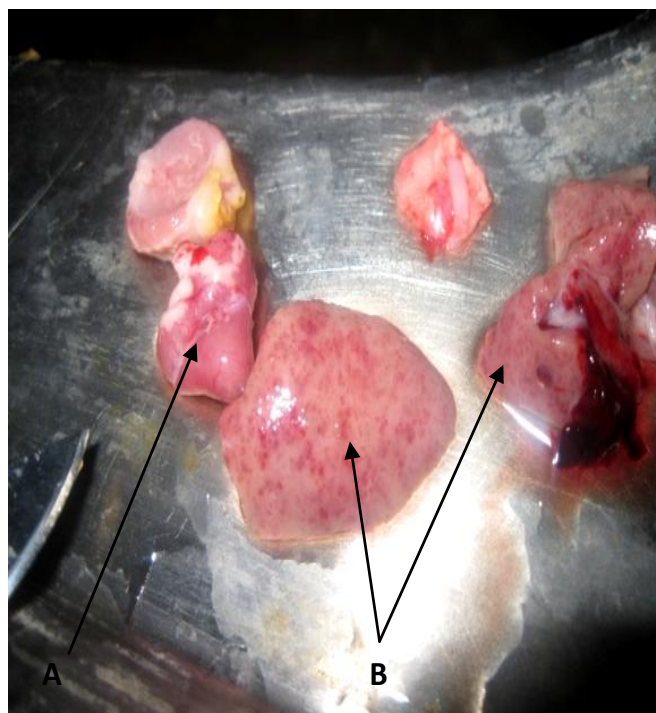
Nematode species	No. examined	Prevalence in sex (%)		Prevalence in age; months (%)	
		M	F	6±12	12±24 <sup>+</sup>
<i>A. galli</i>	212	19/80 (23.75 )	33/132 (25 )	37 /100 (37)	15/112 (13.39)

**Table 3.** Prevalence of cestodes infection in DAZRC poultry farm based on age.

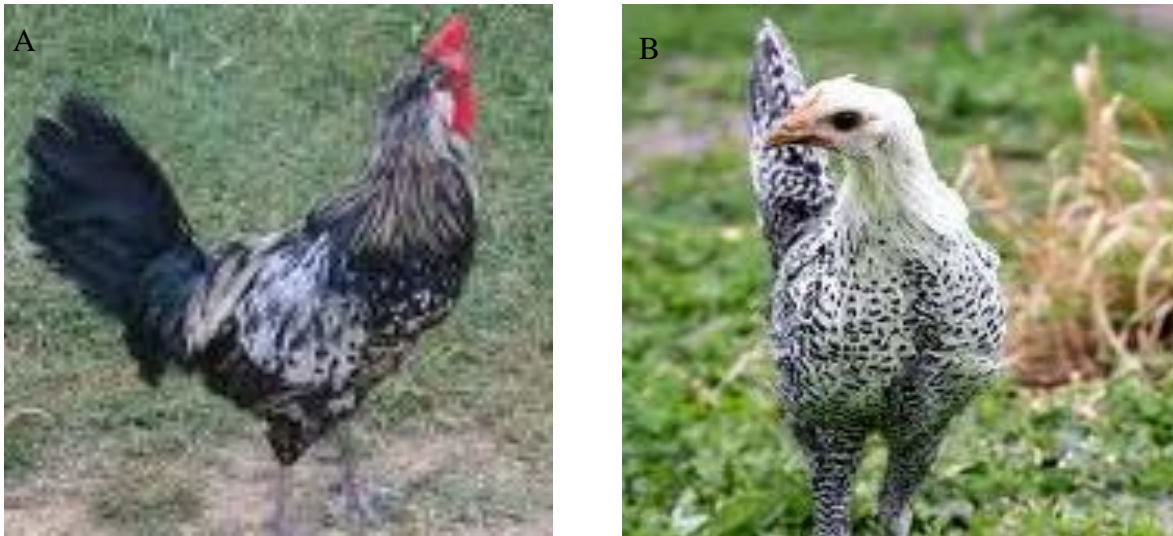
Cestodes species	No. examined	Prevalence (%)	Prevalence in sex (%)		Prevalence in age; months (%)	
			M	F	6±12	12±24 <sup>+</sup>
<i>R. tetragona</i>	212	18 (8.49)	4/80 (5)	11/ 132 (8.33)	8/100 (8 )	10/112 (8.93)
<i>R. echinobothrida</i>	212	15 (7.07)	9/80 (11.25)	6/132 (4.54)	4/100 (4)	11/112 (9.82)
<i>R. cesticillus</i>	212	1 (0.47)	0/80 (0)	1/132 (0.76)	0/100 (0)	1 /112 (0.89)
Total	212	34 (16.04)	13/80 (23.75)	18/132 (25)	12/100 (12)	22/112 (19.64)



**Figure 1.** Intestinal obstruction due to *A. galli*.



**Figure 2.** (A) Pericarditis and; (B) Pneumonia.



**Figure 3.** (A) Male Fayoumi; (B) Female Fayoumi.



**Figure 4.** Housing for semi-intensive Fayoumi breed management.

high number of GI-helminthes. Fayoumi chickens on the other hand were seen to have resistance to diseases and adapted to different environmental conditions.

Poultry production system in Ethiopia shows a clear distinction between the traditional low input system, on one hand and the modern production system, using relatively advanced technology, on the other hand. Traditional poultry production system operates indigenous chickens using a small sized flock without input and with

poor or no housing facilities (Tadelle, 1997). Given the management conditions and the magnitude of input provision, the connotation that “the productivity of local chickens in Ethiopia is poor” is virtually unfounded (Yilma et al., 1998).

Due to the high mortality rate and lack of adaptation to the rural environment in exotic breeds, professionals are arguing that the crossbreeding scheme underway in the country is not based on justified ground. Also, the merits

and demerits of both the existing and imported germplasms have not been studied thoroughly. The low prevalence of both ectoparasites and endoparasites in this study is probably related to less frequent exposure of chicken under this semi-intensive management system (Figure 5). Chickens are usually exposed to multiple parasitic infections under extensive management system as indicated in the results obtained by Yacob et al. (2009) conducted on scavenging chickens kept under traditional management practices.

Management has a great role in controlling both ectoparasites and GI-helminthes. In addition to good management, periodical deworming can also reduce the effect of parasitic diseases (Tadelle, 1997). The present study clearly indicated that Fayoumi chickens kept under semi-intensive management system in DZARC poultry farm were exposed to ectoparasites and GI-helminthes parasites; thus causing major constraints to poultry production. Since the Fayoumi chickens are exotic and recently introduced to Ethiopia, detail studies should be conducted to assess the impact of these ectoparasites and GI-helminthes on productivity of this chicken species.

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