



## Helminth Fauna in Chickens That are Kept in Rural Areas in Aydın

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### ABSTRACT

**Background/Aim:** Chickens have important place in poultry and normally grow in hencocks, cages, fences and commercially in the production system in many parts of world. Many parasitic diseases in poultry production systems is reduced as a result of the use of commercial off the production systems. However, traditional methods of poultry have been growing in many parts of the world and a number of these animals lead to the vulnerability of helminth infections. Chickens that walk around in garden sometimes directly and sometimes indirectly infected through intermediate hosts of a variety of gastrointestinal helminth infections. In this study, chickens kept in soil based hencock in rural areas in Aydın Centre District, Governor District of Incirlioiva, Köşk and Karacasu, have been examined to determine the prevalence of helminth fauna infection. **Material and Method:** A total of 50 chickens comprising 30 females and 20 males were euthanized and necropsy was performed for collection and examination of helminth and their eggs. A total of 460 faecal samples were collected. Faecal samples have been examined using native, flotation, sedimentation methods. Collected nematodes were washed in isotonic salty water (0.09%) and fixed with ethanol 70%. Cestodes in digestive tract have been hold at -20oC to easily detaching of their scolices in a few days. Clearing of collected helminths have been performed with lactophenol. Their measurements were taken under light microscope using helper computer programs (DP Controller 3.11.267, analySIS LS Starter 2.4) an morphometric measures of detected helminth eggs have been recorded using digital photos of light microscope and diagnosis were made using parameters used in other literatures (Tolgay, 1973; Güralp, 1981; Soulsby, 1986). Collected cestoda were measured their lengths and recorded at protocol. 10 females and 10 males have been measured for their lengths for each chicken. In cases, where the number of samples was less than 10, measurements were taken from the average of all samples. **Results and Conclusion:** Helminth infections were observed in 48 (96%) of 50 necropsized chickens and 141 (30.65%) of 460 faecal samples. There were 5 helminth species were observed and the most abundant helminth species was found to be *H. gallinarum* (80%). Other helminth species were *C. retusa* (18%), *R. tetragona* (%4), *A. cunatea* (2%) and *A. galli* (2%). Three helminth species were observed in one sample, 2 helminth species were observed in 7 samples and only one species was observed in 32 samples. Only three types of nematode eggs were examined in this study, which were *H. gallinarum* (23.91%), *Capillaria* spp. (11.30%) and *A. galli* (0.21%). Helminths were only collected from small and large intestines of chickens. No helminth infections have been observed in other tissues and organs in examined chickens. Also, no trematoda and acanthocephala worms were observed in this study.

**Keywords:** Aydın, Helminth, Chicken, Prevalence.

## Aydın Yöresinde Ev Kümeslerinde Yetiştirilen Tavuklarda Helmint Faunası

### ÖZET

**Öz bilgi/Amaç:** Kanatlılar içinde önemli bir yer tutan tavuklar dünyanın pek çok yerinde kümesler, kafesler, çitler ya da ticari üretim sistemlerinde tutulmaktadır. Tavuklarda pek çok paraziter hastalık ticari kapalı üretim sistemlerinin gelişmesi ile belirli ölçülerde azaltılmıştır. Bununla birlikte dünyanın pek çok yerinde kanatlıların geleneksel yöntemlerle yetiştiriliyor olması bu hayvanlarda çeşitli helmint enfeksiyonlarının varlığını sürdürmesine yol açmaktadır. Daha çok kırsal kesimlerde ticari amaçlı olmayan aile işletmeciliği şeklinde toprak üstünde kurulmuş kümeslerde yetiştiricilik yapılmaktadır. Bahçe içinde veya dışında gezerek dış ortam ile oldukça etkileşim içinde bulunan tavuklar bazen doğrudan bazen de ara konakları sindirim yoluyla almak suretiyle çeşitli helmint enfeksiyonları ile enfekte olmaktadır. Bu çalışma Aydın Merkez, Incirlioiva, Köşk ve Karacasu ilçelerinde halk elinde toprak tabanlı kümeslerde yetiştirilen tavukların helmint faunasını tespit etmek amacıyla yapılmıştır. **Materyal ve Metot:** 20'si erkek (horoz) ve 30'si dişi toplam 50 tavuğun ötenazisi yapılarak nekropsi muayeneleri yapılmış, helmint ve helmint yumurtası yönünden incelenmiştir. Toplam 460 dışkı örneği incelenmiştir. Dışkı örnekleri native, flotasyon ve sedimentasyon yöntemleri ile muayene edilmiştir. Organların muayenesi sonucu toplanan nematodlar serum fizyolojik ile yıkılarak kaynama derecesine yakın %70'lik etanol içinde tespit edilmiştir. Sindirim sisteminde bulunan cestodların scolekslerini mukozadan zedelenmeden ayrılması için -20°C'de birkaç gün bekletilmiş ve sonra oda sıcaklığında çözdürülerek cestodların scolekslerinin mukozadan kolayca ayrılması sağlanmıştır. Nekropsi sonucunda toplanan helmintlerin şeffaflandırma işlemi laktofenol ile gerçekleştirilmiş, ışık mikroskobu altında yardımcı programlar (DP Controller 3.11.267, analySIS LS Starter 2.4) kullanılarak ölçümleri yapılmış ve ilgili literatürlerin (Tolgay 1973, Güralp 1981, Soulsby 1986) doğrultusunda morfolojik kriterler göz önüne alınarak tür düzeyinde teşhisleri yapılmış ve fotoğrafları çekilmiştir. Toplanan cestodların boyları ölçülerek protokole kaydedilmiştir. Bir tavuktan toplanan her nematod türü için 10 erkek ve 10 dişinin ölçümleri yapılmış, örnek sayısının 10'dan az olduğu durumlarda bulunan örneklerin tamamı ölçülmüş ve parazitlere ait ortalama ölçümler belirlenmiştir.

**Bulgular ve Sonuç:** Nekropsi yapılan 50 tavuğun 48'inde (%96) ve muayene edilen 460 dışkı örneğinin 141'inde (%30,65) helmint enfeksiyonuna rastlanmıştır. Tavuklarda rastlanan en yoğun helmint türü *H. gallinarum* (%80) olmuştur. Bulunan diğer helmint türlerinin ise *C. retusa* (%18), *R. tetragona* (%4), *A. cunatea* (%2) ve *A. galli* (%2) olduğu belirlenmiştir. Nekropsi sonucunda toplam 5 helmint tespit edilmiştir. Tek bir tavukta üç, yedi tavukta iki ve 32 tavukta da tek bir helmint türüne rastlanmıştır. Dışkı muayenesi sonucunda 460 dışkı örneğinin 141'inde (%30,65) helmint enfeksiyonu tespit edilmiştir. Bu çalışmada, sadece 3 tip nematod yumurtasına rastlanmıştır. Bulunan türler *H. gallinarum* (%23,91), *Capillaria* sp. (%11,30) ve *A. galli* (%0,21)'dir. Nekropsisi yapılan tavukların sadece ince ve kalın bağırsaklarında helmintler toplanmıştır. Diğer doku ve organlarda herhangi bir helmint türüne rastlanmamıştır. Bu çalışmada trematod ile acanthocephala türlerine rastlanmamıştır.

**Anahtar Kelimeler:** Aydın, Helmint, Cıvcıv, Prevalans

## Introduction

A significant portion of animal protein comes from chicken meats and eggs in Turkish population. The fat and calorie content of chicken meat is lower than those of red meat and hence its consumption has risen in recent years. As per the Turkey Statistical Institute (TSI), around 88 millions of chicken were slaughtered in May 2011 to produce 147.743 tonnes of chicken meat. There were 1.04 billion chicken eggs also produced at the same period (TSI official web site, 2011).

chickens were recorded. 30 of them were female chickens. Mature chickens in laying period and mature cocks in mating season have been examined in order to possibility of age determination. Faecal samples were obtained from rectum of 50 chickens that was performed necropsy. Besides 150 faecal samples were collected from hencocks of selected chickens and 260 faecal samples were collected in other hencocks. A total of 460 faecal samples were examined in this study.

Faecal examinations that were collected from the rectums

**Table 1.** Prevalence of helminth infections by necropsy examination.

**Tablo 1.** Nekropsi muayenesinde helmint enfeksiyonlarının prevalansı.

Helminth Species	Numbers of positive chickens	Percents of findings
<i>R. tetragona</i>	2	%4
<i>A. cuneata</i>	1	%2
<i>A. gali</i>	1	%2
<i>H. gallinarum</i>	40	%80
<i>C. retusa</i>	9	%18

In addition, given the inability of animal protein consumption of chicken meat in terms of cheapness and workability of the food industry is poised to close this gap significantly. Parasitic diseases are known to cause of significant production loses in poultry farming. This is mostly due to reduced growth of chicken and also high mortality rate. However, parasitic diseases are subclinical and are often neglected. Species and amount of Class Nematoda are mostly examined in poultry. There is evidence that helminths infected poultry has been associated with increased sensitivity to other diseases and also transmit infection to other birds such as turkeys and chicks (Özdağ and Ayaz 2005, Oruç and Biçek 2009).

Chickens have important place in poultry and normally grow in hencocks, cages, fences and commercially in the production system in many parts of world. Many parasitic diseases in poultry production systems is reduced as a result of the use of commercial off the production systems. However, traditional methods of poultry have been growing in many parts of the world and a number of these animals lead to the vulnerability of helminth infections. Chickens that walk around in garden sometimes directly and sometimes indirectly infected through intermediate hosts of a variety of gastrointestinal helminth infections. (Permin and Hansen, 1998; Biçek et al., 2000; Özdağ and Ayaz 2005).

## Material and Method

A total of 50 chickens were randomly selected and were kept in soil based hencock in rural areas of Aydın Centre District, Governor District of İncirliova, Köşk and Karacasu from April 2009 to June 2011. Localization, race and gender of selected

and soil bases were performed in shortly possible time. Faecal samples were examined with native (direct smear), flotation with saturated salty water and sedimentation methods and detected helminth eggs were recorded (Ok et al., 1997; Bowman et al., 2003; Kaya, 2003; Gökçen, 2008). Morphometric measures of detected helminth eggs have been recorded using digital photos of light microscope and diagnosis were made using parameters used in other literatures (Tolgay, 1973; Güralp, 1981; Soulsby, 1986).

Collected nematodes were washed in isotonic salty water (0.09%) and fixed with ethanol 70%. Cestodes in digestive tract have been hold at -20oC to easily detaching of their scolices in a few days. Clearing of collected helminths have been performed with lactophenol. Their measurements were taken under light microscope using helper computer programs (DP Controller 3.11.267, analySIS LS Starter 2.4). Collected helminths were identified to species based on morphological criteria published in literatures (Tolgay, 1973; Güralp, 1981; Soulsby, 1986). Collected cestoda were measured their lengths and recorded at protocol. 10 females and 10 males have been measured for their lengths for each chicken. In cases, where the number of samples was less than 10, measurements were taken from the average of all samples.

## Results

In the present study 48 (96%) out of 50 chickens were found to be infected by various species of helminthis. Distribution to central and urban areas and rates of helminth species were presented in Tables 1 and 2. Infection with *H. gallinarum*

**Table 2.** Rates of helminth species according to central and urban areas (Ac: *A. cuneata*, Rt: *R. tetragona*, Ct: *C. retusa*, Hg: *H. gallinarum*.)

**Tablo 2.** Merkez ve kırsal alanlara göre helmint türlerinin oranları.

Areas	Number of Collected Chickens	Numbers and percents of positive samples.	Detected helminth species.
Centrum	14	12 - %85,71	Ac, Ct, Hg, Rt
İncirliova	12	12 - %100	Ct, Hg
Köşk	12	12 - %100	Ag, Ct, Rt
Karacasu	12	12 - %100	Ct, Hg

**Table 3.** Numbers of helminth species according to necropsy examination.**Tablo 3.** Nekropsi incelemesinde helmint türlerinin sayısı.

Organ	Cestod				Nematod			
	<i>R. tetragona</i>	<i>A. cunatea</i>	<i>A. galli</i>		<i>H. gallinarum</i>		<i>C. retusa</i>	
			Female	Male	Female	Male	Female	Male
Small Intestine	4	6	3	1	-	-	-	-
Large Intestine	-	-	-	-	420	384	22	32
Total	4	6	4		804		54	

was found to be highest (80%). Distribution of infection with other species were were *C. retusa* (18%), *R. tetragona* (4%), *A. cunatea* (2%) and *A. galli* (2%). In this study 40 chickens were infected with only one species, 7 chicks were with 2 species and only one chicken was infected with three species of helminths. Most frequently detected helminth species in a necropsy were numbered three that were *R. tetragona*, *A. galli* and *H. gallinarum*. Helminths were only found in the small and large intestines of chickens. No helminth infections were observed in other tissues or organs (Table 3). No trematoda and acanthocephala worms have been observed in this study.

Results of fecal examination are presented in Tables 4 and 5. According to fecal examination, helminth infections have been detected in 141 (30.65%) out of 460 faecal samples. Only three types of nematode eggs were found in this study. The distribution was *H. gallinarum* (23.91%), *Capillaria* spp. (11.30%) and *A. galli* (0.21%). No trematoda, cestoda and acanthocephala worms were observed in any faecal samples.

## Discussion

Helminth species and rate of infection vary according to necropsy results in different parts of the world. There are evidence that of chickens are infected with various helminth species are wide-ranging from 83.5% to 100% in various

on the necropsy results, *A. cunatea* was identified in 2% in this study. This cestod was found as 0.3-3.61 in a study about chicken helminths in Turkey (Merdivenci, 1967; Kurt and Açıcı, 2004). However, *A. cunatea* infection was not observed in helminthological research in turkeys and chickens in Afyon, Şanlıurfa and Ankara (Güçlü, 1992; Gökçen et al., 2003; Yardibi, 2004; Köse et al., 2009). Ashenafi and Eshetu (2004) have reported *A. cunatea* infection (approximately 37.4%) in chicks. Although this ratio is lower compared to that of similar studies conducted abroad, similar studies in Turkey was conducted (Kurt and Açıcı, 2003; Ashenafi and Eshetu, 2004).

Prominent nematod in this study was *H. gallinarum* in necropsized chickens. This nematod was found to be around 38-66% in other studies in Turkey (Güçlü, 1992; Gökçen et al., 2003; Köse et al., 2009), whereas in other countries it is between 8-89% (Pal et al. 1985; Permin et al, 2002; Ashenafi and Eshetu, 2004; Hassouni and Belghyti, 2006). *C. retusa* has been identified as 3.2-13.25% in various studies in Turkey (Ergün, 1956; Tolgay, 1963; Güçlü, 1992; Gökçen et al., 2003; Kurt and Açıcı, 2003). *C. retusa* has been reported as 23-69% in Iran. In this study, *C. retusa* was detected as 18%. This rate in this study is lower compared to other studies in different district of Turkey. *A. galli* has been identified as 19-43% in chickens in Turkey (Ergün, 1956; Tolgay, 1963; Güçlü, 1992; Gökçen et al., 2003; Kurt and Açıcı, 2003). *A. galli* has been

**Table 4.** Species and rates of of helminth eggs.**Tablo 4.** Helmint yumurtalarının tür ve oranları.

Detected eggs according to fecal examination	Results Number (percent)
<i>H. gallinarum</i> egg	110 (%23,91)
<i>Capillaria</i> sp. Egg	52 (%11,30)
<i>A. galli</i> egg	1 (%0,21)

countries (Goldstein, 1968; Eslami and Anwar, 1973; Hedge et al, 1973; Jensen and Pandey, 1989; Islam, 1985; Hassouni and Belghyti, 2006). Chicken helminth infections spreading rate was reported to be 16.2% to 72% in various locations in Turkey (Tolgay, 1967; Güçlü, 1992; Gökçen et al., 2003; Kurt and Açıcı, 2003; Köse et al., 2009).

Yardibi (2004) has reported that the types of helminth species in poultry trematoda species have lesser than cestoda and trematoda species (Yardibi, 2004). There were no trematoda species in the chickens examined in this study.

In this study, *R. tetragona* was identified in only one chicken out of 50 chickens under investigation. Current trend of *R. tetragona* infection was reported as 2.7 to 5.22% in other studies (Gökçen et al., 2003, Kurt and Açıcı, 2003). *R. tetragona* was detected as 4 % in this study. This ratio was appropriate in current studies but lower than the previous studies. Based

reported as 9-53% in studies in various countries (Ashenafi and Eshetu 2004, Hassouni and Belghyti, 2006; Permin et al., 2002)., *A. galli* identified as 2% in this study was lower compared to the results reported from various district of Turkey.

Biçek (2000) has first reported trematode eggs in focal sample examination of the chickens in Turkey. Researchers have noted that nematodes and cestodes eggs are generally in faecal samples (Güçlü, 1992; Yardibi, 2004). Al-Rubai (1987) has reported 8 helminth species from Ankara province. However Dik et al. (1988) have reported 8 helminth species in Konya province. Güçlü (1992) has detected 2 cestode and 5 nematode species. On the other hand, species of one trematode, one cestode and 6 nematode have been reported in Van (Biçek et al., 2000). In this study, 3 types of nematode eggs were found in faecal samples. Number of species described in this study is lower compared to other studies in various district of Turkey and other countries.

**Table 5.** Percent and number of infected species.  
**Tablo 5.** Enfekte türlerin sayısı ve yüzdesi.

Number of Infected Helminth Egg Type	Number of Positive Fecal Specimen (percent)
Positive fecal samples with one egg type	119 (%25,87)
Positive fecal samples with two eggs type	22 (%4,78)
Number of positive fecal samples and percents of infection (total)	141 (%30,65)

It is difficult to differentiate the diagnosis of *A. galli* and *H. gallinarum* eggs since these eggs are similar in shape and appearance. *H. gallinarum* eggs are lighter in appearance than those of *A. galli* and also its embryo completely fills the egg. *A. galli* eggs are slightly bigger than those of *H. Gallinarum* (Güralp, 1981). In the present study, the eggs smaller than 77.5-79.5 x 48.5 µm by microscopic examinations were evaluated as *H. gallinarum*.

Prevalence of helminth species is variable in chickens. In general, detection of eggs of acantocephala and trematod in Turkey has been found lower than those of cestod and nematode (Güçlü 1992, Yardibi 2004). Güçlü (1992) has observed 6 cestode species and 5 nematode species in chickens in necropsy samples in Ankara. However, Kurt and Açıcı (2003) have reported a total of 16 helminth species including 7 nematode species, 7 cestode species and 2 trematod species in chicken necropsy samples in Samsun. Three cestode species and 6 nematod species have been identified in Afyonkarahisar (Köse et al., 2009). In the present study, two cestode species and 3 nematode species were found. Moreover, a total of 5 helminth species were found.

There are differences in rates of spreading of helminth species in chickens in many parts of Turkey. Detection of helminth infections by necropsy examinations is generally more prevalent compared to faecal examinations (Tolgay, 1967; Dik et al., 1988; Güçlü, 1992). In Turkey, helminth infections in chickens have been detected as 30,36-86,5 in faecal examinations (Tolgay, 1967; Dik et al., 1988, Güçlü, 1992; Biçek et al., 2000; Gökçen et al., 2003; Orunç and Biçek, 2009; Aydın et al., 2010). Al-Rubai (1987) has detected helminth eggs in 711 of 1517 faecal samples (46.86%). *A. galli* (30.65%), *H. gallinarum* (14.96%), *S. avium* (12.39%), *C. annulata* (3.82%), *C. caudinflata* (2.76%), *T. tenuis* (2.17%), *C. infundibulum* (0.19%) and *D. proglottina* (0.06%) were reported. In a study from Van province, the presence of trematode egg was detected as 79.62% in faecal samples. For (Biçek et al, 2000). Güçlü (1992) has detected rate of infection as 50.31% in necropsy samples and 30.43% in faecal samples in Ankara province. Moreover, infection in Samsun province has been reported as 72% in necropsy samples and 34% in faecal samples in Samsun (Gökçen et al., 2003). In Germany, Zeller (1990) noted that helminth infections were 68% in faecal samples in chickens. In this study, helminth infections were found to be 141 out of 410 faecal samples (30.65%). This ratio was close to reports from Turkey, but lower compared to studies by other counties.

Both in Turkey and other countries, many reports indicate that helminth infections is high among backyard chickens compared to that of large-scale controlled farming (Hussain, 1967; Al-Rubai, 1987; Dik et al., 1988; Hensen and Pandey, 1989; Güçlü, 1992; Köse et al., 2009). In backyard grown chickens with traditional methods, helminth infection rate was reported to be 58-96% in several studies in Turkey (Al-Rubai, 1987; Dik et al., 1988; Güçlü, 1992; Köse et al., 2009). This ratio is higher in other countries (around 98-100%) (Hussain, 1967; Hensen and Pandey, 1989). In this study, helminth infections (30.65%) detected in 141 out of 460 faecal samples are close to reports

from various countries, but it is higher compared to reports from Turkey. Moreover, detection of 2 cestode species and 3 nematode species in this study was low compared with studies in Turkey and other countries. It is possible that the number of helminth species could increase with sample number examined.

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