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Cestode Parasites of Free-Range Chickens (*Gallus gallus domesticus*) in the North-Eastern of Algeria

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Abstract: A study was carried out on 144 local chickens (*Gallus gallus domesticus*), from rural area of El-Tarf to determine the prevalence of cestode parasites in the intestinal tract of the chickens. The overall prevalence rate was 88.19%, in the El-Tarf poultry. At least one species of cestodes was found on every chicken examined. Seven species of cestodes were identified in all; they had the following prevalences: *Raillietina echinobothrida* (83.33%), *Raillietina tetragona* (68.75%), *Raillietina cesticillus* (29.16%), *Hymenolepis carioca* (12.5%), *Choanotaenia infundibulum* (11.8%), *Davainea proglottina* (11.11%) and *Amoebotaenia cuneata* (4.16%). This study showed that there was no significant difference ($p>0.05$) between the prevalence of cestodes in relation to age and sex.

Key words: Cestodes, rural, poultry, El-Tarf, Algeria

INTRODUCTION

Poultry sector in Algeria is based on the intensive farming; the total production is estimated at 340 000 tones of white meat per year and more than 4.8 billion eggs (Aalloui and Bennoune, 2013). It may be noted that the availability of white meat per capita are lower by more than 40% of the average diet (12.1 kg/capita) consumed in the Maghreb and Middle East region (Nouad, 2011).

This situation therefore requests for not only reinforcement the current resources of production of animal protein foods but also exploiting some suitable effectual alternate sources of production in the country. In this respect, rural poultry already marginalised in Algeria can play an important role in providing food security as far as income, animal proteins obtainability and fight against poverty in rural areas. The promotion of production in this type of livestock includes control of feeding as well as some diseases. A free-range chicken is found to be infected with various types of parasites. Among these, endoparasites are more important and incidence of different species of cestodes in chickens has been reported (Jatoi *et al.*, 2013; Mukaratirwa and Hove, 2009). There are many species of cestodes that infect poultry and determine significant economic losses. The most important of poultry are the *Raillietina*, *Hymenolepis*, *Choanotaenia* and *Davainea* species.

The chickens infected with cestode parasites show loss of appetite, diarrhea, weight loss and decreased egg production. The lesions included the villous atrophy and desquamation of epithelium, catarrhal enteritis, granuloma formation in duodenum, congestion, cellular infiltration, desquamation of submucosal glands and haemorrhagic exudate (Anwar *et al.*, 2000).

Moreover, infection with *Davainea proglottina* can be fatal and causes nervous system disorders characterized by partial or incomplete paralysis of the bird. It is the most pathogenic cestode in poultry (Cardona and Msoffe, 2009).

So keeping in view the importance of these parasites in poultry, this study was designed with following aims to determine the diversity and the prevalence of different gastrointestinal cestodes present in free-range chickens in the north east of Algeria.

MATERIALS AND METHODS

Area of study: The area of El-Tarf is located between latitude 36°75'00 "and longitude 08°16'66" to the extreme north-east of Algeria stretch from the Tunisian border to Annaba in the west.

It has a Mediterranean climate, characterized by a great pluviometry, a hot summer and a mild wintry temperature. It is one of the most watering areas in the north of Africa, rainfall gradient varying from 450 to over 1000 mm.

The annual average temperature is 18°C. January and February are the coldest months (10°C on average). July and August are the hottest months (30°C on average).

Animals of the study: The present study started in February 2011 to January 2012. Total number of 74 males and 70 females chickens (12 hosts per month) including 72 chicks and 72 adult of local race from different farms in the rural areas of El-Tarf were selected randomly and then transported to the parasitology laboratory for detailed parasitological and necropsy examination.

Recovery and identification of cestodes: The digestive tract of each chicken was separated into oesophagus, proventriculus, gizzard, duodenum, lower small intestine and Large intestine. Each part was opened into a separate container and washed with physiological saline and placed in different beakers. Cestodes were recovered from the washing using a stereoscopic microscope and preserved in 10% formalin, stained with borax-carmin and mounted on clean glass slides using Canada balsam mountant under a coverslip. The identity of the cestode species was established under a light microscope with 10-100x magnification according to their morphological characteristics by Soulsby (1982).

Statistical analysis: Pearson chi-square test was used to compare the prevalence of cestodes on chickens with the statistical software SPSS v19. The influence of age and sex were estimated. Statistically significant differences were considered when $p < 0.05$.

RESULTS AND DISCUSSION

Overall prevalence was 88,19%, as 127 out of 144 local chickens were infected with at least one species of parasites.

Seven species of cestode belonging to four families were recorded during 12 months. They include:

Family: Davaineidae: four species:

Davainea proglottina (Davaine, 1860)

Raillietina cesticillus (Molin, 1858)

Raillietina echinobothrida (Megnin, 1881)

Raillietina tetragona (Molin, 1858)

Family: Dilepididae: one specie:

Amoebotaenia cuneata (Linstow, 1972)

Family: Dilepididae: one specie:

Choanotaenia infundibulum (Bloch, 1779)

Family: Hymenolepididae: one specie:

Hymenolepis carioca (Magalhaes, 1898)

Overall Prevalence of cestodes observed in this study exceeded largely those reported by Yousfi *et al.* (2013) in the North-west of Algeria and other studies in many countries of the world (Faizullah *et al.*, 2013; Jatoi *et al.*, 2013; Naphade and Chaudhari, 2013; Tolossa and Tafesse, 2013; Irungu *et al.*, 2004; Mwale and Masika, 2011), reflecting that rural poultry in the area of El-Tarf are strongly infested. It may be due to the absence of management practices and hygienic conditions on the farms of El-Tarf area.

The recording of the large spectrum in the present study could be related to the local environmental conditions

like thermal regulation and the high humidity of El-Tarf area and her rich biodiversity and availability of a sufficient number of intermediate hosts, as ants, beetles and other arthropods.

Nevertheless, it is important to notice that other species were not observed in our study. Works of Mukaratirwa and Hove (2009) in Zimbabwe mention *Cotugnia digonopora* not identified in this study. *Raillietina spiralis*, *Choanotaenia gondwana* and *Amoebotaenia domesticus* noticed by Dar and Tanveer (2013) in India are not found in the El-Tarf area.

The results regarding the prevalence and mean intensity of cestode species are given in Table 1. The most prevalent cestode parasite during the present study was *Raillietina echinobothrida*. One hundred twenty out of 144 chickens were infected with *R. echinobothrida* (83.33%) mean intensity of 6,39, followed by *Raillietina tetragona* (68.75%), *Raillietina cesticillus*, *Hymenolepis carioca*, *Choanotaenia infundibulum*. *Davainea proglottina* and *Amoebotaenia cuneata* were the least prevalent, present in (11.11%) and (4.16%) of the chickens sampled, respectively.

The results of the present study are fully in line with those of Tolossa and Tafesse (2013) and Hussen *et al.* (2012) who reported that *Raillietina echinobothrida* is the most important species in terms of prevalence, followed by *Raillietina tetragona* and *Raillietina cesticillus*. Many other investigations have found *Raillietina echinobothrida* to occur with high prevalence (Yousfi *et al.*, 2013; Tolossa and Tafesse, 2013; Rahman *et al.*, 2009).

Mean intensity of *Raillietina echinobothrida* (6,39) is higher compared with others species ($p < 0,05$).

This result strongly suggested that *Raillietina echinobothrida* was the most common and important cestodes infection of poultry birds in El-Tarf area.

It might be attributed to the free-range conditions and ease accessibility of insects such as ants that serve as intermediate hosts.

This tapeworm, one of the most damaging of poultry, is of considerable economic importance. They infect the small intestine of fowl, from where it obtains nutrition from the digested food of the host. Serious injury to the intestinal walls, diarrhea, stunted growth, emaciation and decreased egg production (Small, 1996).

Table 1: Prevalence and mean intensity of cestode species

	No. of infected chickens	No. of cestode	Prevalence (%)	Mean intensity
<i>Amoebotaenia cuneata</i>	6	9	4.16	1.5
<i>Choanotaenia infundibulum</i>	17	25	11.8	1.47
<i>Davainea proglottina</i>	16	30	11.11	1.87
<i>Hymenolepis carioca</i>	18	32	12.5	1.77
<i>Raillietina cesticillus</i>	42	85	29.16	2.02
<i>Raillietina echinobothrida</i>	120	767	83.33	6.39
<i>Raillietina tetragona</i>	96	200	68.75	2.08

Table 2: Prevalence of cestode parasites in relation to age and sex

Species	Age		Sex	
	Chicks (n = 72)	Adults (n = 72)	Male (n = 74)	Female (n = 70)
<i>Amoebotaenia cuneata</i>	5.55	2.77	4.05	4.28
<i>Choanotaenia irfundibulum</i>	11.11	12.5	13.51	10
<i>Davainea proglottina</i>	9.72	12.5	10.81	11.42
<i>Hymenolepis carioca</i>	11.11	13.88	13.51	11.42
<i>Raillietina cesticillus</i>	27.77	30.55	32.43	25.71
<i>Raillietina echinobothrida</i>	76.38	90.27	81.08	85.71
<i>Raillietina tetragona</i>	63.88	69.44	72.97	60

Table 3: Number and site distribution of cestode species.

Location species	Lower small intestine	Duodenum	Rectum	Total
<i>Amoebotaenia cuneata</i>	0	9	0	9
<i>Choanotaenia irfundibulum</i>	0	25	0	25
<i>Davainea proglottina</i>	0	30	0	30
<i>Hymenolepis carioca</i>	4	28	0	32
<i>Raillietina cesticillus</i>	6	79	0	85
<i>Raillietina echinobothrida</i>	701	50	16	767
<i>Raillietina tetragona</i>	156	40	4	200
Total	867 (75.52%)	261(22.73%)	20 (1.74%)	1148

Prevalence according to age and sex: Except for *Amoebotaenia cuneata*, the prevalence of cestode species was higher in adults compared to chicks (Table 2) with no significant differences ($p>0.05$).

Mpoame and Agbede (1995) had also noticed that *Amoebotaenia cuneata* is most prevalent in chicks aged <4 weeks in rural chickens in Cameroon.

Our results are compared with those of Kyalo (2012), who had carried out a similar study in Kenya.

Adult chickens may have had a higher prevalence because of their gregariousness compared to chicks, therefore, expose more than the former (Nnadi and George, 2010).

There were no statistically significant differences ($p>0.05$) in the prevalence of cestode infections between sex. This result is in agreement with the study of Hassouni and Belghyti (2006) who found that the difference was not significant between the prevalence of helminths infections and the sex of chickens in the Gharb region of Morocco.

Other workers also reported similar results (Magwisha *et al.*, 2002; Hussen *et al.*, 2012).

Distribution of cestode species: The most heavily infected segment of the intestine was the lower small intestine (Table 3), from which four species were identified and 867 specimens or 75,52% of total cestodes loads were recovered, followed by the duodenum (22,73%). The least populated segment was the rectum with 20 specimens or 1,74% of the total load. Our results are compared with those of Onyirioha (2011) and Yousfi *et al.* (2013), who had carried out a similar study in India.

Conclusion: It is concluded that the vast majority of the free-range chickens are infected with cestode species,

which is a very serious problem in rural poultry in north-eastern of Algeria. It may be due to the absence of management practices and hygienic conditions.

The most common cestode specie is *Raillietina echinobothrida*. It is suggested that appropriate control strategies need to be invented in order to minimize the risks of strong infestations in rural poultry.

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