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Coproscopy a Premordial Diagnostic Tool in Avian Parasitology

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ABSTRACT

Parasitic diseases are a problem that affects all poultry farms, whether large commercial or small backyard farms, where economic losses can be significant. In this study, a survey on intestinal parasites of chickens was carried out in the Souk Ahras region over a period of 6 months. The faeces of a total of 90 chickens collected from different farm types were examined by flotation to detect gastrointestinal parasites. The results obtained from these chickens showed that all the examined faeces were 100 % infected. The qualitative analysis showed a flocculation of helminths and protozoa's oocytes across the taken chicken samples at different farms with different infection percentage. Broiler chicken reported infected with *Ascaridia* (50%); *Heterakis* (35%) and *Eimeria* (15%). The laying hen infected with *Ascaridia*, *Heterakis* and coccidial oocysts which represented by 33.33%, 33.33% and 33.34%, respectively. However, for the local chiken, *Ascaridia*: (40%) *Heterakis* (35%), *Eimeria* (15%), *Syngamus* (5%) and *Capillaria* (5%) were recorded. The high infection rate recorded in the study area suggested that an intensive poultry management system and regular chicken control should be held.

Keywords: *Qualitative analysis, parasitic diseases, Souk Ahras, Oocytes, Poultry farming.*

INTRODUCTION

Chicken is generally considered one of the oldest domesticated birds (Oueslati *et al*., 2020). In Algeria the poultry sector occupies a special social and economic position, with 9.84% of animal production (Debbou-Iouknane *et al*., 2018). In addition, poultry farming produces on average 340,000 tons of white meat and more than 4.8 billion eggs annually (Allaoui and Bennon, 2013). However, the poultry sector is facing serious multifactorial problems (Berghiche *et al*., 2018a), both in intensive and traditional extensive systems, among these constraints and, in the first place, parasitic diseases of the digestive tract in these two farming systems, which can result in a real epidemic with dramatic economic repercussions for livestock farmers in North Eastern Algeria (Over., 1992), such as digestive helminthiasis, which do not systematically lead to death, but rather performance decreases and digestive disorders (Sykes, 1994), avian coccidiosis can cause significant mortality, especially in young chickens between 4 and 8 weeks of age (Berghiche *et al*., 2018b). These diseases are of particular importance because they are widespread, researched and treated in a preventive and curative manner (Bould *et al*., 2009).

Studies and scientific data on the different gastr-ointestinal endoparasites in chickens are still limited; we only find the study on coccidiosis performed by Debbou-Iouknane *et al*., (2018). Therefore, the purpose of this work is to isolate and identify the main parasites that infect hens reared in traditional and industrial scale in the Wilaya of Souk-Ahras. As well as to carry out an inventory of the oocytes in the region and propose a diagnostic tool to help veterinarians identify them. A qualitative study of gastrointestinal parasitic infes-tations, from November 2018 to March 2019, was planned and identification of the detected parasite was also considered. Comparison of the identified recorded parasites among different farms along the selected region, Souk Ahras, was done.

MATERIALS AND METHOD

Ethical approval

The experiment was carried out according to the National Regulations on Animal Welfare and Institutional Animal Ethical Committee (Van & Achterbosch, 2008).

Experimental design

Our work was carried out at the parasitology laboratory level of the Souk Ahras Agro-Veterinary Institute. Ninety faeces samples, from chickens farms distributed along the selected region (Figure 1), were collected. The droppings sampling of chickens of different weights, distributed as follows: 30 samples from 6-week-old adult broiler chickens of Cobb 500 strain; 30 samples from laying hens more than 8 weeks old, Isa Brown strain, and 30 samples from local adult chickens.

Methods and identification technique

Each sample was examined by a qualitative method called the flotation method, as described by Chauve (1988). Three groups of chickens were chosen and investigated. Fresh desired amount of faeces (5 g) was used for each group in which 30 samples were taken to be representative for each chicken group. Fresh droppings, required for coproscopy (by the flotation method), collected and not exceeding 24 hours, to ensure accurate identification of parasite species detected (Murthy & Rao, 2014).

Diagnosis of the different eggs

All samples of chicken dropping were investigated. The detected parasites were identified according to the keys and description given by Soulsby (1982) and Yamaguti (1958).

Statistical Analysis of the Experimental Data

The statistical analysis of the experimental data was carried out using statistical software Graph Pad Prisme version 5.01.

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Figure (1): Different poultry farms, (A) Broiler chicken farming; (B) Laying chicken; (C) Local chicken.

RESULTS AND DISCUSSION

Depending on the data obtained, the main parasitic elements recorded in coprology in local, broiler and laying hen were non-sporelled coccidial oocysts (genus *Eimeria*) and helminth eggs of *Ascaridia galli*, *Heterakis gallinarium*, *Syngamus*, *Trichostrongylus*, *Tetramers* and *Capillaria annulata*. The existence of these parasites was varied and regulated by the chicken types and inhabitant hygiene.

Diagnosis of the different eggs

Identification of parasites, based on the morphology of eggs, of the different groups of chickens revealed the presence of the followings:

A.Helminthes

Ascaridia galli

This parasite was diagnosed by a single granular cell, smooth and thick wall (Fig.2 A and B). *Ascaridia* eggs are similar to those of *Heterakis* but have convex side walls.

Hétérakis

Detection of eggs of *Hétérakis* were identified by their unique characters of their non-embryonic and non-segmented. The non-segmented egg contains no more than 2 blastomers (most often a single granular cell giving a homogeneous mass appearance). The hull is oval and thick (Figure 2 C and D). These eggs are very similar to *Ascaridia's* eggs but the sides of the latter are slightly curved while those of *Heterakis* are almost parallel.

Syngamus

Another genus of parasitic organism was detected in faecal of different chicken types selected in this current study. By means of microscopical examination, *Syngamus* eggs were observed and characterized. They are relatively large in size, presence of a cap at each pole and a morula generally consisting of 8 cells (Fig. 2 E).

Trichostrongylus

The genus of *Trichostrongylus* was also detected. It is characterized by its eggs in which the morula is not filling all the space delimited of the egg body. The eggs are smooth and their wall is thin and slightly have uneven poles.

Tetrameres

Helminthic eggs of genus *Tetramers* were observed and characterized. They are embryonic (vermiform embryo) with slightly uneven poles.

Capillaria

Genus *Capillaria* was also recognized by its eggs. They are oval and contain a single yellowish granular cell. They are very identifiable by their flattened polar caps at each pole (Figure 2 F).

B.Coccidies

The second detected non-sporelled coccidial oocysts were diagnosed based on the presence of oocysts in the faeces of investigated chickens. The detected genus was *Emeria*. To identify *Emeria* species, *oocystes* sporulation which is required for complete identification. The egg is spherical to elliptical and has pink colour (Figure 3A and B).

List of parasites according to the type of production of each breed

Variation in parasite the observation in different types of chickens and their prevalence were found. Hygienic conditions in different frames was also observed but not well studied. Other environmental conditions including conditions like moisture contents, light intensity and temperature are in need to be investigated. Meanwhile, in the current study a list of different parasites detected in chicken droppers are discussed.

A. Broiler chicken

For broiler chickens, infestation with the following parasites was listed which comprises of *Ascaridia, Hétérakis* and *Emeria* eggs. Observation of ectoparasites were also detected (Figure 4). These data are in confirmation with data recorded by Saroj et al., (2015). They recorded species of roundworms, large one include *Ascaris* sp., and small roundworms of genus *Capillaria* sp.

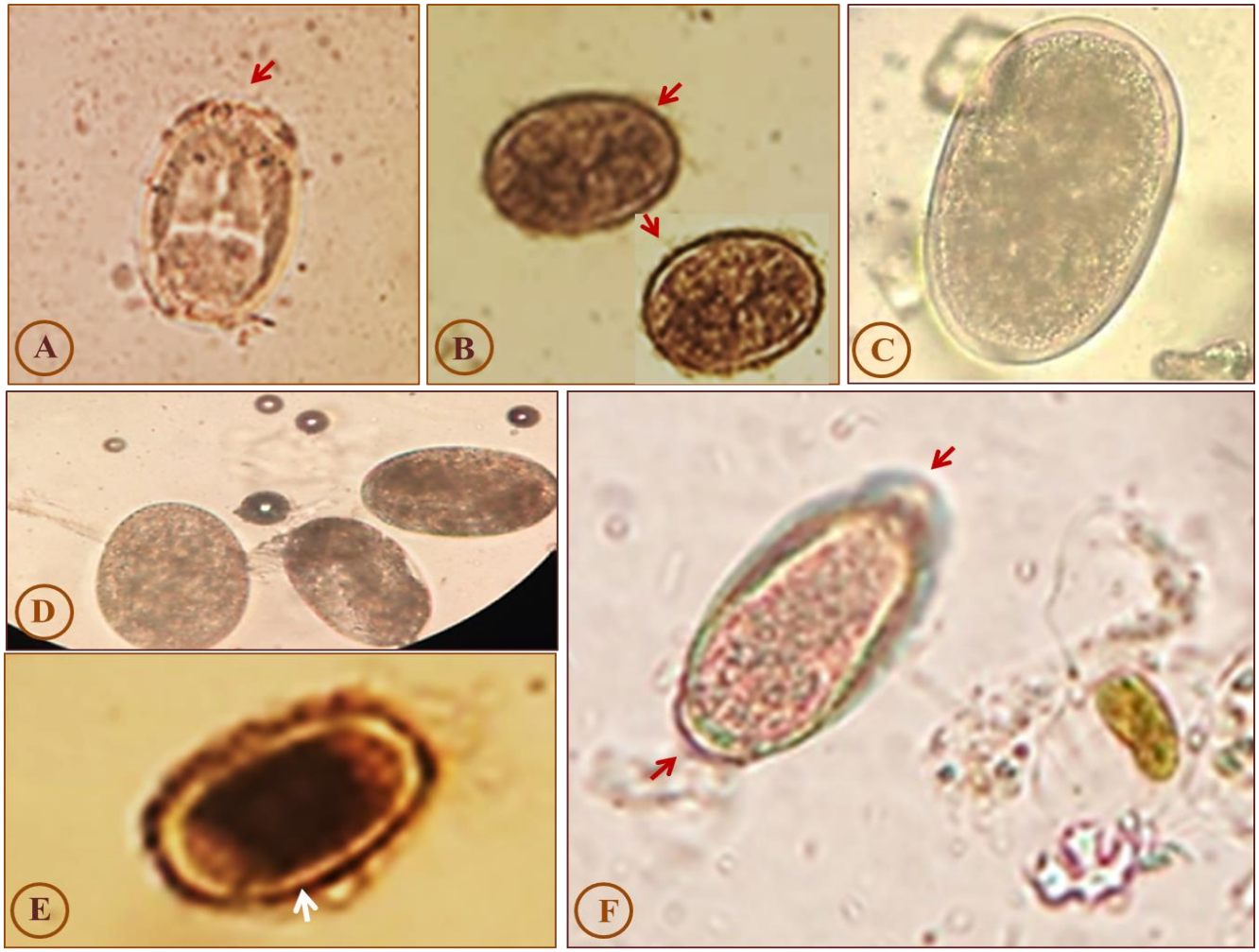

Figure 2: Different genera of parasitic organisms detected in chicken farms, A and B, *Ascaridia galli* egg with polar convex side wall (arrow); C and D, eggs of *Hétérakis* with homogeneous mass appearance; E, *Syngamus* eggs with thickened rough wall (white arrow), and F, egg of *Capillaria* with oval shape and flattened polar caps at each pole (arrows).

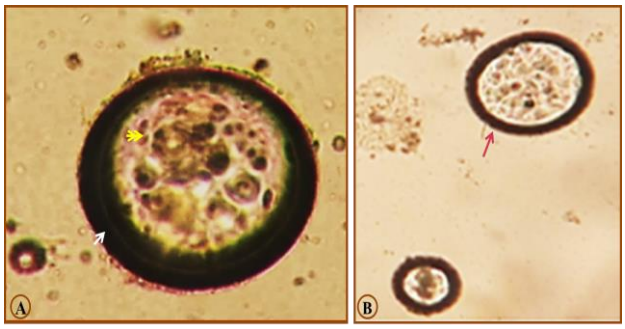

Figure (3): Microscopic observation of *Emeria* eggs in chicken droppings. X40.

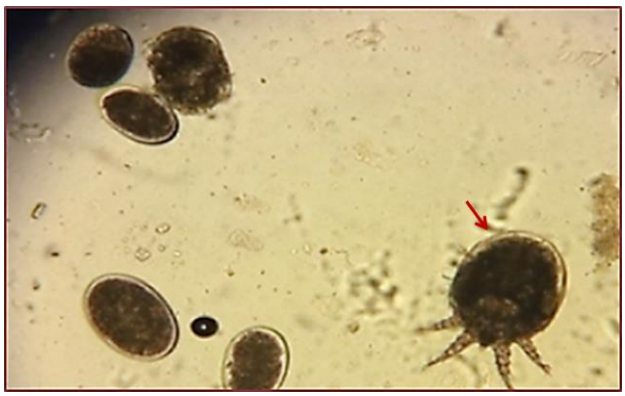

Figure (4): Microscopic observation of ectoparasites (arrow) associated with endoparasites. X40.

B. The laying hen

Investigation of dropping from the laying hen showed that infection with large worm of gnus *Ascaridia sp,.* which was detected by the existence of *Ascaridia* eggs, was the common existing parasite. This data is in agreement with data recorded previously by Susanna et al., (2019) and Grafl et al., (2017).

C. Local chicken

Microscopic observation of different parasites recorded for the third chicken type, local one, revealed the presence of *Hétérakis, Emeria, Ascaridia, Syngamus and Capillaria* eggs.

The results obtained show a permanent presence of oocytes in the faeces, with very high parasite rates in the local chicken, but these hens are apparently healthy and without any pathological signs.

Verminous parasitism is due to the consumption of intermediate host invertebrates (indirect cycles), which is common in this type of farming, the importance of *Ascaridia* in chicken is unexpected; given the ethology, contamination is probably due to "occasional hosts" rather than the direct cycle usually described (Elsheikha & Patterson, 2015).

In extensive village farms, a study revealed a varied abundance of parasites, which depends on the species (host/parasite) and the seasons (McDougald, 1998).

Prevalence of parasites according to the type of production of each breed

Microscopic examinations of poultry carried out for 90 semi-industrial farms (i. e. 30 broiler and 30 laying hen farms) and 30 traditional farms have shown oocystal excretion, egg excretion of *Ascaridia*, *Heterakis gallinarium*, *Syngamus*, *Capillaria annulata* and ring egg excretion of taenia is rarely encountered.

In total, helminthic species have been identified, including four nematodes and one protozoa species coccodial, in terms of worms, the frequencies of *Ascaridia*, and *Heterakis gallinarium* are more prevalent compared to others (Figure 6). The number of excretion of *Ascaridia* eggs in industrial poultry farms (broilers) is close to that found in traditional poultry farms (not significant difference) while the difference between them and that of the laying hen is very marked.

With regard to oocystal excretion, which is very frequent, the prevalence values are important to compare between industrial (meat) and farm animal husbandry, whereas there is a significant difference compared to laying hen husbandry (false negative); The high prevalence of infestations in local chicken can be explained by the traditional nature of this type of farming, without any technical and health monitoring. (Alders, 2015); The main risk associated with exposure of samples to high outdoor temperatures is the evolution of larvae inside eggs, sometimes leading to hatching, which then makes it very difficult or impossible to detect them by sodium chloride flotation. (Silverman & Campbell, 1959).

The consequences of the presence of litter in the droppings were initially difficult to measure the precise weight of the droppings (necessary for dilution) because they were most often inseparable from the litter (Font-Palma, 2012). Then, it hindered the reading of the blades in total flotation because even after a preliminary filtration, the non-figured elements remained in very important quantity. The presence of eggs in droppings does not necessarily show clinical signs without reaching an infestation threshold; There is no correlation between the amount of eggs per gram of faecal matter and the consistency of the faeces (Daş et al., 2011). However, they suspect that a dilution effect that could distort the results, in other studies of the same type have not found parasites that we have found in farms in the Souk Ahras region (Fig. S1).

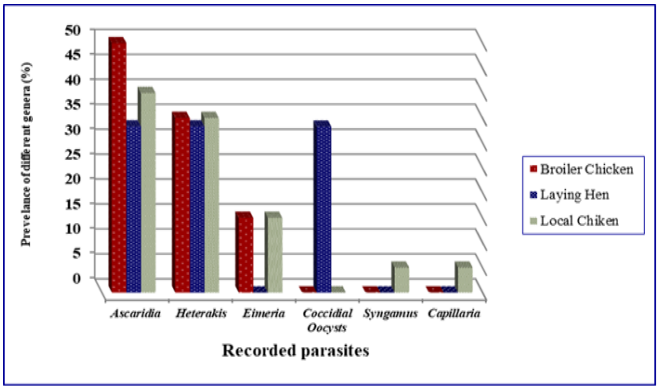

Figure (6): Prevalence of gastrointestinal parasites detected in different chicken types selected for the current study.

CONCLUSION

The role of the poultry sector, clearly defined but it is confronted with major avian diseases leading to significant mortality, performance losses and economic losses; The development of poultry farming is therefore linked, among other things, to the control of these pathological constraints, including digestive parasitosis of poultry caecum.

Indeed, due to its etiological plurality and its repercussions on zootechnical performance, cæcum intestinal parasitism deserves particular attention in both intensive and extensive systems, this plurality reflects the need for precise control measures based on etiological and epidemiological knowledge of caecum digestive parasitism in the different types of livestock, Isolation and identification of intestinal parasites involved 90 chickens from 3 types of semi-industrial farms (broilers and layers) and traditional farms (farm chickens); The results obtained show intestinal parasitism in poultry regardless of the type of farming, the intestinal parasites found in industrial chickens as divagants are coccidia (such as *Eimeria*) and in farm chicken we have identified several types of oocytes, this study found that heavy losses due to parasitism are recorded in both semi-industrial and traditional livestock systems, the permanent presence of chicken parasites, linked to the farming method practised in the Souk Ahras region, requires the implementation of control measures combining anti-parasitic treatments for poultry with the improvement of habitat hygiene and food quality; Low animal productivity does not allow farmers to invest in adequate pest control, raising awareness among farmers, at least about sanitary control methods, could give better days to this type of production. Nevertheless, some medicinal plants in rural areas for their anti-parasitic action continue to have an effect.

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الفحص المجهري أداة تشخيصية محورية في علم طفيليات الطيور

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الملخص العربـــــي

الأمراض الطفيلية هي مشكلة تؤثر على جميع مزارع الدواجن، سواء كانت مزارع تجارية كبيرة أو مزارع صغيرة في المنازل، ويؤدي هذا الي خسائر اقتصادية كبيرة بسبب هذه الطفيليات؛ ولذلك استهدفت هذه الدراسة بإجراء مسح على الطفيليات المعوية للدجاج في منطقة سوق أهراس على مدى 6 أشهر.تم فحص فضلات مجموعة من 90 دجاجة من أنواع المزارع المختلفة عن طريق التعويم لتحديد الطفيليات المعوية.
وأظهرت النتائج التي تم الحصول عليها من هذه الدواجن، المختلفة الانواع، أنها مصابة بنسبة 100٪ بانواع مختلفة من الطفيليات لكل المزارع الدواجن محل الدراسة. كما اظهرت التحاليل النوعية تلبد الديدان الطفيلية وبويضاتها في مختلف المزارع مع نسب العدوى التالية :
دجاج التسمين: (Ascaridia: 50%; Heterakis: 35%; Eimeria: 15%)،
اما الدجاج البيوض: (Ascaridia: 33.33%; Heterakis: 33.33%; coccidial oocysts: 33.34%)،
والدجاج المحلي :.(Ascaridia: 40%; Heterakis: 35%; Eimeria: 15%; Syngamus: 5%; Capillaria: 5%) .
وبناء علي النتائج لهذه الدراسة يجب التوصية بتشجيع نظام إدارة مكثف للدواجن و مراقبة الدجاج بشكل منتظم في هذه المنطقة موضوع الدراسة.