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Analysis of ectoparasites and gastrointestinal parasites of chickens in modern farms of the City of Korhogo

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Abstract

A study was carried out in the commune of Korhogo to assess gastrointestinal parasites and ectoparasites in modern poultry farms. To achieve this, 214 droppings samples, including 129 broilers and 85 laying hens from 40 broiler farms and 12 laying chicken farms were collected and analyzed using the flotation method. The results highlighted two (2) species of mallophagous lice namely *Menopon gallinae* (50%) and *Menacanthus stramineus* (33%) and a species of bug namely *Cimex lectularius* (17%) for ectoparasites. As for the gastro-parasites, two (2) species and four (4) genera namely *Trichostrongylus tenuis* (17%), *Syngamus trachea* (19%); *Heterakis* sp (10%), *Ascaridia* sp (17%), *Raillietina* sp (8%) and *Eimeria* sp (29%) have been identified. *Coccidiosis (Eimeria)* was the most important pathology in broiler farms with 67% and less important in laying hens (33%). Helminth eggs have been observed more in laying hens. Ultimately laying hens are more infested than broilers.

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Introduction

Ectoparasites are small organisms that mainly affect the skin. These organisms feed either by eating the dead cells of the skin and feathers, or by piercing the seed coat and sucking blood or secretions from tissues including the lymph (Baud'huin, 2003). The proliferation leads to extreme discomfort, itching that disturbs food intake. Severe irritation may be observed and results in damage to the plumage. The symptoms developed are therefore a disturbance in the birds' rest, stunted growth in young birds and weight loss in adult subjects (Wangrawa, 2010). The presence of parasites on poultry leads to slower laying and deteriorates the quality of the eggs. The numerous bites caused by these parasites can cause severe anemia in the hen which can die from exhaustion (Algom, 1994). Gastrointestinal parasites are small living organisms that live inside their host. Their bodies are segmented at least in the adult stage. They are compulsory parasites with a heteroxene cycle (Amoussou, 2007; Baker, 2007). Their presence translates on the one hand to significant losses due to mortalities and reduced performance, and on the other hand to the high costs of medication (Bon, 2006). In addition, the epidemiological situation of external and internal parasitism of chickens from modern farms in the commune of Korhogo is poorly understood. The overall objective of this study is to help improve the health status of poultry raised on modern farms.

Material and methods

Study site

The study was carried out on 52 farms in the commune of Korhogo distributed in seven (7) districts (Nagnenefou, Oshenin, Teguere, Residentiel, Residentiel 1, Delafosse and Nouveau-quartier) and four (4) villages (Bafime, Lakpolo, Waraniene and Natiokobadara) as shown in Fig. 1.

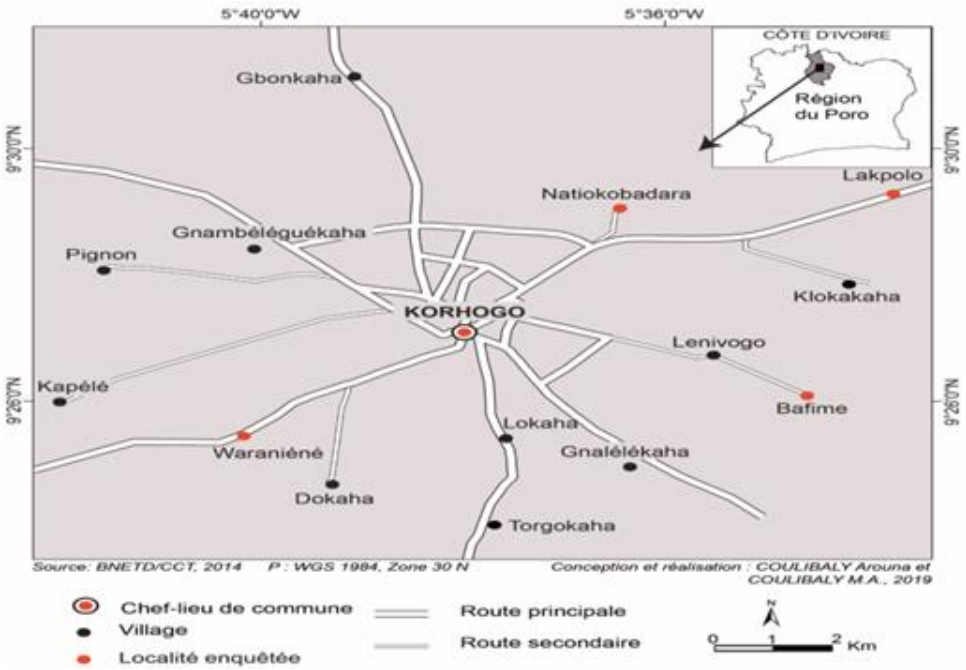

Fig. 1. Survey site ; Source : RGPH, 2014.

Biological material

The biological material used in this study consists of broilers and laying hens raised in the commune of Korhogo. On each subject it was collected and identified ectoparasites (fleas, scabies, lice and ticks) and collected droppings for analysis in the laboratory.

Collection of ectoparasites

The collection was done after restraining each animal, then body inspection of the head on the legs. The feathers have been raised to make the poultry skin visible. The ectoparasites present on the body were then torn off using the fingers and put in Eppendorf

tubes containing 70° alcohol to ensure their conservation and facilitate their transport to the laboratory for analysis.

Droppings

The droppings were also collected on the subjects in the farms surveyed and put in a cooler for the conservation of the eggs of the parasites.

Identification of ectoparasites

The identification of ectoparasites was done using a binocular magnifier. Ectoparasites were identified according to their morphological characteristics, using the entomological diagnosis of Borror and White (1970) and Klein (1979).

Coprological examinations

The coprological examination consisted of looking for eggs in the faeces. Its purpose is the qualitative diagnosis of infestations and the assessment of the degree of these infestations. It therefore includes both qualitative and quantitative methods. As part of our study, the flotation enrichment method (qualitative method) was used. Briefly, in a porcelain mortar, 2g of droppings were suitably crushed in 30 ml of a saturated solution of sodium chloride which constitutes the enrichment liquid. The mixture was then poured into a test tube through a tea strainer to remove organic debris. After allowing it to stand for a few minutes, an object slide was brought into contact with the solution supernatant. After 5 min, the slide covered with a coverslip was observed under an optical microscope at 10X magnification.

Epidemiological measures

Two (2) epidemiological measures were studied, namely prevalence and frequency.

Prevalence

Prevalence (P) is the ratio of the number of parasitized subjects to the total number of subjects present in the population studied at the same given time.

It was calculated using the following formula:

P (%) = Number of disease cases/Total population exposed ∗ 100

Frequencies

The frequency (f) of a parasite is represented by the ratio of the total number of this parasite to the total number of parasites in the study. It was determined by the following formula:

f (%) = number of cases of the disease/total number of sick individuals ∗ 100

Data analysis

Quantitative and qualitative data were collected during the survey. A descriptive analysis was made using computer tools. SPHINX software version 4.5.0.19 was used to develop the sample card, collect data, and determine averages, frequencies. The Microsoft Office EXCEL 2007 spreadsheet made it possible to create tables and graphs

Results

Frequency of gastrointestinal parasites

Fig. 2 shows the frequency of gastrointestinal parasites in the study chickens. Out of the 214 droppings samples analyzed, 103 samples harbored gastrointestinal parasites, an overall prevalence of 48.13% with the following decreasing prevalences such as 30 eimeria carrier chickens (29%); 20 carriers *Sygamus trachea* (19%); 17 *Ascaridia* sp carriers (17%); 17 carriers *Trichostrongylus tenuis* (17%); 10 *Heterakis* sp carriers (10%) and 8 *Raillietina* carriers (8%).

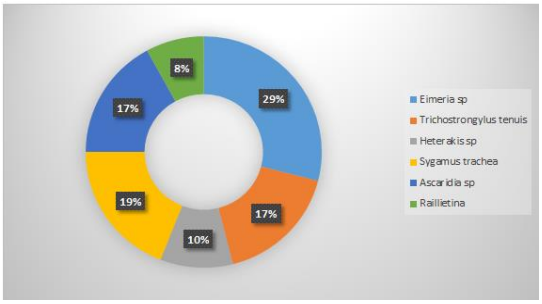

Fig. 2. Frequency of gastrointestinal parasites in the farms studied.

Frequency of parasites by type of farming

Table 1 shows the frequency of chickens carrying gastrointestinal parasites by type of farm. *Coccidiosis* (*Eimeria* sp) was the most common disease in meat farming with a prevalence of 67% and less in laying hens (33%).

Table 1. Frequency of gastrointestinal parasites by type of farming.

Gastrointestinal parasites	Types of chickens	Proportion (%)
Eimeria sp	Broilers	67
	Laying hens	33
Trichostrongylus tenuis	Broilers	56
	Laying hens	44
Heterakis sp	Broilers	40
	Laying hens	60
Sygamus trachea	Broilers	50
	Laying hens	50
Ascaridia sp	Broilers	59
	Laying hens	41
Raillietina	Broilers	63
	Laying hens	37

Frequency of ectoparasites

Fig. 3 shows the overall frequency of chickens carrying ectoparasites. Analysis of the data collected revealed that 120 chickens out of the 214 individuals sampled carried at least one species of ectoparasites, thus translating an overall prevalence of 56% in the commune of which 60 chickens were carrying *Menopon gallinae* (50%), 40 were carriers of *Menacanthus stramineus* (33%) and 20 were carriers of *Cimex lectularius* (17%).

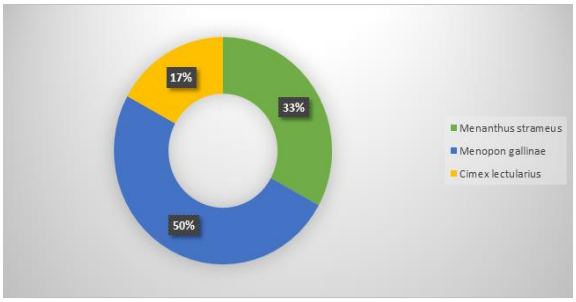

Fig. 3. Frequency of ectoparasites.

Frequency of ectoparasites by type of farming

Table 2 shows the frequency of chickens carrying ectoparasite by type of farm. Irrespective of the type of parasite, the parasites were more common in the breeding of laying hens and were more infested than that of broilers.

Table 2. Frequency of ectoparasite by type of farm.

Ectoparasites	Types of chickens	Proportion (%)
Menacanthus stramineus	Broilers	38
	Laying hens	62
Menopon gallinae	Broilers	33
	Laying hens	67
Cimex lectularius	Broilers	25
	Laying hens	75

Overall prevalence of ectoparasites and gastrointestinal parasites

Table 3 shows the overall prevalence of ectoparasites and gastrointestinal parasites. Out of the 214 droppings samples analyzed, 103 harbored gastrointestinal parasites and 120 harbored ectoparasites, giving an overall prevalence of 48% and 56% respectively.

Table 3. Prevalence of ectoparasites and gastrointestinal parasites.

Parasites	Health status of chickens	Proportion (%)
Gastrointestinal parasites	Infested chickens	48
	Uninfested chickens	52
Ectoparasites	Infested chickens	56
	Uninfested chickens	44

Prevalence by species of gastrointestinal parasite

Fig. 4 shows the overall prevalence of gastrointestinal parasites. During the study, six species of gastrointestinal parasite were identified. These are in decreasing numerical order of importance, *Eimeria* (14%), *Sygamus trachea* (9%); *Trichostrongylus tenuis* (8%), *Ascaridia* sp (8%), *Heterakis* sp (5%), *Raillietina* (4%). The most frequent parasite was *Eimeria* with 42%.

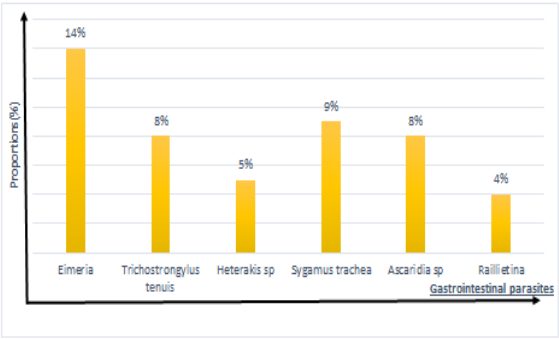

Fig. 4. Prevalence by species of gastrointestinal parasite.

Prevalence of gastrointestinal parasites by type of farming

Table 4 presents the prevalence of gastrointestinal parasites by type of farming. The study showed that laying hens (51.8%) were more infested than broilers (47.73%).

Table 4. Prevalence of gastrointestinal parasites by type of farming.

	Prevalences
Broilers (129)	47.73%(n=62)
Laying hens (85)	51.8%(n=44)

Prevalence by species of parasites by type of farming

Table 5 presents the prevalence by species of parasite by type of farm. *Coccidiosis (Eimeria)* was the most prevalent pathology in the two types of farming with respective prevalence of 15.5% for broilers and 11.76% for laying hens.

Table 5. Prevalence by species of parasites by type of farming.

	Eimeria sp	*Trichostrongylus tenuis*	*Heterakis* sp	*Sygamus trachea*	*Ascaridia* sp	*Raillietina*
Broilers (129)	15.5% (20)	7.75%(10)	3.1%(4)	7.75%(10)	7.75%(10)	3.88%(5)
Laying hens (85)	11.76%(10)	9.41%(8)	5.1%(4)	11.76%(10)	8.24%(7)	5.53%(4)

Prevalence by species of ectoparasites

Fig. 5 shows the overall prevalence of ectoparasites. The results show that the mallophagous lice represented by the two species Menacanthus stramineus and Menopon gallinae had the highest prevalence with 33% and 50% respectively against 17% for Cimex lectularius.

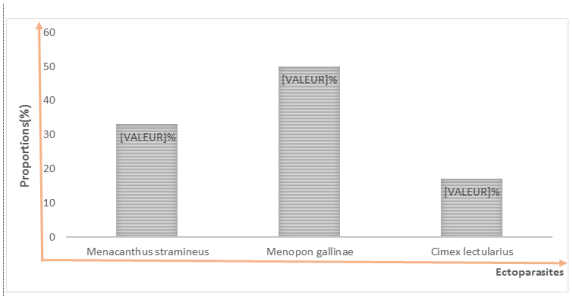

Fig. 5. Prevalence of ectoparasite species.

Prevalence of ectoparasites by type of farming

Table 6 presents the prevalence of ectoparasites by type of farming. Laboratory analysis has shown that laying hens are more infested than broiler chickens with the prevalence 94% and 31% respectively.

Table 6. Prévalence des ectoparasites selon le type d'élevage.

	Prévalences
Broilers (129)	31% (n=40)
Laying hens (85)	94% (n=80)

Prevalence by ectoparasite species by type of farming

Table 7 presents the prevalence by species of ectoparasites by type of farming. Whatever the type of parasite, laying hens were more infested than broiler chickens. Broilers were more infested with Menopon gallinae 15.5%.

Table 7. Prevalence by ectoparasite species by type of farming.

	Menacanthus stramineus	*Menopon gallinae*	*Cimex lectularius*
Broilers (129)	11.62% (n=15)	15.5% (n=20)	3.87% (n=5)
Laying hens (85)	29.41% (n=25)	47% (n=40)	17.64% (n=15)

Table 8. Prevalences of gastrointestinal parasite associations.

Types of parasitism	Associated Parasites	Broilers (n=129)		Laying hens (n=85)	
		Numbers	Prevalence	Numbers	Prevalence
Diparasitism	Eimeria+Heterakis	3	2,32%	3	3,52%
	Eimeria+Trichostrongylus	2	1,55%	4	4,70%
	Eimeria+Ascaridia	2	1,55%	2	2,35%
	Eimeria+Sygamus trachea	3	2,32%	-	-
	Trichostrongylus+Heterakis	1	0,77%	-	-
	Trichostrongylus+Ascaridia	1	0,77%	1	1,17%
	Heterakis+Ascaridia	-	-	2	2,35%
Diparasitism total		10	9,28%	12	14,09%
Triparasitism	E+A+H	-	-	1	1,17%
	E+A+T	-	-	2	2,23%
Triparasitism		-	-	3	3,23%
Tetraparasitism	E+A+T+R	-	-	2	2,23%

E=*Eimeria* ; A=*Ascaridia* ; H=*Heterakis* ; T=*Trichostrongylus tenuis* ; R=*Raillietina*

Prevalences of gastrointestinal parasite associations

Table 8 below presents the different prevalence of parasite associations observed in modern chicken farming. Gastrointestinal parasite associations were more common in laying hens with 14.09% diparasitism compared to 9.28% in broiler chickens.

No case of triparasitism or tetraparasitism has been detected in broiler chickens.

Prevalences of ectoparasite associations

Table 9 presents the prevalence of ectoparasite associations. Associations of ectoparasites were more common in layers than in flesh.

Table 9. Prevalences of ectoparasites associations.

Types of parasitism	Associated Parasites	Broilers (n=129)		Laying hens (n=85)	
		Numbers	Prevalence	Numbers	Prevalence
Diparasitism	Menacanthus stramineus+Menopon gallinae	10	7.75%	16	18.82%
	Menacanthus stramineus+Cimex lectularius	8	6.20%	12	14.11%
	Menoon gallinae+Cimex lectularius	5	3.87%	14	16.47%
Diparasitism total		23	17.82%	42	49.4%
Triparasitism	M.stramineus+M.gallinae+C	4	3.10%	6	7%
Triparasitism total		4	3.10%	6	7%

Discussion

Three species of ectoparasites have been identified in modern poultry farms visited. These include two (2) species of *Mallophagous* lice, *Menacanthus stramineus* and *Menopon gallinae,* as well as one species of bed bug: *Cimex lectularius*. These results are contrary to those of Djelil (2012), who found only *Mallophagous lice* and several species of mites on farm chicken in Algeria. This difference may be due to the divergence of agro-ecological zones and the farming method. Indeed, the author worked in a temperate zone on animals in extensive system.

These ectoparasites were found in 56% of modern farms visited in the Municipality of Korhogo. Whatever the type of parasite, laying hen farms were more infested than broiler chickens. Broilers were 38% more infested with *Menacanthus stramineus*.

The strong presence of these mallophagous lice can be explained by the fact that these insects complete their entire life cycle on the body of the poultry, which translates their permanence on the bird according to Wangrawa (2010).

The lower infestation level of broilers (25%) compared to laying hens (75%) is due to their short duration of breeding (35-45 days). According to Seguy (2007), the development cycle (from the egg stage to the adult stage) of *Mallophagous lice,* ranging from two to three weeks, would limit their proliferation on the flesh. In addition, Salifou *et al*. (2008) indicate that the prevalence of parasitism increases significantly with the age of the animals.

Unlike Capinera (2008) who found a 100% prevalence of *Dermanyssus gallinae* in the laying hen in France, our study did not show any case of infestation by "red lice". This could be explained by the absence of optimal humidity conditions necessary for their development. In addition, the intermittent life cycle of these mites makes them difficult to see on animals.

As for gastrointestinal parasites, our results highlighted eggs of Coccidia of the genus *Eimeria* and of *helminths* composed of nematodes of the genera *Ascaridia, Trichostrongylus, Heterakis* and *Syngamus* and of cestodes only of the genus *Raillietina*, identified in the droppings. In addition to *Trichostrongylus tenuis*, identical observations were made by Amoussou (2007) on local chicken in Benin.

The prevalence for the most numerous coccidia is 67%. This high rate makes coccidiosis the major parasitosis. It was frequent in the 2 types of farms. These results are similar to those of Domenech *et al*, (1991). Indeed, these authors report that coccidiosis is

at the top of avian pathologies in industrial farms in Côte d'Ivoire. Furthermore, the prevalence of coccidiosis is higher in the flesh and increases with age. In laying hens, the low prevalence observed is probably explained by an age-related resistance phenomenon which would develop in them due to their duration in breeding. In this regard, Fournier (2005) indicates that after an infestation, the chicks gradually develop their own immunity to new infestations. This immunity is linked to white blood cells. Its development depends on the frequency and duration of infestation of animals by the parasite (Aboghe, 2001). During the study, the helminths identified belonged to several species.

The digestive helminthoses encountered like ascariasis are linked to the length of the poultry production cycle (Buldgen *et al.*, 1996). They relate more to laying hens (more than 12 months of breeding) than broilers (45 days of breeding or less). This can also be understood by the fact that in the laying of laying hens, the litter is generally not renewed or treated on a regular basis to prevent the perpetuation of host-parasite contact (Habyarimana, 1998). Parasite associations, although more diverse in the laying of laying hens, had low prevalence. These results could be the fact that inside the same host, some parasites may not find the ideal environmental conditions. Interspecific competition is observed for the resources available (Dayon and Arbelot, 1997).

Conclusion

The present study has made it possible to highlight the major external and internal parasitoses which prevail in modern poultry farms in the commune of Korhogo. It made it possible to know the prevalence of these parasitoses in these farms. Three (3) species of ectoparasites were found on 120 animals among the 214 sampled, representing a prevalence of 56%. The study also revealed the presence of gastrointestinal parasites identified in 103 out of 214 animals, a prevalence of 48%. Ultimately, parasitosis is one of the major constraints to the productivity of chickens from modern farms. Other complementary studies could be carried out in other localities of the commune of Korhogo in order to confirm the results obtained.

Conflict of interest

No conflict of interest exists between the different authors.

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