

PARASITES PREVALENCE IN POULTRY: FOCUSING ON FREE RANGE TURKEYS (*Meleagris gallopavo*)

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ABSTRACT. In most countries, poultry are reared by traditional farmers due to the relative minimum capital needed to start off, availability of feed and the fast period of the birds to grow. This research was conducted on turkeys which aims to study the abundance and prevalence of ectoparasites from three localities around Kedah, Malaysia. A total of 20 turkeys (eight males and twelve females) were examined for ectoparasites infestation and endoparasites infection. Six species of ectoparasites: five lice and a mite have been discovered. The most prevalent ectoparasite was *Menopon gallinae* with occurrence of 45%. Other external parasites recorded include *Lipeurus caponis* and *Megninia cubitalis* with occurrence of 40%, *Menacanthus pallidulus* (35%), *Goniocotes gallinae* (30%) and *Chelopistes meleagridis* (20%). There was a significant difference between the ectoparasite abundance in Jabatan Perkhidmatan Veterinar and Alor Belat Barat [ANOVA, $F(2,17)=6.33$, $p=0.009$]. These lice commonly found in the fluff of the feathers, especially at the neck, abdomen, and wings. *Lipeurus caponis* was

found to have the highest infestation in all male and female turkeys and *Menacanthus pallidulus* was noted as the less common ectoparasite infesting both the male and female turkeys. Endoparasite infection was recorded in two species of parasite eggs of nematodes and protozoa. Oocyst of *Eimeria* spp. recorded the highest faecal egg count with 7300 epg compared to *Capillaria* spp. with only 1200 epg. Scavenging and pecking behaviour of turkeys in barn area with unsuitable farm housing environment were the major contributing factors to the infestation of ectoparasites as well as endoparasites infection.

Keywords: turkeys, ectoparasites, endoparasites, northern peninsular Malaysia.

INTRODUCTION

Poultry are domesticated birds from members of the order Galliformes (chickens, quails and turkeys) and Anseriformes that consist of family Anatidae or commonly known as “water fowl” or domestic geese and ducks (Eaton, 1992). Based on research studies

by Pearson (1995) and Khan *et al.* (2003), birds are animal protein sources produced within the fastest possible time. Therefore, the demand for poultry meat is getting more from year to year throughout the world as the human population increases. Turkey meat is less consumed in Malaysia compared to western countries such as Europe and United States. Most people eat broiler chickens that are available in many places and the price is more reasonable than turkey meat. In Malaysia, turkey or locally known as *ayam pirus* is not new in the poultry industry. However, the lack of awareness makes turkey meat not popular as a delicacy or dish. Normally, turkey meat is sold at RM25 to RM30 per kg on average in some poultry farm. Although turkey meat is more expensive than broiler and scavenging chickens, Udoh *et al.*, (2014) mentioned that turkey meat contains lower calories and fat, and higher in protein, than other meats. Ogunmola *et al.* (2013) discovered that the nutritive value of sampled turkey meat has the highest crude fat, fibre and protein content based on the type of diet. This indicates that turkey meat could provide more energy and other beneficial minerals than other meat sources.

There are several different types of arthropods and worms as parasite that can affect turkeys. Parasites are threats to the birds especially in a poultry farm as organisms will invade the host in many different ways that come in contact with these animals. Parasites living mainly on the skin may cause the birds to be agitated

and be lack of sleep, resulting in loss of weight as well as potential inability to reproduce (Mullen and Durden 2002; Wall and Shearer 2001). According to Sabrina (2014), the prevalence of lice infestation was higher in commercial free-range chicken compared to tick, mite and flea.

There have been no studies in Malaysia on the species distribution of parasites in turkeys. Therefore this finding would serve as a reference point for further study. This study examined the abundance and prevalence of ectoparasites and endoparasites of free-range turkeys, *Meleagris gallopavo* that can be a pioneer research for turkey poultry industry in Malaysia.

MATERIALS AND METHODS

Screening and identification of ectoparasites

A total of twenty turkeys consisting eight males and twelve females were collected and examined from Jabatan Perkhidmatan Veterinar Daerah Pendang (N6°7'11.1894" E100°24'46.548"), Kg. Alor Belat Barat (N06°03'24.6" E100°23'22.1") and Kg. Sungai Baru Tengah (N06°09'39.4" E100°19'55.1"). Turkeys belong to the Black Spanish breed (3 males and 3 females) were examined from Jabatan Pekhidmatan Veterinar Daerah Pendang (JPV), whereas turkeys from cross breeds were collected from Kg. Alor Belat Barat (5 males and 5 females) and Kg. Sg. Baru Tengah (4 females). The turkeys aged from

three months to six months were examined. These turkeys were reared in a backyard and left scavenging in an enclosed area. No anthelmintic and antibiotics were given to the turkeys obtained from the three sampling sites. External parasites were screened closely on the entire turkeys' body including area around comb, wattle, legs, body plumage and tail by using forceps and plucking the feather by hand. Lice and mites were collected and preserved in universal bottles containing 70% ethanol for further identification following keys and illustration by Tuff (1977) and Sloss (1970).

Collection of faecal samples

Faeces were taken from new droppings on the ground of the poultry house and stored in a plastic bag before placing it in a cooling box to keep them fresh before transporting to the laboratory. Floatation and McMaster techniques were applied for the detection of coccidia oocyst and nematode eggs in faecal samples following Christopher *et al*, (1992). For the floatation method, two grams of fresh faeces were mixed thoroughly with 45 ml concentrated sodium chloride (NaCl) solution in a beaker and later strained through an 85-mesh screen. The strained faeces were poured immediately into test tubes and were placed in a test tube rack vertically while the retained faeces debris was discarded. In order to form a convex meniscus at the top of the test tube, the tubes were topped up with the faecal suspension and a cover slip

placed at the top for 20 minutes. The cover slip was lifted off straight up together with the flotation fluid that adhered to and was placed on a glass slide. The accumulated helminth eggs and coccidian oocysts under the cover slip were observed under a compound microscope for identification.

For the McMaster technique, faecal suspension (3 gm faeces mixed with 45 ml concentrated sodium chloride (NaCl) solution) was mixed and filtered through an 85-mesh screen and the filtrate was collected. A well-mixed filtrate was filled up into both sides of the McMaster slide counting chamber. The presence of air bubbles in the glass slides needed to be avoided. Both counting chambers were examined under a compound microscope after 5 minutes and all helminth eggs were counted. The eggs and oocysts were identified according to characteristics listed by Permin and Hansen (1998).

RESULTS

All turkeys from JPV and SBT were heavily infested with ectoparasites (Table 1) and most of the turkeys from all sampling sites were infested with at least one type of ectoparasites. The most number of ectoparasites, with 845 individuals, was reported in JPV. Five species of lice and one species of mite were recorded. *Lipeurus caponis* was recorded as the most abundant species with 548 individuals that can be found in JPV and ABB. Other species like *Menacanthus pallidulus* and *Menopon gallinae* were recorded from

Table 1. Abundance of ectoparasites species (number of individuals (%)) according to sampling sites; Jabatan Perkhidmatan Veterinar Pendang (JPV), Kg. Alor Belat Barat (ABB) and Kg. Sg. Baru Tengah (SBT).

Ectoparasite	Species	Sampling sites		
		JPV	ABB	SBT
Lice	<i>Menopon gallinae</i>	55(7%)	-	24(18%)
	<i>Menacanthus pallidulus</i>	10(1%)	-	10(8%)
	<i>Lipeurus caponis</i>	546(65%)	-	-
	<i>Goniocotes gallinae</i>	144(17%)	2(100%)	-
	<i>Chelopistes meleagridis</i>	-	-	31(23%)
Mites	<i>Megninia cubitalis</i>	90(11%)	-	68(51%)
Total		845(100%)	2(100%)	133(100%)

Table 2. Abundance of ectoparasites species, number of turkeys infested, prevalence and predilection sites across all sampling sites.

Types of ectoparasites	Species	Abundance	No. of turkeys infested	Prevalence (%)	Predilection sites (Mean± SE)		
					Neck	Winged feather	Tail
Lice	<i>Menopon gallinae</i>	79	9	45	-	3.95 ± 1.74	-
	<i>Menacanthus pallidulus</i>	20	7	35	-	1.00 ± 0.41	-
	<i>Lipeurus caponis</i>	548	8	40	27.4 ± 14.56	-	-
	<i>Goniocotes gallinae</i>	144	6	30	-	7.2 ± 3.14	-
	<i>Chelopistes meleagridis</i>	31	4	20	-	1.55 ± 1.12	-
Mite	<i>Megninia cubitalis</i>	158	8	40	-	7.9 ± 3.87	-

Table 3: Faecal egg count of *Capillaria* spp. and oocyst count of *Eimeria* spp. from the turkeys at three sampling sites.

Helminth egg/oocyst	Sampling site	Egg per gram (epg)
<i>Capillaria</i> spp.	1. Jabatan Perkhidmatan Veterinar Daerah Pendang, Kedah	700
	2. Kg. Alor Belat Barat, Alor Star, Kedah	400
	3. Kg. Sg. Baru Tengah, Alor Star, Kedah	100
	Total	1200
Oocyst of <i>Eimeria</i> spp.	1. Jabatan Perkhidmatan Veterinar Daerah Pendang, Kedah	6000
	2. Kg. Alor Belat Barat, Alor Star, Kedah	800
	3. Kg. Sg. Baru Tengah, Alor Star, Kedah	500
	Total	7300

JPV and SBT while *Goniocotes gallinae* occurred only in JPV. The common large turkey louse, *Chelopistes meleagridis* with 31 individuals (23%) were found in the SBT farm. Ectoparasites abundance was significantly different between JPV and ABB [ANOVA, $F(2,17)=6.33$, $p=0.009$].

Total infestation rate was 60% with 12 turkeys infested (Table 2). This finding showed that *M. gallinae* was the most common ectoparasite with 45% occurrence, followed by *L. caponis* and *Megninia cubitalis* with similar prevalence of 40%, *M. pallidulus* (35%) and *G. gallinae* (30%). These lice were commonly found in the fluff of the feathers especially the neck, abdomen, and wings. For instance, *L. caponis* only occurred in the neck area whereas other louse were found in the winged feather of the turkeys. The only mite found at the base of the turkey's feather was *Megninia cubitalis*.

Out of 20 domestic turkeys examined, 12 turkeys were infested with ectoparasites comprising of 5 (25%) males and 7 (35%) females. However, there was no significant difference in abundance of ectoparasites for male and female (t-test, $t(18)=1.24$, $p=0.230$). *Lipeurus caponis* was found the most abundant in infesting all male and female turkeys while *Menacanthus pallidulus* was noted as the less common ectoparasite infesting both male and female turkeys.

Faecal samples collected were infected with two species of *Capillaria* eggs and coccidian oocyst, *Eimeria* spp. (Table 3). Highest *Eimeria* oocyst and

Capillaria spp. were found from turkeys in Jabatan Perkhidmatan Veterinar Daerah Pendang, Kedah with 6,000 epg and 700 epg, respectively. *Capillaria* spp. and *Eimeria* oocyst were least found in Kg. Sungai Baru Tengah (100 epg and 500 epg, respectively).

DISCUSSION

In Malaysia, study of parasites on turkeys was given less priority due to the low consumption of turkey meat among Malaysians. No documentation or publication providing a list of turkey parasites is available in Malaysia. In the present study around Kedah, most of the domestic turkeys were infested with ectoparasites from two groups of arthropods; lice and mite. Evidently, six species of ectoparasites have been recorded and identified. They consist of five species of lice including *Menopon gallinae*, *Goniocotes gallinae*, *Lipeurus caponis*, *Menacanthus pallidulus* and *Chelopistes meleagridis*. The only mite species to be found was *Megninia cubitalis*. The results of a study by Mekuria and Gezahegn (2010) discovered a similar number of ectoparasites. This present finding stated only 12 turkeys were found to be infested with this external parasite and eight turkeys left with no infestation at all. Since turkeys belong to the same group of avian like other scavenging and commercial chickens, the infestation of common poultry ectoparasite might happen on turkeys to be their host.

The majority of domestic turkeys studied were infested at least by one species of ectoparasite. These ectoparasites were discovered in the fluff of feathers commonly the underside of wing feathers, around the neck and tail. This is in agreement with Ikpeze *et al.* (2008) who reported that most of the lice including *Menopon gallinae*, *Lipeurus caponis* and *Goniocotes gallinae* occurred on body surfaces, beneath and on the wings including feather shafts of infested birds. In this study, prevalence of chewing lice infestation was higher than other external parasites (tick, flea and mite). Similar findings were reported from other studies (Sabrina, 2014; Ilyes *et al.*, 2013; Amede *et al.* 2011; Termizi, 2011; Bala *et al.*, 2011, Mekuria and Gezahegn, 2010; Ikpeze *et al.*, 2008). Most of the turkeys were infested with the shaft louse, *Menopon gallinae*. This infestation was clearly seen with the many egg knits spotted on the feathers causing some of the turkeys to lose their feathers due to heavy infestation of *Menopon gallinae*.

The high prevalence of ectoparasites in the present study may be related to the poor management in the turkey production system. Most of the turkeys from these three locations were reared in an enclosed area. Concomitantly, there were two turkey farmers in this study that placed their turkeys in small cages together with others birds like scavenging chickens and quails. Bala *et al.* (2011) suggested that ectoparasites easily migrate from one bird to another due to the crowded condition. This could explain the reason why most

common chicken louse were abundantly found on turkeys compared to the only one large turkey louse, *Chelopistes meleagridis* which only occurred on the original host from turkeys sample in Alor Setar. The occurrence of the turkey louse on this original host probably due to the different breed brought from their native place.

Low input of backyard poultry management (e.g. the turkeys were reared with other birds) and the inappropriate environmental conditions such as extreme temperature encourage the abundance of ectoparasite in poultry (Mekuria and Gezahegn, 2010). According to Banda (2011), *Menopon gallinae* were frequently found in a hot humid climate rather than in a hot dry condition. Greater diversity of ectoparasite species on turkeys also due to the unhygienic poultry farming carried out by the farmers that neglect the sanitation. On the potential side, some farmers do not provide enough space for the turkeys to freely roam in the coop. Poor ventilation also made them compete with each other to fulfil their essential needs like space and food. According to Shanta *et al.* (2006), unsuitable housing as well as no additional food supplement is the most unethical practice conducted in traditional backyard poultry that made the poultry malnourished.

Although seven turkey females were heavily infested with ectoparasites compared to five turkeys, there were no significant differences between the two sexes. Comparatively this finding is similar

to other studies conducted by Sabrina (2014), Banda (2011), Termizi (2011), Mekuria and Gezahegn (2010) and Ekpo *et al.*, (2010). Thus it can be suggested that infestation of ectoparasites is similar between male and female turkeys.

Helminth parasites involving nematodes and protozoans were reported in faecal specimens of turkeys, comprised of *Capillaria* spp. and coccidian oocyst of *Eimeria* spp. Since no turkeys were slaughtered to observe the gastrointestinal infection for this internal parasite, faeces were collected to study the presence of parasite eggs. However, this faecal examination only discovered a low number of endoparasites species and coproculture method need to be done in order to identify the worms until the species level. Microscopic examination by using McMaster method, following floatation method to detect the presence of parasite eggs in turkey faeces only found these two types of endoparasites.

Coccidian oocyst from protozoan, *Eimeria* spp. recorded the highest reading of egg per gram with 7,300 epg compared to *Capillaria* spp. where only 1200 epg were found. As a matter of fact, Udoh *et al.* (2014) recorded the same endoparasites in domestic turkeys. In particular, various species of *Capillaria* in several poultry were recorded by Kaufmann *et al.* (2011), Abdul Wahab *et al.* (2009), Muhairwa *et al.* (2007), Rabbi *et al.* (2006), Permin *et al.* (1999) Castle and Christensen (1984) and Hon *et al.* (1975). For *Eimeria*, coccidian oocyst infection in certain bird

species were reported found by Fiaz (2013), Puttalakshmama *et al.* (2008) and Permin *et al.* (2002).

The occurrence of helminth eggs in turkeys faeces were attributed to the managerial factors and environment condition. Abdul Wahab *et al.* (2009) mentioned the infection of nematodes species was influenced by several elements including food types given to the poultry, pattern of rainfall, soil and the place itself. In this study, farmers gave pellets, corn brans and broken grains as the food sources to the turkeys. Therefore, the turkeys were free range pecking on the ground to feed themselves with various remnants that may facilitate the spreading of parasites among turkeys. For this reason, the chickens feed on the contaminated ground surface with earthworm that act as intermediate host and infected with parasite egg and larva in the soil (Puttalakshmama *et al.*, 2008; Muhairwa *et al.*, 2007). Particularly, low responsibilities from the farmers on good housing sanitary condition may expose the turkeys to serious infection if no actions are undertaken. Nevertheless, the parasite infection can be minimized if intensive management of turkey production system is conducted instead of backyard poultry.

By the same token, endoparasite infection can occur extremely in poultry because of poor sanitation and lack of proper hygiene in the farm. *Capillaria* spp. is found commonly infecting poultry birds. Permin and Hansen (1998) mentioned *Capillaria* spp. was found infecting the intestinal tract of domesticated and wild

birds. Meanwhile *Eimeria* spp. infection in birds can lead to coccidiosis, the most common disease caused by a protozoan that is becoming a problem for poultry globally (El-Shahawy, 2010). Moreover, *Eimeria* spp. that belongs to protozoan types of endoparasites are host specific with absence of intermediate hosts and have direct life cycle (Badran and Lukesova, 2006; McDougald, 1998). The environmental condition of coops that have restricted accessibility to vegetation stimulates the foraging behaviour of turkeys which increases the risk of helminth dissemination as infective stages occur in soil and faeces.

CONCLUSION

The present study demonstrated the occurrence of parasites of domestic turkeys in Kedah, Malaysia. Six species of ectoparasites were found in this study which comprised of five species of lice and one specie of mite which was *Megninia cubitalis*. Other lice were identified as *Lipeurus caponis*, *Menopon gallinae*, *Goniocotes gallinae*, *Menacanthus pallidulus* and *Chelopistes meleagridis*. Two species of endoparasites consisted of *Capillaria* eggs and coccidian oocyst, *Eimeria* spp. were recorded. These turkeys were reared in an enclosed backyard area and practiced by traditional farmers. The surrounding area of the turkey coops have little ventilation and less space which contributed to environmental stress of the turkeys. Natural behaviour of the turkeys to

scavenge on ground that contained various types of foods including intermediate hosts may lead to infection of endoparasites.

Obviously, this study recorded a large number of ectoparasite species but low number of endoparasites and also reported the similar parasite species that were found on other poultry birds from the previous study. High infestation and infection of parasites can be reduced by a well-planned management of poultry emphasising on hygiene and suitable environment around the poultry farm. Short training courses to potential and new breeders are recommended in order to provide guidelines and knowledge about the rearing system, sanitary and disease control. Since turkeys are not reared intensively in Malaysia, good

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