

## The prevalence of intestinal helminths in broiler chickens in Trinidad

Vandanaa Baboolal, Vijaya Suratsingh, Lana Gyan, Gabriel Brown, Nkechi V. Offiah, Abiodun A. Adesiyun, and Asoke K. Basu\*

*School of Veterinary Medicine, Faculty of Medical Sciences, The University of the West Indies, St. Augustine, Trinidad and Tobago*

---

**BABOOLAL, V., V. SURATSINGH, L. GYAN, G. BROWN, N. V. OFFIAH, A. A. ADESIYUN, A. K. BASU: The prevalence of intestinal helminths in broiler chickens in Trinidad. Vet. arhiv 82, 591-597, 2012.**

### ABSTRACT

A study was conducted between September 2009 and August 2010 to identify intestinal helminths in commercial broiler chickens and estimate their prevalence in Trinidad. Three hundred and forty four intact intestines of commercial broiler chickens were obtained from eight counties and examined. Of these 36 (10.5%) were found to harbor helminths. The chickens were found to have a single infection with nematodes (5.5%), a single infection with cestodes (4.1%) and a mixed infection with nematodes and cestodes (0.9%). No intestinal trematodes were detected. Four species of nematodes were identified as *Ascaridia galli* (5.8%), *Heterakis gallinarum* (0.9%), *Subulura brumptii* (0.3%), *Capillaria* sp. (0.3%), and the three species of cestodes found were *Raillietina echinobothrida* (2.3%), *R. cesticillus* (0.9%) and *Choanotaenia infundibulum* (2.3%). Helminth infection was found to be highest in the county of St. George (34.9%) followed by St. Andrew (14%), Caroni (9.3%), Victoria (9.3%), Mayaro (9.3%), Nariva (2.3%), St. Patrick (2.3%) and St. David (2.3%). A significant ( $P < 0.001$ ) difference was found in the prevalence of helminth infection between the counties. In spite of the short life span and rearing under intensive farm management, broiler chickens in Trinidad harbor several intestinal helminths.

**Key words:** broiler chicken, intestinal helminths, Trinidad

---

### Introduction

Of the world's poultry population of eighteen billion, about twenty-eight and a half million birds made up the poultry population of Trinidad and Tobago in 2008. The most commonly kept poultry in Trinidad are domestic chickens (*Gallus domesticus*) and Muscovy ducks (*Carina moschata*), with the former being greater in number and of greater economic importance (SINGH and SEEPERSAD, 2001). The annual per capita

---

\*Corresponding author:

Asoke K. Basu, M.V.Sc., Ph.D., School of Veterinary Medicine, Faculty of Medical Sciences, The University of the West Indies, St. Augustine, Trinidad and Tobago, Phone: +1 868 645 2640 ext. 4239; Fax: +1 868 6457428; E-mail: asokebasu@gmail.com

consumption of broiler meat in Trinidad and Tobago (35.79 kg in 1998) is among the highest in the world (SINGH and SEEPERSAD, 2001). The broiler industry is today one of the largest and most successful agro-industries in Trinidad and Tobago. It is estimated to contribute 88.60% of all meats consumed and thereby constitutes a strategic food and protein source (SINGH and SEEPERSAD, 2001).

The broiler industry of Trinidad and Tobago is owned and operated wholly by the private sectors: it is characterized by a structure that has a high degree of vertical integration. The companies use intensive management systems and the broilers are floor-raised on litter. The live chickens and processed chicken products are supplied to the consumers through both pluck shops (Cottage poultry processors) and processing plants.

Poultry diseases continue to play a major role in directly interfering with poultry productivity, which decreases economic returns and may therefore negatively affect the development of the industry. Internal and external parasites of poultry are common in the tropics because of the favourable climatic conditions for their development and the poor standards of poultry husbandry (ABEBE et al., 1997). Losses due to reduced productivity (for example, increased feed conversion ratio, poor weight gain, poor egg production) caused by helminthiasis are economically very important to the poultry industry. Despite the economic significance of the parasitic diseases of commercial and small-scale poultry in the country, no substantial research has been reported on parasites and the economic losses due to parasitic diseases of local poultry. Similar studies carried out in a nearby Caribbean country, Grenada, revealed a prevalence of helminth infection of 66.9% (PINCKNEY et al., 2008).

Improved poultry management practices are responsible for the reduction in the incidence of parasitic infections (PUTTALAKSHMAMMA et al., 2008). Prevalence studies have been undertaken in many tropical countries such as Nigeria (NNADI and GEORGE, 2010), Kenya (MUNGUBE et al., 2007), Ethiopia (ESHETU et al., 2001), Zambia (PHIRI et al., 2007), Morocco (HASSOUNI and BELGHYTI, 2006), India (YADAV and TANDON, 1991) and Iran (ESLAMI et al., 2009). No published report exists on intestinal helminths in broiler chicken from Trinidad. Therefore an attempt has been made to identify the intestinal helminth species of commercial broiler chickens and determine their prevalence in Trinidad.

### **Materials and methods**

*Study period.* This study was conducted from September 2009 to August 2010 and samples were collected between January and March 2010.

*Study area.* The study area included all the eight counties of Trinidad. In Trinidad there is a wet season from June to December and a dry season from January to May. The mean annual rainfall ranges in excess of 3500 mm in the Northern Range to values below 1500

mm along the western coast of the island and along the South coast (Central Statistical Office). The maximum temperature ranges from 33.1 to 34.4 °C with a minimum ranging from 20 to 22 °C. Relative humidity ranges from 50.6 to 99.5%. From each of the eight counties (Table 1) of Trinidad the samples were obtained from markets and/or 'pluck shops', which are small-scale, private operations, also called cottage poultry processors.

*Study animals and study materials.* As the main species of poultry consumed in Trinidad, *Gallus domesticus*, is widely available throughout the country and this has been selected as the study animal. For the present study the intact intestines of chickens were obtained from the discarded parts of six- to eight-week-old broilers, slaughtered on the day of collection.

*Sample size.* The sample size for the prevalence study was calculated using the formula given by THRUSFIELD (1995) with a precision level of 5% and confidence interval of 95%. The required sample size was three hundred and forty one, but forty-three samples representing each county gave a new sample size of three hundred and forty-four broilers.

*Collection of samples.* The intestines of the broiler chickens obtained from the chicken outlets were brought to the parasitology laboratory at the School of Veterinary Medicine for examination.

*Examination procedure.* The examination of the birds' intestines for helminth parasites/ ova was undertaken using four different methods: gross examination of the split intestine, direct examination of a smear of intestinal content, examination of the intestinal content using flotation techniques and examination for minute parasites of the intestine using physiological saline (YACOB et al., 2009).

*Identification of parasites.* The ova and helminths from all the methods mentioned above were identified using the helminthological keys earlier described (SOULSBY, 1982; URQUHART et al., 1996).

The chi-square test of equality was used to analyze the data obtained.

## Results

Out of the 344 intestines of the chickens examined, 36 (10.5%) were positive, showing the presence of helminths in the intestine. A significant ( $P < 0.001$ ) difference was found in the prevalence of helminth infection among the counties, with the highest in St. George (34.9%) followed by St Andrew (14.0%), Caroni (9.3%), Victoria (9.3%), Mayaro (9.3%), Nariva (2.3%), St. Patrick (2.3%) and St. David (2.3%).

The chickens were found to have 6.4% infection with nematodes (5.5% single nematode infection +0.9% mixed infection with cestodes and nematodes) and 4.9%

Table 1. Number and percent of broiler chickens infected with different intestinal helminths in different counties of Trinidad.

County	No. of birds examined	Total number of birds infected (%)	Number of birds infected with Nematode					Total
			<i>A. galli</i>	<i>H. gallinarum</i>	<i>S. brumpti</i>	<i>Capillaria</i> spp	Mixed infection	
St. George	43	15 (34.9%)	4	1	1	1	<i>a</i> = 1	6
St. Andrew	43	6 (14%)	6	2	-	-	<i>a</i> = 2	6
Caroni	43	4 (9.3%)	2	-	-	-	-	2
Nariva	43	1 (2.3%)	1	-	-	-	-	1
St. Patrick	43	1 (2.3%)	1	-	-	-	-	1
St. David	43	1 (2.3%)	1	-	-	-	-	1
Victoria	43	4 (9.3%)	2	-	-	-	-	2
Mayaro	43	4 (9.3%)	3	-	-	-	-	3
Total	344	36 (10.5%)						22 (6.4%)

  

County	No. of birds examined	Total number of birds infected (%)	Number of birds infected with Cestode					Mixed infection (Nematode + Cestode)
			<i>R. echinobothrida</i>	<i>R. cesticilus</i>	<i>C. infundibulum</i>	Mixed infection	Total	
St. George	43	15 (34.9%)	7	3	3	3	<i>b</i> = 2	11
St. Andrew	43	6 (14%)	-	-	-	-	-	0
Caroni	43	4 (9.3%)	-	-	2	2	-	2
Nariva	43	1 (2.3%)	-	-	-	-	-	0
St. Patrick	43	1 (2.3%)	-	-	-	-	-	0
St. David	43	1 (2.3%)	-	-	-	-	-	0
Victoria	43	4 (9.3%)	1	-	2	2	-	3
Mayaro	43	4 (9.3%)	-	-	1	1	-	1
Total	344	36 (10.5%)						17 (4.9%)

*A* = *Ascaridia*; *C* = *Choanotaenia*; *H* = *Heterakis*; *R* = *Raillietina*; *S* = *Subulura*. For mixed infection, *a* = *A. galli* + *H. gallinarum*; *b* = *R. echinobothrida* + *C. infundibulum*; *c* = *A. galli* + *C. infundibulum*; *d* = *A. galli* + *R. echinobothrida* + *C. infundibulum*; *e* = *S. brumpti* + *C. infundibulum*

infection with cestodes (4.07% single infection with only cestodes +0.9% mixed infection with nematodes and cestodes). No intestinal trematodes were detected (Table 1). Considering only the helminth infected birds (36), infection with nematodes was found in 61.1%, whereas, cestode infection was found in 47.2% with 8.3% showing both nematodes and cestodes in their intestines.

The helminths found in the intestines of the broiler chickens were four species of nematodes (*Ascaridia galli*, *Heterakis gallinarum*, *Subulura brumpti* and *Capillaria* spp.) and three species of cestodes (*Raillietina cesticilus*, *R. echinobothrida* and *Choanotaenia infundibulum*). The most common helminth detected was *A. galli* (5.8%), followed by *R. echinobothrida* (2.3%), *C. infundibulum* (2.3%), *H. gallinarum* (0.9%), *R. cesticilus* (0.9%), *S. brumpti* (0.3%) and *Capillaria* spp. (0.3%). Mixed infections were also observed (Table 1).

### Discussion

The results revealed a prevalence of 10.5% infection of broiler chickens with intestinal helminths in Trinidad. This is very low compared with reports from other countries, such as India, 90.9% (YADAV and TANDON, 1991), Ethiopia, 91% (ESHETU et al., 2001), Morocco, 89.9% (HASSOUNI and BELGHYTI, 2006), Kenya, 93.3% (MUNGUBE et al., 2007), Zambia, 95.2% (PHIRI et al., 2007), Nigeria, 87.7% (YORIYO et al., 2008) and Iran, 96% (ESLAMI et al., 2009). The probable reason for such a low prevalence might be the regular use of anthelmintics on the farms of integrated broiler companies. Also the short life span and confinement of commercial broilers might be other causes. Among the helminth infected birds, infection with nematodes was found in 61.1%, whereas, cestode infection was in 47.2%, with 8.3% birds showing both nematodes and cestodes in their intestines. No trematode infection was detected. The absence of trematode parasites in the sampled specimens might be due to the absence of the necessary intermediate host around the farms.

The lower prevalence of intestinal helminths in Trinidad (10.5%) compared to other countries (87 - 96%) may be explained by the following differences in the species of chicken studied, the quality of husbandry and / or geographical location. In the present study, samples originated from intensively reared commercial broiler chickens; in other countries they were from village chickens, which grow in a more natural environment and thus are more likely to be exposed to infection. Another possible factor that may explain the differences in prevalence is the possibility of exposure to suitable intermediate hosts of helminths.

As a small island, Trinidad does not have many climatic differences between the counties, which could have affected the prevalence of infection. Moreover, there is every possibility that chickens are moved from farms to pluck shops located in different counties

in the country. So, the significant difference in the prevalence of infection between the different counties may be due to differences in the intensity of care between the farms.

It can be concluded that the prevalence of intestinal helminths infection in chickens is very low compared to other tropical countries. This may be due to the intensive husbandry practices and the implementation of appropriate preventive medicine programmes for these chickens. In spite of the low prevalence of infection preventive measures should be continued as recommended to limit the negative effect of these infections on broiler productivity in Trinidad.

---

#### Acknowledgements

This work has been funded by a grant from the University of the West Indies, St. Augustine, Trinidad and Tobago (project No. CRP.3.MAR09.10).

#### References

- ABEBE, W., T. ASFAW, B. GENETE, B. KASSA, P. H. DORCHIES (1997): Comparative studies of external parasites and gastro-intestinal helminths of chickens kept under different management systems in and around Addis Ababa (Ethiopia). *Rev. Méd. Vét.*, 148, 497-500.
- ESHETU, Y., E. MULUALEM, H. IBRAHIM, A. BERHANU, K. ABERRA (2001): Study of gastro-intestinal helminths of scavenging chickens in four rural districts of Amhara region, Ethiopia. *Rev. sci. tech. Off. int. Epiz.* 20, 791-796.
- ESLAMI, A., P. GHAEMI, S. RAHBARI (2009): Parasitic infections of free-range chickens from Golestan Provinces, Iran. *Iran J. Parasitol.* 4, 10-14.
- HASSOUNI, T., D. BELGHYTI (2006): Distribution of gastrointestinal helminths in chicken farms in the Gharb region-Morocco. *Parasitol. Res.* 99, 181-183.
- MUNGUBE, E. O., S. M. BAUNI, B. A. TENHAGEN, L. W. WAMAE, S. M. NZIOKA, L. MUHAMMED, J. M. NGINYI (2007): Prevalence of parasites of the local scavenging chickens in a selected semi-arid zone of Eastern Kenya. *Trop. Anim. Health Prod.* 40, 101-109.
- NNADI, P. A., S. O. GEORGE (2010): A cross-sectional survey on parasites of chickens in selected villages in the subhumid zones of south-eastern Nigeria. *J. Parasitol. Res.* Volume, Article ID 141824. doi:10.1155/2010/141824
- PHIRI, I. K., A. M PHIRI, M. ZIELA, A. CHOTA, M. MASUKU, J. MONRAD (2007): Prevalence and distribution of gastrointestinal helminths and their effects on weight gain in free-range chickens in Central Zambia. *Trop. Anim. Health Product.* 39, 309-315.
- PINCKNEY, R. D., C. COOMANSINGH, M. I. BHAIYAT, A. CHIKEWTO, R. SHARMA, C. N. L. MACPHERSON (2008): Prevalence of gastrointestinal parasites in free-range poultry in Grenada, West Indies. *West Ind. Vet. J.* 8, 23-26.
- PUTTALAKSHMAMMA, G. C., K. J. ANANDA, P. R. PRATHIUSH, G. S. MAMATHA, R. SUGUNA (2008): Prevalence of gastrointestinal parasites of poultry in an around Bangalore. *Veterinary World* 1, 201-202.

- SINGH, R., G. SEEPERSAD (2001): A profile of the broiler industry in Trinidad and Tobago. In: The Caribbean Poultry Industry: Competitiveness Trade Policy and Development Strategies. Publ. Caribbean Poultry Association. pp. 20.
- SOULSBY, E. J. L. (1982): Helminths, Arthropods and Protozoa of Domesticated Animals, 7<sup>th</sup> ed. Williams & Wilkins, London.
- THRUSFIELD, M. (1995): Veterinary Epidemiology, 2<sup>nd</sup> ed., Blackwell Publishing, Iowa State Press, pp. 178-198.
- URQUHART, G. M., J. ARMOUR, J. L. DUNCAN, A. M. DUNN, F. W. JENNINGS (1996): Veterinary Parasitology, 2<sup>nd</sup> ed. Blackwell Science Ltd., Oxford, UK.
- YACOB, H. T., D. S. ZIAD, A. K. BASU (2009): Ectoparasites and gastrointestinal helminths of chickens of three agro-climatic zones in Oromia Region, Ethiopia. *Animal Biol.* 59, 289-297.
- YADAV, A. K., V. TANDON (1991): Helminth parasitism of domestic fowl (*Gallus domesticus* L.) in a subtropical high-rainfall area of India. *Beitr. Trop. Landwirtschaft. Veterinarmed.* 29, 97-104.
- YORIYO, K. P., K. L. ADANG, J. P. FABIYI, S. U. ADAMU (2008): Helminthes parasites of local chickens in Bauchi State, Nigeria. *Science World Journal* 3, 35-37.

Received: 7 November 2011

Accepted: 27 June 2012

---

**BABOOLAL, V., V. SURATSINGH, L. GYAN, G. BROWN, N. V. OFFIAH, A. A. ADESIYUN, A. K. BASU: Prevalencija crijevnih helminata u tovnih pilića u Trinidadu. *Vet. arhiv* 82, 591-597, 2012.**

Provedeno je istraživanje radi identifikacije helminata tovnih pilića i određivanja njihove prevalencije u Trinidadu u razdoblju od rujna 2009. do kolovoza 2010. U sklopu istraživanja bila su pretražena 344 uzorka crijeva pilića podrijetlom iz osam pokrajina u Trinidadu. Helminti su pronađeni u ukupno 36 uzoraka crijeva (10,5%). U 5,5% pretraženih uzoraka bila je ustanovljena jedna vrsta nematoda, u 4,1% uzoraka jedna vrsta cestoda, dok je miješana invazija dokazana u 0,9% pretraženih uzoraka. Ni u jednom pretraženom uzorku crijeva nisu pronađeni metilji. Identificirane su četiri vrste nematoda i to *Ascaridia galli* (5,8%), *Heterakis gallinarum* (0,9%), *Subulura brumpti* (0,3%), *Capillaria* sp. (0,3%) te tri vrste trakavica *Raillietina echinobothrida* (2,3%), *R. cesticillus* (0,9%) i *Choanotaenia infundibulum* (2,3%). Najveća prevalencija bila je dokazana u pokrajini St. George (34,9%). Manja prevalencija dokazana je u pokrajinama Caroni (9,3%), Victoria (9,3%), Mayaro (9,3%), Nariva (2,3%), Sv. Patrick (2,3%) i Sv. David (2,3%). Značajna razlika ( $P < 0,001$ ) bila je dokazana u prevalenciji helminata u pilića iz različitih pokrajina. Može se zaključiti da neovisno o kratkom životnom vijeku i uvjetima intenzivnog uzgoja, proizvodnju tovnih pilića u Trinidadu ugrožavaju helminti.

**Ključne riječi:** tovni pilići, crijevni helminti, Trinidad

---

