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Prevalence of intestinal parasites in pigs in Grenada, West Indies

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Abstract

In order to estimate the prevalence of intestinal parasites in pigs of Grenada, a cross-sectional study was undertaken. During July 2009, coprological examination was carried out on 221 pigs from 16 farms. The overall prevalence of intestinal parasites was 68.78% (95% CI, 62.67 to 74.89%). Four types of parasites were identified including *Oesophagostomum* spp., *Strongyloides* spp. *Trichuris suis* and *coccidia*. Mixed infections were common on some farms, comprising 6/10 (60.0%) in small herds and 5/6 (83.3%) in large herds. There was no significant difference between infection rates on larger and smaller pig farms (p > 0.05). There was also no association between infection rate and age group on either smaller farms (p = 0.12) or larger farms (p = 0.06). There was no evidence of infection with *Ascaris suum*. The results of this study provide baseline information about intestinal parasites of pigs and preventive methods currently in use in Grenada.

Key words: Prevalence, intestinal parasites, pigs, Grenada

Introduction

During the last 25 years, the pig industry in Grenada has suffered major setbacks including closure of major pig processing companies and destruction of major farms by hurricane Ivan in 2004. Consequently, the pig industry is relatively under-developed, comprising mainly small scale producers[1].

In the tropical and sub-tropical areas, parasitic infections in pigs are estimated to be second to African swine fever[2]. Infection with parasites is associated with significant economic losses evidenced by decreased litter size, poor growth rate, reduced weight gain, organ condemnation at slaughter and death[3].

Prevalence studies on intestinal parasites affecting pigs have been undertaken worldwide. In a study in Eastern Ghana with a prevalence of 91%, eggs of *Metastrongylus salmi* (19.3%); *Physocephalus sexlutus* (17.4%), *Oesophagostomum* spp. (60.6%), *Trichuris suis* (4.6%), *Ascaris suum* (12.7%); *Ascarlops strongylina* (8.1%); *Brachylaemus suis* (1.9%), *Paragonimus suis* (0.8%); *Globecephalus urosubulutus* (2.7%) and *Schistosoma suis* (0.4%) were identified. Among the coccidian parasites *Eimeria* spp. were more prevalent than *Isospora suis*[2]. In Botswana, 82% of the pigs were infected with *Ascaris suum* (54.6%), *Trichostrongylus* spp. (20.4%) and *Trichuris suis* (6.8%)[3]. In the Guadong province of China, Weng *et al*.[4] reported *Trichuris suis* (5.2%), *Ascaris suum* (2.5%), *Oesophagostomum* spp (24.9%) and coccidian spp (*Eimeria* spp and /or *Isospora suis*) (47.2%). In Western Australia there was evidence of nematodes in 79% of piggeries and *Oesophagostomum* spp. was the most prevalent nematode with *Ascaris suum* found mostly in growing pigs[5]. In an abattoir survey of 137 pigs in Belize, *Oesophagostomum* spp., *Hyostrongylus rubidus*, *Physocephalus sexalutus*, *Globocephalus* spp., *Trichostrongylus colubriformis*, *Ascalops strongylina*, *Ascaris suum, Macracanthrynchus hirudinaceus*, *Strongyloides ransomi* and *Trichuris suis* were identified with *Oesphagostomum* spp. being the most prevalent[6]. In Trinidad and Tobago, Adesiyun *et al*.[7] found no evidence of nematode parasites in pigs.To our knowledge, there is no published information detailing prevalence of helminth parasites in pigs in Grenada. The objective of this study was to estimate the prevalence of intestinal parasites in pigs by examination of faecal samples.

Materials and Methods

In July 2009, faecal samples were collected from 16 pig farms selected at random throughout Grenada (Figure 1). For St. John and St. David, only one farm was sampled due to a limited number of farms. Faeces were collected in sterile plastic containers and transported to the parasitology laboratory at the School of Veterinary Medicine, St. George's University. All faecal samples were kept in 10% buffered formalin as recommended by Williams[8] and Anne and Gary[9]. Faecal samples were usually examined the following day. Simple faecal flotation was conducted as follows: Three grams of faeces were mixed with a flotation solution (zinc sulphate), strained into a centrifuge tube and centrifuged at 1500 rpm for 10 minutes. The centrifuge tube was then filled to the brim with more zinc sulphate and a cover slip placed on top of the tube. The cover slip was removed from the centrifuge tube and placed on a glass slide for microscopic examination. Identification of helminths and coccidia was made as described by Williams[8] and Soulsby[10]. Since eggs of *Oesophagostomum* spp. (80x40µm) and *Strongyloides* spp. (45x27µm) were larvated, their identification was based on their size.

Data on herd size, age group, health status of pigs, and anthelmintic treatment regimes were recorded by interview. Pigs up to 10 weeks of age were considered piglets, 10 to 16 weeks growers and above 16 weeks adults.

Statistical Analysis

The infection rate of larger farms and smaller farms were analyzed by using χ^2 test for equal proportions. The association between infection rate and age group on smaller farms and larger farms was analyzed using the software R[11].

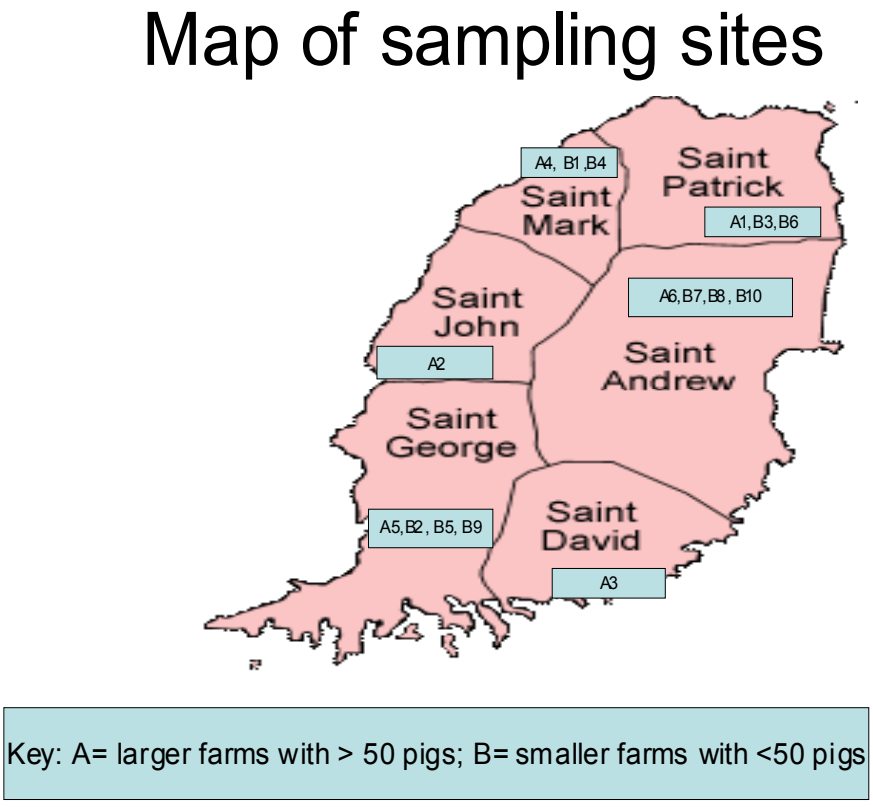

Figure 1. Map showing sampling sites

Results

Out of 221 pigs, 152 pigs were infected, giving an overall prevalence of 68.78% (95% CI 62.67% to 74.89%).Pigs in all six parishes were infected (Table 1). Infection rates per parish were as follows: St. John (88.0%), St. George, (85.5%), St. Andrew (71.7%), St. Patrick, (59.6%), St. Mark, (47.8%) and St. David, (27.8%).

Table 1. Comparison of number and infection rate of pigs from 6 parishes of Grenada

Parish	No. of pigs sampled	No. of pigs infected	Infection rate (%)
St. John	25	22	88.0
St. George	62	53	85.5
St. Andrew	46	33	71.7
St. Patrick	47	28	59.6
St. Mark	23	11	47.8
St. David	18	5	27.8
Total	**221**	**152**	

Four types of intestinal parasites were identified: *Coccidia, Oesophagostomum* spp., *Strongyloides* spp. and *Trichuris suis*. Coccidia affected 88% of the farms followed by *Oesophagostomum* spp. (75%), *Strongyloides* spp. (44%), and *Trichuris suis* (38%), (Table 2).

Table 2. Rate of infection by type of parasite on 16 pig farms in Grenada

Parasite	Farms affected	Farms unaffected	% affected
Coccidia	14	2	88
Oesophagostomum spp	12	4	75
Strongyloides spp	7	9	44
Trichuris suis	6	10	38

There was no significant difference between large and small farms in terms of overall infection ($p = 0.18$). Mixed infections were common comprising 6/10 (60.0%) in small herds and 5/6 (83.3%) in large herds. However, there was no association between mixed infections and size of herd ($p = 0.74$, Tables 3 and 4).

Table 3. Intestinal parasite infection on larger pig farms in Grenada

A	Herd size[1]	No. Sampled	Single infection	Mixed infection	No. positive
A1	57	23	3(O), 6(C) 1(S)	1(S&O), 1(S&C), 1(T&C)	13
A2	73	25	11(C), 2(O)	9(C&O)	22
A3	74	18	4 (O)	1(O&T)	5
A4	76	10	6(C), 1(O)	1(C&S), 1(C&O)	9
A5	83	34	18(C), 2(O), 2(T)	1(C&O), 6(T&C), 1(S&C), 1(O&T), 1(T,C &O)	32
A6	134	12	7(O)1(C)	0	8
	Totals	**122**			**89** (73%)

[1]A= > 50 pigs in herd, C= *Coccida*, O=*Oesophagostomum* spp., S=*Strongyloides* spp., T=*Trichuris suis*

Table 4. Intestinal parasite infection in smaller pig farms in Grenada

B	Herd size[1]	No. Sampled	Single infection	Mixed infection	No. positive
B1	5	3	0	1(O&C)	1
B2	5	5	2(C)	0	2
B3	14	7	2(C)	2(C&O), 2(S,C&T) 1(S,O&C)	7
B4	15	10	0	1(S&C)	1
B5	20	5	2(C)	0	2
B6	28	17	4(C), 4(O)	0	8
B7	32	8	4(C)	4(O&C), 1(O,S&C)	9
B8	33	7	1(T)	0	1
B9	36	18	7(C)	4(S&C), 1(O&C),4(S,O&C), 1(O,T&C)	17
B10	44	19	14(C)	1(O&C)	15
	Totals	**99**			**63** (63.6%)

[1]B= < 50 pigs in herd, *C*=*Coccidia*, O=*Oesophagostomum* spp., S=*Strongyloides* spp., T=*Trichuris suis*

There was no association between infection rates and age group for either large farms (p = 0.06, Table 5) or smaller farms (p = 0.12, Table 6).

Table 5. Intestinal parasite infection in larger pig farms according to age group of pigs in Grenada

A	Sow/Boar	Grower	Piglet
A1	3/7 (O)	8/13 (1S, 6C, 1T&C)	2/3(1S&O, 1S&C)
A2	9/9(4C, 1O, 4C&O)	10/13 (6C,4O &I)	3/3 (1C, 1O, 1O &1C)
A3	2/8 (1O)	1/7 (1O &T)	2/3 (2 O)
A4	1/1 (1 I)	3/4 (1I,1 O, 1 O&I)	5/5 (4I, 1I&S)
A5	10/10 (5C, 1I&O, 2I&T, 1 O &T, 1C&S)	7/7 (2 C, 1T, 3C&T)	15/17 (10C, 2O, 1T, 1I&T, 1I,T&O
A6	0/0	6/10 (5O, 1C)	2/2 (2O)
Totals	**25/35**(71.4%)	**35 /54**(64.8%)	**29/33**(87.9%)

A= >50 pigs in herd, *C*=*Coccidia* O=*Oesophagostomum* spp., S=*Strongyloides* spp., T=*Trichuris suis*

Table 6. Intestinal parasite infection in smaller pig farms according to age group of pigs in Grenada

B	Sow/Boar	Grower	Piglet
B1	1/3 (1O &C)	0	0
B2	1/4 (1C)	1/1 (1C)	0
B3	1/1 (1O &C)	6/6 (2C, 1S&C, 1O &C, 1S, C&T 1O, C &S)	0
B4	0/1	1/6 (1S&C)	0/3
B5	1/4 (1 C)	1/1 (1 C)	0
B6	3/5 (3 O)	4/11 (3C, 1O)	1/1 (1C)
B7	4/4 (1C, 3C&O)	1/1 (1 C)	4/4 (2C, 1C&O, 1O,C&S)
B8	1/5 (1T)	0/2	0
B9	7/8 (6C,1O, C&S)	3/3 (1C, 1C&S, 1O, C&T)	7/7 (3S&C, 1O&C, 3S,I&O)
B10	2/3 (2 C)	10/12 (9C, 1O &C)	3/3 (3 C)
Totals	**21/38** (55.3%)	**27/43** (62.8%)	**15/18** (83.3%)

B= <50 pigs in herd, *C= Coccidia*, O=*Oesophagostomum* spp., S=*Strongyloides* spp., T=*Trichuris suis*

All farms included in the study, except for one, were deworming their pigs with either ivermectin or fenbendazole at intervals of 2 to 4 months. Sanitary conditions on large as well as small farms were poor. At the time of the visit, clinical signs of diarrhoea (5 farms, mainly in piglets), and emaciation (6 farms) were noted.

Discussion

Intestinal parasites can contribute significantly to poor performance of piggery enterprises[6]. The overall prevalence of internal parasites was 68.78% (95% CI 62.67 to 74.89%) with more than 50% of farms having mixed infections. This prevalence was similar to the findings of studies in Ghana, Botswana and China[2,3,4]. In Trinidad and Tobago, there was no evidence of nematode parasites in pigs possibly due to effective deworming programmes and farm hygiene practised there[7]. Similar to findings in Ghana, Belize, China and Australia[2,6,4,5], *Oesophagostomum* spp. was the most prevalent helminth in our study. However, in Botswana *A. suum* was the most prevalent[3]. In this study, unlike other studies cited above, there was no evidence of *A. suum*. It may be that *A. suum* is not present in Grenada or is present at a very low prevalence.

The majority of the pig farmers included in this study was using either ivermectin or fenbendazole for internal parasite control. Despite use of anthelmintics, parasites were still a big problem on pig farms in Grenada. Further studies to elucidate anthelmintic resistance are indicated. However, the majority of farms were unsanitary, thus contributing to the parasite burden. Extension programmes to educate farmers on the correct measures for preventing and controlling intestinal parasites in pigs are therefore recommended.

Clinical signs of diarrhoea and emaciation noted on some of the pig farms at the time of sampling may have been caused by *Coccidia, Oesophagostomum* spp*., Trichuris suis* and *Strongyloides* spp. since these parasites have been reported to cause such clinical signs[10]. Pig farms A1, A2, A5, B3, B7 and B9 where diarrhoea and emaciation were observed had high levels of both single and mixed parasitic infections. (Tables 3 and 4).

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