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Coprological Investigation on Gastro Intestinal Parasites in Pigs in and around Bishoftu, Ada'a-Warada District, Oromia, Ethiopia

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Abstract: Coprologically investigation of gastrointestinal parasites in pigs was performed in Bishoftu and around Bishoftu town, Oromia regional state, Ethiopia from October 2013 to April, 2014. Three hundred eighty four pigs of different ages and sexes were selected for fecal sample collection. Fecal samples were collected from the rectum of pigs with strict sanitation. The samples were examined for eggs and cysts of GIT parasites by flotation and sedimentation techniques from multistage stratified sampling random sampling pigs. Out of 384 pigs examined through flotation and sedimentation, 24.4% were infected by parasite including *Eimeria* spp. (11.4%) which was the most prevalent parasite followed by *Ascaris* spp. (9.1%) and the lowest prevalence was *Trichuris* spp. (3.6%). There was no significant association between sex, age management system and physiological status and with prevalence of parasite ($p > 0.05$) for all.

Key words: Bishoftu · Eimeria · Intensive Management · Gastrointestinal Parasites · Pig

INTRODUCTION

The pig population in Ethiopia was estimated to be 29, 000 heads representing 0.1% of African pig population [1]. Pig production is believed to be a solution to mitigate deficiency of animal protein and considered a tool to fight poverty in the tropics [2]. Small-scale pig production has been indicated as a viable livestock system in many East African countries, playing an important role in pork production either for home consumption or sale for income generation [3]. High fecundity rate and feed conversion efficiency, early maturity, presence of short generation interval, relatively small space requirement and ability to produce maximally under varied management were some of the advantages of pig production as compared to other livestock rearing [4].

Pork covers 39% of the world's total meat consumption, which is higher as compared to 26.5% for beef and 28% for poultry [5]. Pig production in Ethiopia is believed to be in its infant stage. Moreover, studies showed that pig production in developing countries is contributing little benefits due to many production constraints including; under developed infrastructure, poor genetic performance of local breeds, inadequate nutrition, poor management and husbandry practices, shortage of trained man power, cultural and religious taboo on marketing and consumption of pork and wide spread diseases [6].

Helminthosis is particularly important in tropical and sub-tropical country where nutrition and sanitation is generally poor [7]. In tropical countries due to minimum management attention given to swine, they are prone to number of disease and various internal and external parasites [8]. Infection of pig with gastrointestinal (GIT) parasites is widely reported from all corner of the world and shown to be influenced by the type of pig management [9]. Helminthes are the major health problem to those swine grazing on pasture. Helminth's importance on swine is chiefly economical with its sub-clinical infection delaying the achievement of market weight by reducing feed conversion rate [10]. Clinical helminthosis mainly encounter in young pigs, whereas older pigs are either free of infection or act as asymptomatic carriers [11, 12]. Helminthosis in pig is characterized by decreased litter size, poor growth rate, reduced live weight gain and death [13]. Other losses are attributed to condemnation of liver and intestines at meat inspection. Therefore, heavy helminthic infection may cause significant loses to the pig industry [7].

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The prevalence, worm burden and spectrum of helminthspecies depend on the agro-ecology, breed and type of swine production system. In highly intensive production system, the infection levels are usually low and involved only few species. On the other hand, in most traditional production system the poor hygienic and nutritional conditions favour a high prevalence, burden and rate of helminth transmission [14, 15].

The roaming behavior of pig favours the uptake of internal parasite eggs, making the pigs particularly susceptible to infestation with internal parasite [16]. Moreover, the warm and humid conditions of the tropical and infrequent treatment of pig against parasitic disease cause them to carry heavy burden of gastrointestinal nematode [17]. The common helminth parasites of swine are *Ascarissuum*, *Trichurissuis, Oesophagostomum*, *Trichenella*, strongyles species and *trichostronglusaxei* have been identified in pig raised under extensive production in Kenya, Ghana and Burkina Faso [15] and in semi-intesive management in Nigeria [18]. Pig rose under sem-intesive and extensive husbandry were found to be infected with *Ascaris suum* and oesophagostomum species in Holeta, Ethiopia [19].

In Ethiopia, so far, no study has been carried out to determine the prevalence and species composition of helminthes in pigs kept under different management system and eco-climate areas. However, factors like poor sanitation, management system, climate and sub-optimal feeding may facilitate the occurrence and pattern of helminth infection in pigs kept in semi-intensive and small scale management system [20].

Knowledge about the prevalence and type of helminth is useful when formulating pig development and extension program to prevent and control helminth of pigs. Therefore, the objectives of this study were to identify the major types of gastrointestinal parasite in pigs at Bishoftu and around Bishoftu town and to determine the prevalence of gastrointestinal parasite of pig in different farm in bishoftu.

MATERIALS AND METHODS

Study Area: The study was conducted in Bishoftu and round Bishoftu town. Bishoftu is located in Central Oromia National Regional State, at a distance of 47 km of the South Eastern part of Addis Ababa. Bishoftu lies between 9° N. latitude and 39° E longitude and an altitude of 1860 meter above sea level. It gets an annual rainfall of 871 mm of which 80% is received during long rainy season starting from June to September and the remaining in short rainy season extending from March to May and the dry season from October to February. The mean annual maximum and minimum temperature are 26 and 14°, respectively with a minimum relative humidity of 63.8% [21].

Study Animals: The study animals were pig inBishoftu and round Bishoftu town. Important risk factors including sex, management system, physiological statusand age were considered. The pigs used in this study were those reared by different farm in Bishoftu town.

Study Design: A cross sectional study was done to determine the prevalence of GIT parasite in pig in different farmin Bishoftu and round Bishoftu town and faecal examinations was conducted. During sampling age, management, physiological status and sex were recorded for further association study.

Sampling and Sample Size Determination: The selection of the pigs included in the study was based on multistage stratified sampling randomsampling (from among those kept at 4 weaners pens, 5 fatteners pens, 4 partitioned piglets, sow and boar keeping pen). The animals wereselected by employing simple random method among the different pens proportionally. The selected animals were identified using ear tag identification number for fecal sampling [22]. Accordingly, on average 8 animals were sampled 3 times a week for 16 weeks.

The sample size was determined based on the formula recommended by Thrusfield [22].

$$n = \frac{1.96^2 \; x \; P_{exp}(1 - P_{exp})}{d^2}$$

where,

n = Sample size required
P_{exp} = Expected prevalence,
d = Desired absolute precision

Since, there was prior prevalence of gastro intestinal parasite in pig in the study area, 50% expected prevalence rate was used. In addition, 95% confidence interval and 5% desired absolute precision also used. Therefore, the total sample size required was 384.

Coprological Examination

Collection of Fecal Samples: Faecal sample was taken directly from rectum or from the top freshly voided feces. 5 grams of the captured fecal sample was put in screw

cap bottles containing 10% formalin and transport to the laboratory for examination. Those samples that were not examined within 4 hour were stored in refrigerator at 4. Faceal samples from the selected 384 random samples were taken from different farms and samples were submitted to Addis Ababa University College of Veterinary Medicine and Agriculture Parasitology laboratory for subsequent examination.

Flotation: Three gram of each fecal sample was mixed with 50 ml of 0.4 g/ml sodium chloride (flotation fluid) using mortar and pistil; the resulting fecal suspension was poured through a tea strainer into a beaker; the suspension was then poured from the beaker into a test tube leaving a convex meniscus at the top; a cover slip was then carefully placed on top of the test tube and the test tube was left to stand for 20 minutes, then the cover slip was carefully lifted from the tube together with a drop of fluid adhering to it and immediately placed on a glass slide for microscopic examination up to 40 objective lens [23].

Sedimentation: To detect helminth eggs which do not float well in the sodium chloride solution such as *Fasciola* spp. simple sedimentation technique was carried out. For this purpose, 3 g of feces was put in a conical flask and mixed with 30 ml of water; the mixture was then sieved through a tea strainer into a beaker, transferred into a centrifuge tube and centrifuged at 1500 rotation per minute for 3 minutes; the supernatant was then discarded, the sediment was mixed with 1% of methylene blue and examined under the microscope using 40 objective lens [23].

Data Analysis: The raw data was entered and managed in Microsoft Excel worksheet and descriptive statistics is utilized to summarize the data. The data were analyzed using SPSS version-17 statistical software. Pearson's Chi square test was used to measure the association and statistical significance between the prevalence of the disease and risk factors identified. In order to consider a result to be statistically significant 95% CI and p-value < 0.05 was taken.

RESULTS

Out of 384 pigs examinedcoprologically, an overall prevalence of 24.4% (94) for Endoparasites was found in Bishoftu and round Bishoftu town. During microscopic examination 35 (9.1%), 45 (11.4%) and 14 (3.6%) pigs were found to be positive for eggs of *Ascaris* spp, *Eimeria* spp. and *Trichuris* spp respectively.

Table 1: Prevalence of gastero intestinal helmenths in the basis of age, sex, physiologically status and management

Risk factors		No of pig (%)	No of Positive (%)	Degree of freedom	χ^2	p-value
Management	Winners	118 (30.7)	10 (2.6)	4	2.12	0.8
	piglets	86 (22.4)	6 (1.5)			
	Fatteners	99 (25.8)	11(2.8)			
	Sow	70 (18.2)	6 (1.6)			
	boar	11(2.9)	2 (0.5)			
Sex	Male	153 (39.8)	17 (4.4)	1	1.2	0.269
	female	231 (60.2)	18 (4.6)			
Physiological status	Dry	78 (20.3)	6 (1.5)	4	4.1	0.39
	Lactating	79 (19.8)	76 (19.7)			
	Pregnant	16 (4.9)	3 (0.7)			
	None	210 (54.7)	21 (5.4)			
Age	Young	204 (53.1)	16 (4.1)	1	0.4	0.5
	Adult	180 (46.9)	19 (4.9)			

Table 2: Prevalence of *Eimeria* spp in the basis of age, sex, physiologically status and management

Risk factors		No of pig (%)	No of Positive (%)	Degree of freedom	χ^2	p-value
Management	Winners	118 (30.7)	14 (3.6)	4	1.5	0.8
	piglets	86 (22.4)	12 (3.1)			
	Fatteners	99 (25.8)	11 (2.8)			
	Sow	70 (18.2)	6 (1.6)			
	boar	11(2.9)	2 (0.5)			
Sex	Male	153 (39.8)	19 (4.9)	1	0.1	0.73
	female	231 (60.2)	26 (6.8)			
Physiological status	Dry	78 (20.3)	6 (7.7)	4	4	0.39
	Lactating	79 (19.8)	7 (9.2)			
	Pregnant	16 (4.9)	3 (15.8)			
	None	210 (54.7)	29 (13.8)			
Age	Young	204 (53.1)	26 (6.8)	1	0.4	0.5
	Adult	180 (46.9)	19 (4.9)			

Table 3: Prevalence of *Trichuris* spp in the basis of age, sex, physiologically status and management

Risk factors		No of pig (%)	No of Positive (%)	Degree of freedom	χ^2	p-value
Management	Winners	118 (30.7)	6 (1.5)	4	3.3	0.5
	piglets	86 (22.4)	1 (0.3)			
	Fatteners	99 (25.8)	5 (1.3)			
	Sow	70 (18.2)	2 (0.5)			
	boar	11(2.9)	0 (0)			
Sex	Male	153 (39.8)	6 (1.5)	1	0.5	0.8
	female	231 (60.2)	8 (2.1)			
Physiological status	Dry	78 (20.3)	3 (0.7)	4	4	0.39
	Lactating	79 (19.8)	4 (1)			
	Pregnant	16 (4.9)	2 (0.5)			
	None	210 (54.7)	5 (1.3)			
Age	Young	204 (53.1)	7 (1.8)	1	0.57	0.8
	Adult	180 (46.9)	7 (1.8)			

There was no statistically significant difference in prevalence of Ascaris species between different management system in the farm ($p > 0.05$). The prevalence of Ascaris in Adult (4.6%) was higher even though there is no statistically significant difference among different age groups. There was also no association in prevalence of parasites between age groups, sex and physiological status of pigs in the farm ($p>0.05$).

The prevalence of Eimeriaspp in female (6.8%) was higher even though there is no statistically significant difference among different sex groups. There was also no association in prevalence of parasites between age groups, managment and physiological status of pigs in the farm ($p>0.05$).

The prevalence of *Trichurisspp* in weaners (1.5%) was higher even though there is no statistically significant difference among different management groups. There was also no association in prevalence of parasites between age groups, sex and physiological status of pigs in the farm ($p>0.05$).

DISCUSSION

In the present study 24.4% of the pigs were found to be infected with at least one intestinal helminth parasite. This result is in agreement with findings of similar studies in other part of Ethiopia including 27.3% was reported in Mekelle and around urban area of southern Tigray by Tomas *et al.* [24], 26.2% was reported in and around Holeta [19]. But lower than the result found. The overall prevalence recorded was lower than prevalence that was reported in Mekele city 85 % [24], 58.7% in Zimbabwe [25], 91% in Burikinafaso [15], 68.78% in India [26] and in Nigeria around 35.8% [27]. The reason behind the lowered prevalence in this study is the intensive nature of the production system in the farm where management procedures including regular cleaning, disinfecting of the premises, strategic deworming and avoiding of contamination of food and water will help to minimize the infection.

Eimeria spp. was found to be the most common helminth with a prevalence of 11.4%. This result was higher than studies reported in Mekelle (1.7%), Holeta (5.6%) and Burayu (6.6%) [19, 24, 28] respectively. This due to difference in climate and geographically location. In contrast to, this studies high prevalence was reported in Bangiladesh (85%) [29].

In all age categories of pigs examined in the present study the prevalence of emeria was not significant. This can be due to the highly intensified system of the farm where the young which are highly vulnerable to high parasitic burden are kept in door in zero grazing.

In all management system in the farm prevalence of Eimeria was not significant. This may be due to the reason that pigs of all the study areas are under similar risk factors of infection with gastro- intestinal parasites. This is in agreement with similar studies in extensively managed pigs in Mekele [24].

There was also no statistically significant difference in the prevalence rate of Eimeriaspp between male and female pig. This result is consistent with the finding of previous study in Holeta, Ethiopia [19]. The reason for equal exposure of both sexes of pigs to parasites.

The prevalence of the second common parasite was Ascaris*suum*in this study. This result is in agreement with findings of similar studies in Ethiopia, Holeta (13.9) [19] and in Nigeria (11.1) [27]. There was a report of low prevalence compared to the present study in Burayu (4%) by Kumsa and Kifle [28]. This was due to difference in sample size and large population of pig in this study.

High prevalence was reported in Burkina Faso (40%) and spain (17%) by Tomass *et al*. [24] and Tamboura *et al*. [15] respectively. This was due to hygienic condition kept and regular deworming.

In all sex categories of pigs examined in this study the prevalence of *Ascaris* spp. was not significant. This can be due to indoor keeping of both sex and feeding concentrate in farm reduce exposer to parasite. This result was agree with the finding of previous study in Burkina Faso [15] reported higher prevalence of parasite in female pigs than in males in Burkina Faso. Even though there was high prevalence ascarisspp in adult no significant difference among age groups. This due to equally chance of exposer all group pig to parasite because of good management system which was zero grazing.

The prevalence of the Trichurissuis, was very low in different age groups of pigs examined. This low prevalence agrees with the findings of earlier studies in Burayu (1.1%), Mekele (0.3%) and Africa countries like Burikina Faso(1%) and Zimbabwe (42%) as reported by Tamboura *et al*. [15] and Kumsa and Kifle, [24] and Marufu *et al*. [25] and Tomas *et al*. [28] respectively. This supports the speculations that *T. suis* eggs are highly susceptible to environmental factors. Contrary to this there was high prevalence of Trichurissuis were reported in different country like Nigeria (12.2%), India (38%), Abiastate (17%) by Tiwari [26], Sowemimo *et al.* [27] and Nwoha and Ekworike [30] respectively.

In this study the prevalence of trichuris was higher in female compared to male but no statistically significant difference. This was like ascaris and eimeria there was equal chance of exposer to parasite.

CONCLUSION AND RECOMMENDATION

In general, the lower prevalence of gastrointestinal parasite in the study area indicates the parasite to be less important in the farm posing problems in production. In this study area, difference gastrointestinal parasites were identified. Among that *Eimeria s*pp were found to be the most predominant species in the farm and followed by *Ascaris* spp and the list prevalence from the three parasite was *Trichuris* spp. Intensive management system practice and regular deworming program in the farm support less prevalence of parasite. This was because of pig were not exposer to feeding on the field. Based on above conclusion the following recommendations were forwarded:

- Gastrointestinal parasite should be controlled by using strategic deworming.
- Detail study should be conducted to clearly identify the parasite in species level.
- Basic management system should be applied in the farm which contains the welfare of pig.

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