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Prevalence of intestinal parasites of native swine in backyard farming in selected barangays in Talacogon, Agusan del Sur, Philippines

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Abstract Swine backyard farming has been multiplying in every corner, especially in the rural areas of the Philippines. The intestinal parasite is a major problem affecting livestock farming in swine production. This study was conducted last September to December 2021 in three identified backyard farming sites: San Agustin, Zillovia, and Buena Gracia in Talacogon, Agusan del Sur, Philippines. Fecal samples were examined using the Formalin Ethyl Acetate Sedimentation (FEA-SD) techniques. Of the 93 fecal samples of native swine collected, a 95.69% prevalence rate was observed. Eight intestinal parasites were recovered namely: *Balantidium coli,* Coccidians, *Strongyloides* sp., *Ascaris suum*, *Trichuris* sp., *Fasciola* sp., and Hookworm. The result observed the highest infection in Hookworm (74.19%), followed by *Strongyloides* sp. (68.82), *A. suum* (55.91%), *Entamoeba* sp. (37.63%), *B. coli* (26.88%), *Trichuris* sp. (19.35%), and *Fasciola* sp. (16.13%), while Coccidians (13.98%) was recorded to be the lowest. Female swine had 100% prevalence rate which recorded higher than male swine (91.30 %). Among the age category, mature native swine showed the highest infection with 100 %, finisher with 96%, grower with 95% prevalence rate, while weaner recorded the lowest with 92% prevalence rate. The parasite infection among sites results showed no significant difference as Buena Gracia was 96.8 %, Zillovia was 96.77%, and San Agustin was 95.33% prevalence rate. The high infection of intestinal parasites in native swine may pose a risk of zoonotic transmission as all recovered parasites are associated with human infectious diseases. Good farming practices and proper hygiene will help to prevent, control transmission, and eradicate zoonotic diseases in these areas.

Keyword: Native swine, Intestinal parasites, Backyard farming, Prevalence, Zoonosis

Introduction

The Philippines is ranked third among Asian countries in swine production, trailing only Vietnam and China. One of the most widely reared

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swine for meat production is the country's native swine (*Sus scrofa philippinensis*) which is dominated by backyard farming (Manipol *et al.,* 2014). Livestock animals have played a significant role in the national economy and socio-economic development conditions worldwide. Rural farmers and agriculturists in developing countries are dependent on these domesticated animals (Choubisa and Jaroli, 2013). Native swine have a low-cost production system that uses organic methods. As time passes, farmers and growers face difficulty detecting, controlling, and managing diseases connected with native swine progeny (Brion, 2015). One of the major problems is an intestinal parasite that affects livestock farming, particularly swine production. Farm sanitation substantially influences intestinal parasites' prevalence (Suntaravitun and Dokmaikaw, 2018; Shitta *et al.,* 2019). Parasitic diseases in animals are dangerous; they can induce diarrhea and dehydration, which can result in swine mortality (Kochanowski *et al.,* 2017). The environmental transmission route is vital for many protozoan and helminth parasites, with water, soil, and food particularly important. Their environmental robustness includes the ability to survive in moist microclimates for long periods and their ability to produce large numbers of infective stages (Slifko *et al.,* 2000). Despite the threat, swine are raised on commercial farms and in backyards in the Philippines. The latter production system is relatively common and crucial to food security (Barroga *et al.,* 2020). On the other hand, animal sickness continues to be a concern to animal health, food safety, and the national economy (Costa and Akdeniz, 2019).

Swine intestinal parasites are likely to live in the mouth, esophagus, stomach, large intestine, small intestine, and rectum of their hosts (Barbosa *et al.,* 2015). This parasite causes nutrient loss from food ingested by competing hosts, and helminths are one of the most commonly found in intestinal or gut parasites (Bischoff *et al.,* 1997; Carvalho *et al.,* 2021). Swine in backyard farming is at risk of parasitic gastrointestinal infection due to poor environmental hygiene and management. Internal parasites in swine cause severe disease and significant production losses (Joachim *et al.,* 2001; Boes *et al.,* 2010); helminths, protozoan, and internal parasites are threats to swine health and welfare, leading to financial losses for farm owners (Symeonidou *et al.,* 2020). Aside from this kind of loss, a parasite associated with swine also leads to potential zoonotic transmission affecting public health. Some farming practices observed the use of improperly treated animal manure as fertilizers, the unhygienic practice of farmers, and sanitation issues. These factors contribute to parasite contamination in farms. These findings have implications for food safety in poor-resource communities posing public health risks (Paller *et al.,* 2022). In the Caraga region, southern Philippines, thousands of backyard and commercial farms were identified as one of the sources of income in the region, especially in rural areas (Rañola, 2018). Hence, this study determined the presence of intestinal parasites in the feces of the native swine reared in backyard farming in selected sites in

Talacogon, Agusan del Sur, Philippines. This study provided baseline information on intestinal parasites in native swine in the area for backyard farming management and zoonosis transmission control and elimination.

Materials and methods

Study area

The samples were collected from three identified sites in Talacogon, Agusan Del Sur, Philippines. Namely, San Agustin, Zillovia and Buena Gracia (Figure 1). The collection of the fecal samples was done last September to December 2021. The municipality of Talacogon, province of Agusan del Sur is located at 8°19'50" north and 125°50'3" east. It covers an area of around 405.25 km2 (156.47 sq mi), constituting 4.06% of the 9,989.52-square-kilometre- (3,856.98 sq mi) total area of the province. The site is connected to Agusan Marsh and is considered an agricultural field where farming is one of the major sources of income for the local population (Carandang *et al.,* 2015).

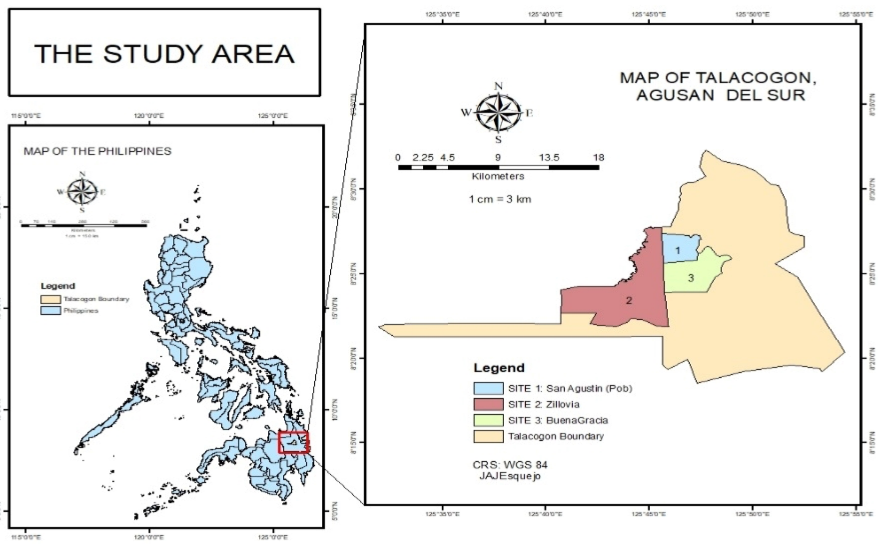

Figure 1. Map showing the sampling sites in Talacogon, Agusan del Sur, Philippines

Collection of swine fecal samples

A permit from the local government unit (LGU), the swine backyard farmer owner, was obtained prior to the conduct of the collection of samples. A non-invasive method of sampling was used to conduct this research. A cross sectional study of the native swine, feces were collected from a semi free-range backyard farming in three different selected barangays within the municipality of Talacogon, a total of 93 swine fecal samples of different sexes and ages (nursing piglets 0-3 weeks, weaners >3 to ≤10 weeks, growers 10> to ≤18 weeks, finisher > 18 to ≤ 26 weeks, mature >26 weeks) which is undergoing a proper screening such as the following criteria adopted from Adhikari *et al*. (2021) and Tamboura *et al.* (2006). Swine must feed domestic food waste, bran, and locally harvested plants, and the fecal must be fresh not over 24 hours. The fecal sample must be on the floor of a backyard farm, and backyard farms less than ten swine per household. The collection of native swine feces was scooped out of 3-5 grams using a fecal scooper. All samples were stored in fecal containers with tight lids and sealed plastic bags containing 20 ml of 10% formaldehyde for fecal preservation. The samples were kept at 5°C until we analyzed them in the laboratory the next day (Jumawan *et al.,* 2020; O'Neill *et al.,* 2021). The samples of swine feces were noted carefully to provide the correct information regarding of sampling site where the samples were collected, data collection, time, and the number of native swine in each sampling area. All the fecal samples were brought to the laboratory within 24 hours.

Laboratory examination of fecal sample

The presence of protozoan and helminths were used to determine the frequency of intestinal parasites in native swine backyard farming. The study used a modified formalin ethyl-acetate sedimentation digestion (FEA-SD) technique adapted from Gordon *et al.* (2012) and Jumawan and Estaño (2021). The fecal samples were examined through concentration with the formol-ether method as part of the parasitological examination procedure. All fecal samples were deposited in a 40 ml sterile plastic container containing 30 ml of 10% formalin. Within 48 hrs after sample collection, a laboratory examination for gastrointestinal parasites was conducted. The analysis was taken longer than 48 hrs, and fecal samples were refrigerated. Before processing, fecal samples were examined microscopically for the presence of adult and larvae worms.

Six grams of fecal samples were carefully homogenized and strained using three layers of surgical gauze. A 7 ml of the resultant solution was put immediately into a centrifuge tube, and the excess on the gauze was discarded. After that, 3 ml of diethyl ether was added to the filtered solution, bringing the total amount to 10 ml. At least one minute was spent vigorously shaking the fluid with electrical tape covering the tube. The suspension was centrifuged for five minutes at 1,500 rpm. After centrifugation, four layers can be visible in the solution, beginning with ether at the top, then debris, the formalin layer, and the parasite eggs and cysts-containing precipitate at the bottom. The initial three layers were decanted, leaving behind the precipitate, which was transferred to a glass slide for microscopic analysis. The precipitate was then covered with a coverslip and observed under a microscope. The presence of gastrointestinal parasites was then recorded and counted. Photographs were taken of each distinct parasite spotted in each sample, and the size of the ova or cyst was measured with the aid of an ocular micrometer. To reliably identify parasitic taxa, the morphology, form, color, and overall appearance of ova and larval helminths, trophozoites, and cystic protozoa were also recorded (Wang *et al.,* 2020; Jumawan *et al.,* 2020; Jumawan and Estano, 2021; Baloria *et al.,* 2022).

Identification of intestinal parasites

Intestinal parasites were identified based on their morphological features such as size, shape, number of nuclei, and other notable characteristics. The photographic guide from "Diagnosing Medical Parasites: A Public Health Officers Guide to Assisting Laboratory and Medical Officers" the "Philippine Textbook of Medical Parasitology" and "Diagnostic Medical Parasitology" were used for the identification.

Data analysis

The prevalence and mean intensity of infection indicated, respectively, the proportion of infected fecal samples and the number of parasites extracted from infected samples. The total number of eggs/ cysts per fecal sample was determined by dividing the total concentration volume by the entire quantity of feces collected and processed to determine the parasite intensity. This technique is calculated the total number of eggs/cysts per gram for every parasite species (Jumawan and Estaño, 2021; Baloria *et al.,* 2022). All statistical tests were performed at a 95% confidence level used by the SPSS v. 20.0 software (IBM Corp., 2011).

Results

Of the 93 native swine fecal samples collected, 89 were reported positive for intestinal parasite infection with 95.69% (95% CI 89.46-98.31) prevalence rate. Eight intestinal parasite were recovered comprising three major groups represented by protozoans such as *Balantidium coli, Entamoeba* sp., and Coccidians, and nematodes *Strongyloides* sp., *Ascaris suum*, *Trichuris* sp., and Hookworm*,* while *Faciola* sp. is the only trematode species recovered in native swine collected in the area.

Prevalence and intensity of parasite species

Result showed that Hookworm has the highest prevalence rate, 74.19% (95% CI 64.47-82) with a mean intensity of 29±10.39, followed by the *Strongyloides* sp. 68.82% (95% CI 58.82-77.33) with a mean intensity of 19±8.15, *Ascaris suum* 55.91 (95% CI 45.79-65.57) with a mean intensity of 10±4.75, *Entamoeba* sp. 37.63% (95% CI 28.46-47.79) with a mean intensity of 9±3.78, *Balantidium coli* 26.88 % (95% CI 18.92-36.68) with a mean intensity of 26±9.53, *Trichuris* sp. 19.35 % (95% CI 12.61-28.53) with a mean intensity of 10±3.7, *Fasciola* sp. has 16.13% (95% CI 10.03-24.92) with a mean intensity of 8±2.29, and Coccidians 13.98 % (95% CI 8.35-22.46) with a mean intensity of 7±2.93 (Table 1).

Table 1. Prevalence and mean intensity of intestinal parasite species recovered in backyard farming of native swine collected in selected sites in Talacogon, Agusan del Sur, Philippines

Parasite	No. of infected swine	Prevalence (%) (CI**)	Mean Intensity (Std. Err)	Associated Diseases
Hookworm	69	74.19 (64.47-82)	29±10.39	Ancylostomiasis
Strongyloides sp.	64	68.82 (58.82-77.33)	19±8.15	Strongyloidiasis
Ascaris sp.	52	55.91 (45.79-65.57)	10±4.75	Ascariasis
Entamoeba sp.	35	37.63 (28.46-47.79)	9±3.78	Amoebiasis
Balantidium coli	25	26.88 (18.92-36.68)	26±9.53	Balantidiasis
Trichuris sp.	18	19.35 (12.61-28.53)	10±3.7	Trichuriasis
Faciola sp.	15	16.13 (10.03-24.92)	8±2.29	Fasciolopsiasis
Coccidians	13	13.98 (8.35-22.46)	7±2.93	Coccidiosis

***95% Cl*

Infection of parasite in native swine

Result showed the summary of the 93 native swine fecal samples collected and examined for parasite infection (Table 2) . Female swine has a 100% (95% CI 92.45-100) prevalence rate and mean intensity of 115±45.75 recorded higher than male swine with 91.30 % (95% CI 79.68-96.57) prevalence rate and mean intensity of 88±17.67. The occurrence of the internal parasites did not show any statistically significant difference between female and male swine. Among age categories, Mature native swine harbors the highest infection with a 100 % (95% CI 85.69-100) prevalence rate and mean intensity of 60±12.75, followed by Finisher with 96% (95% CI 80.46-99.29) prevalence rate and mean intensity of 52±10.21, Grower has 95% (95% CI76.39-99.11) prevalence rate and mean intensity of 31±8.06 while Weaner recorded lowest with 92% (95% CI 75.04-97.78) prevalence rate and mean intensity of 26±6.7. No significant difference in infection among the age group for both prevalence and mean intensity at p=0.074 and p=0.612, respectively. Infection of parasites among sites shows no significant difference. Buena Gracia has a 96.8 % (95% CI 84.26-99.45) prevalence rate and mean intensity of 52±23.21, Zillovia has a 96.77% (95% CI 83.81-99.43) prevalence rate and mean intensity of 50±22.06 while San Agustin has

95.33% (95% CI 78.68-98.15) prevalence rate and mean intensity of 48±19.11.

Table 2. Prevalence and mean intensity of intestinal parasites of swine between sex, sites and various age groups collected in selected sites in Talacogon, Agusan del Sur, Philippines

Parasite	No. of samples	No. of infected	Prevalence (%) (CI**)	Mean Intensity (Std. Err)
Sex				
Female	47	47	100 (92.45-100)	55±15.75
Male	46	42	91.30 (79.68-96.57)	48±11.67
Age				
Weaner	25	23	92(75.04-97.78)	26±6.7
Grower	20	19	95 (76.39-99.11)	31±8.06
Finisher	25	24	96(80.46-99.29)	42±10.21
Mature	23	23	100 (85.69-100)	53±12.75
Sites				
San Agustin	30	28	95.33(78.68-98.15)	48±19.11
Zillovia	31	30	96.77(83.81-99.43)	50±22.06
Buena Gracia	32	31	96.87 (84.26-99.45)	52±23.21

***95% Cl*

Incidence of multiple infections

This study recorded multiple infections of these intestinal parasite in native swine which recovered 23 cases of co-infections. With five species of intestinal parasite recovered in one individual consisting *Ascaris* sp., *Faciola* sp., Hookworm, *Strongyloides* sp., *Trichuris* sp., and Coccidians. While three samples were recorded with four species of intestinal parasites with various combinations (*Strongyloides* sp., *Faciola* sp., *Ascaris* sp., and *Balantidium coli),* (Coccidians, *Faciola* sp., Hookworm, and *Ascaris* sp.) and (Hookworm, Strongyloides sp., *Faciola* sp., and *Balantidium coli*). Eight cases of co-infection with three species of intestinal parasites various combinations while 13 cases of co-infection with two species of intestinal parasites were recorded. Among these multiple infections the co-infection of *Strongyloides* sp. and Hookworm was recorded highest with 24.73% (95% CI 17.08-34.38) prevalence rate followed by co-infections of *Entamoeba* sp. and Hookworm respectively (Table 3).

Discussion

The intestinal parasite affects the performance of swine feed conversion, poor growth rate, and weight loss, and possibly affects other organs. This will lead to losses of productivity and a lack of performance in swine farming. The parasitic protozoan and helminths commonly found in swine and considered as zoonotic are *Trichuris* sp., Hookworm, *Ascaris suum, Balantidium coli*, *and Entamoeba* sp. *Fasciola* sp., *Strongyloides* sp., and Coccidians (Lai *et al.,* 2011). These parasites are also recovered in this study.

Table 3. Prevalence of multiple infection of intestinal parasite species recovered in backyard farming of native swine collected in selected sites in Talacogon, Agusan del Sur, Philippines

Parasite Co-infections (Multiple Infections)	No. of infected Samples	Prevalence (%) (CI**)
Hookworm, + *Strongyloides* sp.+*Faciola* sp.	1	1.075 (0.19-5.84)
Entamoeba sp.+*Ascaris* sp.+*Trichuris* sp.	1	1.075 (0.19-5.84)
Balantidium coli+Coccidians	5	5.37 (2.31-11.97)
Trichuris sp.+Hookworm+*Entamoeba* sp.	1	1.075 (0.19-5.84)
Faciola sp.+Hookworm+*Entamoeba* sp.	1	1.075 (0.19-5.84)
Entamoeba sp.+ Coccidians+*Faciola* sp.	3	3.22 (1.10-9.05)
Ascaris sp. +*Faciola* sp.+Hookworm+*Strongyloides* sp.+Coccidians+*Trichuris* sp.	1	1.075 (0.19-5.84)
Coccidians+*Entamoeba* sp.	2	2.15 (0.59-7.50)
Strongyloides sp.+*Faciola* sp.+*Balantidium coli*+*Ascaris* sp.	4	4.30 (1.685-10.54)
Balantidium coli+Hookworm+*Entamoeba* sp.	1	1.075 (0.19-5.84)
Strongyloides sp.+Hookworm+*Ascaris* sp.	8	8.60 (4.42-16.06)
Strongyloides sp.+*Faciola* sp.+*Balantidium coli*	1	1.075 (0.19-5.84)
Coccidians+*Faciola* sp.+Hookworm +*Ascaris* sp.	2	2.15 (0.59-7.50)
Hookworm, + *Strongyloides* sp.+*Faciola* sp.+*Balantidium coli*	4	4.30 (1.685-10.54)
Hookworm, + *Strongyloides* sp.	23	24.73 (17.08-34.38)
Hookworm + *Ascaris* sp.	5	5.37 (2.31-11.97)
Ascaris sp.+*Trichuris* sp.	6	6.45 (2.99-13.37)
Entamoeba sp.+ Coccidians	3	3.22 (1.10-9.05)
Faciola sp.+*Balantidium coli*	5	5.37 (2.31-11.97)
Hookworm+*Entamoeba* sp.	11	11.82 (6.73-19.95)
Hookworm+*Faciola* sp.	2	2.15 (0.59-7.50)
Trichuris sp.+*Strongyloides* sp.	2	2.15 (0.59-7.50)
Ascaris sp.+*Strongyloides* sp.	1	1.075 (0.19-5.84)
Balantidium coli+*Trichuris* sp.	2	2.15 (0.59-7.50)
Coccidians+Hookworm	2	2.15 (0.59-7.50)

***95% Cl*

The result revealed that hookworm was recorded as the highest among other parasites in native swine reared in backyard farming. In numerous wildlife species, hookworm infections induce anemia, stunted growth, tissue damage, inflammation, and considerable mortality. Hookworms are blood-feeding nematodes feeding mammals' digestive systems (Seguel and Gottdenker, 2017). This parasite is commonly known for soil-transmitted helminths, considered one of the biggest problems of diseases worldwide. When the infected person defecates, not in the proper place, the hookworm is transmitted in the infected person's feces. Its infection is transmitted through walking without any protected stuff on foot or barefoot on contaminated soil. Hookworms are zoonotically inhibited in animals and transmitted to humans (CDC, 2020). The known hookworm infects swine harbors from the genus *Globocephalus*, which reportedly infects domestic and wild animals (Ahn *et al.,* 2015).

Strongyloides sp. is known for infecting animals, including domestic swine, and is most common in young animals in each country worldwide (Thamsborg *et al.,* 2017). Based on the study of Adhikari *et al.* (2021), *Strongyloides* sp. was a more prevalent helminth parasite in suckling and weaned piglets. *Strongyloides* can infect birds, reptiles, amphibians, and livestock, including swine and other primates, as stated by the CDC (2020). *Strongyloides* spp. were also recorded in bovines (Jumawan *et al.,* 2020; Estaño and Jumawan, 2023) and long-tailed macaques (Baloria *et al.,* 2022).

The present survey recovered eggs of *Strongyloides* sp. in native swine fecal samples collected from backyard farming in these areas. *Strongyloides* spp. is a common intestinal nematode of mammalian hosts that parasitizes the small intestine and can cause diarrhea and malnutrition, especially in young animals. In humans, *S. stercoralis* is the pathologic agent of Strongyloidiasis. Aside from this parasitic nematode, *Trichuris* sp. or whipworm also was recovered in native swine. Infection may lead to minor symptoms such as diarrhea, anorexia, and growth retardation, but it can be handled with management and anthelmintic medications. However, re-emerging is one of the issues in the world's traditional and free-range swine production systems (Hansen *et al.,* 2015; Roepstorff *et al.,* 2011). The free-range practices of native swine are widely observed in backyard farming. *Trichuris* sp. infection in swine can be zoonotic in human health, ranked the third most common human roundworm. The infection in humans is commonly asymptomatic. At the same time, the severe impact of infection in children can lead to gastrointestinal problems such as diarrhea and abdominal pain and affect normal growth and rectal prolapse (CDC, 2017).

Another parasitic nematode recovered in native swine in backyard farming is *Ascaris suum*. Based on the study by Carstensen *et al.* (2002), backyard swine were infected by *Ascaris suum* which 28% are weaners, 33% are fatteners, and the sows are 4%. The *A. suum* and *Ascaris lumbricoides* is a complex of closely related enteric roundworms, a soil-transmitted helminth that infects both swine and humans. These parasitic nematodes were reported as one of the highest prevalent intestinal parasites of swine globally. The infection may cause a low to moderate pathogenic impact on swine productivity and health. The eggs can remain infective in the environment for many years. The most common nematode found in swine backyard farming systems can lead to losses of production and meat quality, weight loss, reduced food consumption, and a liver infection (Eijck *et al.,* 2005; Dold and Holland, 2011; Symeonidou *et al.,* 2020). Health inequities and poverty, with resulting deficiencies in water, sanitation, and hygiene, are directly associated with ascariasis prevalence in humans. This parasitic nematode infects humans in the country have a poor sanitation (Bendall *et al.,* 2011). According to a study by Bethony *et al.* (2006), *A. lumbricoides* infect more than 1 billion people worldwide. Both *A. lumbricoides* or *A. suum* infection is asymptomatic; however, the symptoms can include acute lung inflammation, abdominal distension, pain, and intestinal obstruction (Bokhari, 2021). In swine infected with *A. suum*, the symptoms are coughing or thumping, liver damage, impaired growth, and increased susceptibility to other infections (Roepstorff *et al.,* 2021).

This study also recovered *Balantidium coli* in native swine in backyard farming; this protozoan parasite is commonly found worldwide. Swine is a reservoir host in which humans are highly likely infected through direct or indirect contact with the animal. In rural areas of developing countries, human and swine fecal contamination is highly associated with water which may be developed balantidiasis in humans. The intestinal infections are spread via the fecal-oral route, with cysts as the infective stage. It has a simple life cycle, dormant cyst to trophozoite and trophozoite to cyst (Schuster and Ramirez-Avila, 2008). The recorded infection in native swine poses a potential risk in community-rearing backyard farming. The disease has an endemic with the highest prevalence record in tropical and sub-tropical areas in the world due to favorable geo-climatic conditions for the development and survival of the parasite in these regions. The infected animal suffered anorexia, dehydration, retarded growth, and diarrhea (Ahmed *et al.,* 2020). According to the study by Hindsbo *et al.* (2000), the higher prevalence of *B. coli* is significantly increased from 57% found in the age suckling pigs reaching 100% in 4-week-old piglets. This study recorded a 26.88% prevalence rate in native swine as observed in backyard farming. It may lead to a potential risk of the disease in the area since people exposed to the swine farm industry have a higher risk of infection with balantidiasis (Schuster and Visvesvara, 2004). The condition of poor hygiene in the presence of animals and humans, malnutrition, concurrent infections, and incapacitating diseases are all risk factors for the development and spreading of balantidiasis in both animals and humans (Solaymani-Mohammadi and Petri, 2006).

Coccidian is a common intestinal swine parasite can be a causal agent of coccidiosis. It also infects the livestock, resulting in weight loss and diarrhea and affecting the swine industry's economy (Gong *et al.,* 2021). Among the commonly recovered parasites, coccidian is usually reported as the lowest prevalent in swine (Nonga *et al.,* 2015). The present study also recorded this intestinal parasite with the lowest prevalence rate in native swine. Nonetheless, the potential risk for zoonotic transmission may occur in backyard farming recorded in the area. Another common intestinal parasite recovered in this study is the *Entamoeba* parasite, usually found in many parts of the world (Felefel *et al.,* 2023) and infects all vertebrates and invertebrates, including humans and swine. *Entamoeba* spp. such as *Entamoeba suis*, zoonotic *Entamoeba polecki*, and *Entamoeba histolytica* are the common species of *Entamoeba* recovered in swine (Wang *et al.,* 2022). Among these species, *E. histolytica* is the most zoonotic and the causal agent of amoebiasis, which is also associated with mortality and morbidity in humans (Elsheikha *et al.,* 2018). Likewise, the Centers for Diseases Control and Prevention identified *E. histolyca*, a pathogenic intestinal parasite, and drinking of contaminated water are the common causes of amoebiasis and many confirmed cases in developing countries. This survey recovered *Entamoeba* sp. in native swine fecal samples harboring a 37.63% prevalence rate and posing potential health risk in the household that observed native swine backyard farming.

The *Fasciola* is a trematode commonly associated with the liver fluke, typically found in domestic and wild animals as their primary definitive hosts. However, this intestinal parasite causes a disease called fascioliasis, a foodborne zoonotic illness that usually affects grazing animals and humans around the globe (Jumawan *et al.,* 2020). Fascioliasis has targeted the liver, which causes liver damage and hemorrhage because flukes migrate into the liver parenchyma. When they inhabit the bile duct, the matured flukes also have hematophagous activity and damage to the bile duct mucosa caused by their cuticular spines. The infection of livestock caused by the liver fluke results in annual economic losses of approximately 3 billion dollars worldwide. The illness spreads throughout cattle and is a re-emerging human disease. In the study by Saadatnia *et al.* (2020), *Fasciola* sp. is prevalent in swine. A high infection of this parasite was also recorded in rice fields and associated with bovine infections which ruminants grazers animals are highly susceptible (Jumawan *et al.,* 2020). High infection occurs in rice fields with exposure to existing vegetation and such intermediate snail hosts (Mas-Coma *et al.,* 2009; Chang and Flores, 2015; Portugaliza *et al.,* 2019). In this study, the prevalence of the *Fasciola* parasite did not harbor high infection in contrast with the observation in bovines reported by Estaño and Jumawan (2023). Since native swine in backyard farming depend on human feeding, the exposure to vegetation's abundance with the intermediate host is limited. These factors influence low infections observed in native swine, but still, fascioliasis associated with swine poses a threat in backyard farming.

A higher prevalence of intestinal parasites in female than male swine had been detected. This is possibly due to the suppression of the immune system in females during reproductive functions such as pregnancy, parturition, and lactation, which is also reported in the studies of Abonyl and Njoga (2020). It likely explains why female swine are more susceptible to various parasitic infections. Regarding infection among the age group, this study shows no significance. The result revealed the highest prevalence in mature, followed by finisher and grower, while weaner recorded the lowest. The increased prevalence of intestinal parasites usually observed in growing swine could be attributed to their greater exposure to the outside environment. After the weaning period, the grower swine started to explore the environment and independently search for food. They often forage on grasses in open fields and have frequent contact with soil, increasing their exposure to various parasites. The high infection in prevalence and intensity in adult native swine explains that older hosts harbored superinfection as the mature hosts lived long and occupied more wide areas. It also influences the accumulation of parasite loads; other younger ages will be susceptible to infections, especially native swine in backyard farming raised in a semi-free-ranging environment with close association to other swine. Other risk factors will also lead to the spread of zoonotic transmission in other house-hold with swine backyard farming. This could be the reason why high infections were recorded in all sampling sites showing no differences in the prevalence among sites. The risk of a high prevalence rate of intestinal parasites in native swine was threatening and caught attention, further assessment of the possible transmission of infectious diseases in the area. Results recommend further investigation to find out the possible impact of a parasitic infection of native swine in backyard farming on public health, and also good farming practices are recommended.

Swine plays an essential role as reservoir hosts for different intestinal parasites, as seen by the prevalence of multiple infections in fecal samples. This study suggests increased intestinal parasites and co-infections, leading to a higher parasite burden. These parasites frequently feed on nutrients intended for the host animal, resulting in malnutrition despite appropriate food consumption. This can negatively impact the growth and health of swine. Chronic infections can cause extended immune activation and related health issues. Poor growth rates, reduced meat production, and higher veterinary costs may all result in decreased productivity and economic losses.

The findings of this study have a significant impacts on livestock swine farming which the recovered intestinal parasite in native swine has veterinary and medical importance. *Balantidium coli, Entamoeba* sp., Coccidians, *Strongyloides* sp., *Ascaris suum, Fasciola* sp., *Trichuris* sp. and Hookworms are notable intestinal parasites associated with infectious diseases in humans and other animals. The recorded high infections in various age groups among native swine and sites may pose a health risk and result in low swine production. Susceptible for infections, especially those native swine raised in backyard farming with a semi-free-ranging environment closely associated with other swine and adjacent households. These factors will lead to the spread of zoonotic transmission in other animals. The result confirms the role of native swine as reservoir hosts of zoonotic intestinal parasites and may pose a potential risk in backyard farming. The results call for immediate actions, good farming practices such as proper removal of manure and litter, housing native swine in cage fens, and vaccination and treatment of anti-helminthic to the animals. It will help to control and eliminate zoonotic transmission in the area.

Practically all swine farmers in the area should deworm their animals regularly to control intestinal parasites. A veterinarian or diagnostic laboratory technician can collect and evaluate fecal samples regularly. It is recommended that the problem be discussed with a veterinarian or agricultural livestock specialist so that the most effective program for the livestock can be implemented. Swine raised on pasture or in dirt lots where reinfection is inevitable will require a more rigorous surveillance approach than swine raised on slotted floors. To reduce or eliminate the transmission of intestinal parasites, swine cages should be modified, and modern applications of animal technology should be used.

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