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PREVALENCE OF GASTROINTESTINAL NEMATODE INFECTION IN SOWS ON VARIOUS PIG BREEDING FARMS IN GIANYAR DISTRICT, BALI

Prevalensi Infeksi Nematoda Gastrointestinal Pada Babi Induk di Peternakan Pembibitan Babi di Kabupaten Gianyar, Bali

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Abstract

Gastrointestinal nematode infections in sows can cause physiological decline in pigs, fetal development problems, and reduced milk production. This study aimed to determine the prevalence of gastrointestinal nematode infections in sows during the gestation, lactation, and dry phases at a pig breeding farm in Gianyar District, Bali, Indonesia. This was a cross-sectional study using purposive sampling. A total of 204 fecal samples from sows in the gestation, lactation, and dry phases, collected from seven sub-districts in Gianyar Regency, were used in this study. Fecal samples were examined using sedimentation and flotation concentration methods with saturated salt to identify nematode eggs. Prevalence data were described descriptively, while the chi-square test was used to determine the relationship between the prevalence of gastrointestinal nematode infections in pregnant, lactating, and dry sows. The study reported a nematode prevalence of 46.56%, consisting of Strongyl-type worms (43.62%), *Ascaris suum* (2.94%), *Strongyloides ransomi* (2.45%), and *Trichuris suis* (0.49%). No significant differences were observed in prevalence between the phases ($p>0.05$). Co-infections were also observed in sows in this study. The prevalence of nematode infections in sows remains relatively high; therefore, it is recommended to improve management practices, particularly on farms with wet housing conditions and irregular deworming schedules.

Keywords: gastrointestinal, Gianyar, nematodiosis, sow, prevalence

Abstrak

Infeksi nematoda gastrointestinal pada babi induk dapat menyebabkan penurunan fisiologis babi, mengganggu perkembangan janin, dan produksi susu. Tujuan dari penelitian ini adalah untuk mengetahui prevalensi infeksi nematoda gastrointestinal pada babi induk fase bunting,

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menyusui, dan kering di peternakan pembibitan babi di Kabupaten Gianyar, Bali, Indonesia. Penelitian ini merupakan *cross sectional study* dengan metode *purposive sampling*. Sebanyak 204 sampel feses babi induk fase bunting, menyusui, dan kering yang berasal dari tujuh kecamatan di Kabupaten Gianyar digunakan dalam penelitian ini. Sampel feses diperiksa menggunakan metode sedimentasi dan konsentrasi pengapungan dengan garam jenuh untuk mengidentifikasi telur cacing nematoda. Data prevalensi dijabarkan secara deskriptif, sedangkan untuk mengetahui perbedaan prevalensi infeksi nematoda gastrointestinal pada babi induk fase bunting, menyusui, dan kering digunakan uji *Chi-square*. Hasil penelitian menunjukkan bahwa prevalensi nematoda sebesar 46,56%, yang terdiri dari cacing tipe *Strongyl* (43,62%), *Ascaris suum* (2,94%), *Strongyloides ransomi* (2,45%), dan *Trichuris suis* (0,49%). Tidak terdapat perbedaan signifikan (p>0,05) antara infeksi nematoda pada induk babi fase bunting, menyusui dan kering. Koinfeksi pada babi induk ditemukan pada penelitian ini, didominasi oleh *single infection* (44%), diikuti *double infection* (2%), dan *triple infection* (1%). Pada *single infection* didominasi oleh cacing tipe *Strongyl* (41,18%), pada *double infection* didominasi oleh kombinasi *Ascaris suum* dan tipe *Strongyl* (1,47%), pada *triple infection* ditemukan kombinasi *Ascaris suum*, *Trichuris suis*, dan tipe *Strongyl* (0,49%). Prevalensi infeksi nematoda pada babi induk masih cukup tinggi, sehingga disarankan untuk meningkatkan manajemen pemeliharaan, terutama pada peternakan yang memiliki kondisi kandang basah dan pemberian obat cacing yang tidak teratur.

Kata kunci: babi induk, Gianyar, gastrointestinal, nematodiosis, prevalensi

INTRODUCTION

Swine farming is one of the major sectors in the livestock industry in Bali, including Gianyar Regency. Badan Pusat Statistik (2022) reported that the pig population in Gianyar Regency was 85,579, the highest in Bali Province. Pigs are widely raised because of their beneficial characteristics and abilities, such as having many offspring in a single birth (prolific), rapid growth, and ability to convert food scraps or agricultural waste into meat (Yuda, 2017). Helminthiasis is a health challenge that still occurs and threatens pigs. This worm infection can be influenced by several factors, such as environmental conditions and husbandry systems (Pridayasa *et al.*, 2025; Yesenia *et al.*, 2017).

Sows in the gestation, lactation, and dry phases are susceptible to gastrointestinal nematode parasite infections due to physiological changes and stress, leading to immunosuppression. In addition, high lactation rates make sows more susceptible to infections (Yoseph *et al.*, 2018). Gastrointestinal nematode worms that can infect pigs include *Ascaris suum, Strongyloides ransomi, Trichuris suis*, Strongyl-type worms (*Globocephalus urosubulatus, Hyostrongylus rubidius and Oesophagostomum dentatum),* and *Gnathostoma hispidum* (Otranto & Wall, 2024). Infection by these gastrointestinal nematode worms is detrimental to livestock, as they suck nutrients or blood, causing growth disorders and decreased productivity (Guna *et al.*, 2014; Permadi *et al.*, 2012).

Several studies related to the prevalence of nematode worm infections in pigs have been reported by several researchers in Indonesia, including Permadi *et al.* (2012), who found that pigs in the Baliem Valley and Arfak Mountains were infected with *Gnathostoma hispidum* worms, with a prevalence of 80% and 35%, respectively. Agustina (2013) reported that her research on pig farms throughout the province of Bali found pigs of all ages infected with strongylid worms of the species *Hyostrongylus rubidius* and *Oesophagostomum dentatum*, with a prevalence of 41.25% and 47.5%, respectively. Guna *et al.* (2014) reported in their study in the Baliem Valley and Arfak Mountains that they found infections with *Globocephalus urosubulatus* worms with a prevalence of 80% and 30%, respectively. Yoseph *et al.* (2018)

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reported that female pigs at the Denpasar landfill were infected with *Trichuris suis* worms with a prevalence of 52.5%. Muliani *et al.* (2019) reported that female pigs at the Suwung landfill in Denpasar, Bali were found to be infected with *Strongyloides ransomi* worms with a prevalence of 26.3%. Podung *et al.* (2020) found a prevalence of nematode infection in sows of 21.7% in pigs in Kalasey Satu Village, Mandolang District, Minahasa Regency. Wiweka *et al.* (2020) found that female pigs in the lowlands of Bali province were infected with *Ascaris suum* worms with a prevalence of 17.6%.

Based on the above studies, the prevalence of nematode infection varies considerably between 17.6% and 80% and remains a concern in pig farming. In addition, Gianyar District has one of the largest pig populations in Bali; however, information on the prevalence of gastrointestinal nematode infection in sows is still limited. Therefore, this study was conducted. This study presents data on the prevalence of nematode infections in sows, differences in infection rates between reproductive cycle stages, and the diversity of infection combinations.

RESEARCH METHODS

Ethical Clearance

This study did not require ethical approval for animal experimentation because it only used fecal samples from sows collected from all subdistricts in Gianyar Regency, without any physical intervention on the sows.

Time and Location

This study was conducted from August 2024 to February 2025. The research location included all subdistricts in Gianyar Regency, namely Blahbatuh, Gianyar, Sukawati, Payangan, Tegallalang, Tampaksiring, and Ubud. The study was conducted on breeding farmers with the criteria of having sows and trading piglets.

Research Sample

The research object was sows raised in 17 pig breeding farms in Gianyar Regency, Bali, Indonesia. The research sample consisted of 204 fecal samples from different sows, comprising 96 from pregnant sows, 53 from lactating sows, and 55 from dry sows.

Study Design

This was an observational study with a cross-sectional design. Fecal samples were selected using purposive sampling with the criteria of fresh fecal samples defecated by sows, currently in one of three phases (pregnant, lactating, or dry), and located in Gianyar district.

Study Variables

The independent variables in this study were sows in the pregnant, lactating, and dry phases of the study. The dependent variables in this study were the prevalence and type of gastrointestinal nematode worms infecting sows. The controlled variables in this study were sows on pig breeding farms in the Gianyar Regency.

Data Collection Methods

Data on the reproductive phases of sows were obtained from interviews with farmers using a research questionnaire. The reproductive phases included pregnancy, lactation, and dry period. In addition, other data to support the research were also recorded, namely population, feed, water, maintenance management, barn management, sanitation, and biosecurity, which were also recorded through direct interviews with farmers.

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Identification of Nematode

Data on nematode infections were obtained by conducting coprological examinations using the sedimentation and flotation concentration methods with saturated salt solutions. The sedimentation method was performed by taking approximately 3 gram of feces, placing it in a beaker, adding 30 ml of distilled water, stirring until homogeneous, and then filtering. The filtrate was placed in a centrifuge tube (10 ml) and centrifuged at 1500 rpm for 5 min. The supernatant was discarded, and a small amount of sediment was taken and placed on a glass slide, followed by the addition of a small amount of water and covered with a cover glass. The samples were examined using a microscope at a magnification of 100-400× (Zajac *et al.*, 2021).

The flotation concentration method using a saturated salt flotation solution was carried out by taking a fecal sample the size of a candlenut or approximately 3 gram in weight, then placing it in a beaker and adding 30 ml of distilled water, stirring until homogeneous, and then filtering. The filtrate was placed in a centrifuge tube (up to the 10 ml mark on the centrifuge tube) and centrifuged at 1500 rpm for 5 min. The supernatant was discarded, and 10 ml of flotation solution was added to the sediment and stirred until homogeneous. The sample was centrifuged again at the same speed and time as before. The centrifuge tube was removed from the centrifuge and placed upright on a test tube rack, and the floating solution was slowly added drop by drop using a Pasteur pipette until the surface of the liquid was convex. Wait for approximately 5 minutes to allow the worm eggs to float to the surface, touch the cover glass to the surface of the liquid, and then attach it to the object glass. The samples were examined using a microscope at 100–400× magnification.

Identification of Nematode

Morphological identification of gastrointestinal nematode eggs was performed. The sample was considered positive if one or both tests identified nematode eggs. Nematode eggs were identified based on their morphological characteristics by comparison with the relevant literature (Otranto & Wall, 2024; Zajac *et al.*, 2021).

Data Analysis

The prevalence of gastrointestinal nematode infection was calculated by dividing the number of infected pigs by the number of pigs examined and multiplying by 100% (Thrusfield, 2018). The prevalence data were reported descriptively in quantitative form using tables and graphs. Differences in gastrointestinal nematode infection in each phase of the mother (pregnant, lactating, and dry) were tested using the chi-square test with IBM Statistics SPSS Version 26 software with a 95% confidence level or $p<0.05$ (Sampurna & Nindhia, 2016).

RESULTS AND DISCUSSION

Results

Examinations were conducted on 204 fecal samples from sows from 17 farms in the Gianyar Regency of Bali. The proportion of samples came from Blahbatuh District (13 samples), Gianyar (5 samples), Sukawati (27 samples), Payangan (67 samples), Tegallalang (76 samples), Tampaksiring (10 samples), and Ubud (6 samples). The research samples comprised 96 pregnant, 53 lactating, and 55 dry sows.

Based on the examination results and identification of worm eggs, 46.56% (95/204) of the pigs were infected with nematodes, consisting of Strongyl worms 43.62% (89/204), *Ascaris suum* 2.94% (6/204), *Strongyloides ransomi* 2.45% (5/204), and *Trichuris suis* 0.49% (1/204). (Figures 1 and 2). Based on the reproductive phase, nematode infection in pregnant sows had a prevalence of 48.95% (47/96), consisting of Strongyl worms 43.75% (42/96), *Ascaris suum*

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2.08% (2/96), and *Strongyloides ransomi* 4.16% (4/96). In lactating sows, the prevalence was 52.83% (28/53), consisting of Strongyl worms 52.83% (28/53) and *Strongyloides ransomi* 1.88% (1/53). In dry sows, the prevalence was 36.36% (20/55), consisting of Strongyl worms 34.54% (19/55), *Ascaris suum* 7.27% (4/55), and Trichuris suis 1.81% (1/55) (Table 1).

There was no significant difference statistically in the prevalence ($p>0.05$) of gastrointestinal nematode-infected sows. This was also observed for each type of worm infection, showing no significant difference ($p>0.05$). However, it can be observed that the prevalence of Strongyl type infections dominated helminthiasis cases in sows in Gianyar Regency with a prevalence of 43.62% (89/204). The prevalence of Trichuris suis was the lowest at 0.49% (1/204) (Table 1).

The diversity of gastrointestinal nematode infections in sows was dominated by single infections (44%), followed by double (2%) and triple (1 %) infections (Figure 3). In single infections, Strongyl worms were found with a prevalence of 41.18% (84/204), *Strongyloides ransomi* 1.96% (4/204), and *Ascaris suum* 0.98% (2/204) prevalence. In double infections, a combination of *Ascaris suum* and Strongyl was found with a prevalence of 1.47% (3/204), and a combination of *Strongyloides ransomi* and Strongyl was found with a prevalence of 0.49% (1/204). Triple infections were found in the combination of *Ascaris suum, Trichuris suis*, and Strongyl types with a prevalence of 0.49% (1/204) (Table 2).

Discussion

Prevalence of Gastrointestinal Nematodes in Sows

In this study, the prevalence of overall gastrointestinal nematode infection in sows at pig breeding farms in Gianyar Regency was 46.56%. This result is lower than that found by Fendriyanto *et al.* (2015) in piglets at traditional markets in Bali, with a prevalence of 71.6%, and by Permadi *et al.* (2012) in pigs in Papua, with a prevalence of 60%. Parasite infection, based on epidemiology, is influenced by three main factors: parasite agents (life cycle, survival rate, pathogenicity, and immunogenicity), host factors (species, age, breed, sex, immunity status, and nutritional status), and environmental factors (season, geographical conditions, and farm management) (Parija & Poddar, 2025). The higher results found by Fendriyanto *et al.* (2015) are likely due to differences in the age of the pigs, whereby the older the pigs are, the greater their immunity to worms, or the older they are, the lower the prevalence (Akbar *et al.*, 2022). The higher results reported by Permadi *et al.* (2012) are likely due to differences in husbandry management. Farmers in Papua still use an extensive system, where pigs are released around the house or yard, and the floor is never cleaned, so it appears to be wet and dirty. In this study, all farms (17 farms) implemented a semi-intensive system. As many as 76% of farmers raised pigs in clean and dry pens (based on the results of interviews and observations by researchers). This extensive husbandry system allows infections to occur more easily and makes the animals more susceptible to infection.

The Chi-square test results showed no difference in the prevalence of gastrointestinal nematode infection in lactating, pregnant, and dry sows. This indicates that each phase of the sows had the same chance of being infected with gastrointestinal nematodes. During the pregnancy and lactation phases, nematode infection is likely caused by physiological changes, decreased immunity due to high energy and protein requirements during lactation, and physiological stress that disrupts immune function. High lactation rates render females susceptible to infection (Muliani *et al.*, 2019; Yoseph *et al.*, 2018). Infection during the dry phase is likely caused by the short rest period before entering the next reproductive phase. The ideal rest period for sows is 1-8 weeks, depending on the body condition score at weaning (Carrión-López *et al.*, 2022).

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Prevalence of Strongyl Type

In this study, the prevalence of Strongyl-type worm infection in sows at pig breeding farms in Gianyar Regency was 43.62%. The Chi-square test results showed no difference in infection between lactating, pregnant, and dry sows. The prevalence of Strongyl-type worm infection was the highest in this study. This is likely because Strongyl-type worms belong to the Strongylida family, which consists of many genera. The morphology of Strongylida eggs is similar across genera and species. This makes it difficult to determine the worm species based solely on direct observation using a microscope. A fecal culture method is required to identify larvae at the species level. Nematode eggs in feces are incubated until they hatch into infective larvae (L3), which can be morphologically identified. Species identification is then performed by observing the morphology of the cultured larvae (Pradella *et al.*, 2020).

The results of our study were lower than those reported in a previous study by Mariyana *et al.* (2020) for female pigs in the lowland areas of Bali, which found a prevalence of 69.6%. These results were also lower than those reported by Agustina (2013) for pigs throughout Bali, which found a prevalence of 60%. The lower results in this study compared to those of Mariyana *et al.* (2020) are likely due to differences in pen hygiene and treatment timing. Mariyana *et al.* (2020) showed a higher prevalence in dirty pens (76.1%) than in clean pens (62.6%). Dirty and damp cages can support the development of Strongyl worm eggs into the infectious stage (Mariyana *et al.*, 2020). In this study, 88% of the farmers cleaned their cages twice a day. In addition, the timing of medication administration in the study by Mariyana *et al.* (2020) was irregular, usually once a year. In this study, based on interviews conducted with 17 farms, 82% of farmers administered deworming medication every three months. The lower results in this study compared to those of Agustina (2013) may be due to differences in the conditions of the areas studied. Mariyana *et al.* (2020) stated that there is a correlation between regional conditions and Strongylid worm infections. Areas with high humidity and limited sunlight create an environment conducive to the development of gastrointestinal nematodes (GNs). The ideal temperature for the development of Strongylid worm eggs to infectious larvae is in the range of 15-25 ºC (Mariyana *et al.*, 2020).

Prevalence of *Ascaris suum*

In this study, the prevalence of *Ascaris suum* infection in sows was low at 2.94%. The Chi-square test results showed no statistically significant differences ($p>0.05$) based on the reproductive phase of the sows. The low prevalence of *Ascaris suum* infection was likely due to the fact that the farms studied used a pen system with cement floors and iron bars. *Ascaris suum* is a type of worm classified as a soil-transmitted helminth (STH), transmitted through soil (Pal *et al.*, 2025). These results are lower than those reported by Guna *et al.* (2014) in pigs in the Baliem Valley and Arfak Mountains of Papua, with a prevalence of 20%. These results are also lower than those found by Wiweka *et al.* (2020) in female pigs in the lowlands of Bali (17.9 %). This is likely due to differences in the housing conditions. In the study by Guna *et al.* (2014), pigs were raised free-range in yards, and the floors were never cleaned; therefore, they appeared dirty and muddy. In the study by Wiweka *et al.* (2020), pigs were kept in pens that were rarely cleaned, causing the pens to become wet and damp. Wet pen floors are ideal breeding grounds for *Ascaris suum* eggs. *Ascaris suum* eggs can survive for 2-4 weeks, and in a dry environment and for 8 weeks in a humid environment (Wiweka *et al.*, 2020). In this study, 88% of the 17 farms had implemented cleaning of the pens twice a day, and 76% of the farms had clean and dry pen conditions when the researchers conducted their observations.

Prevalence of *Strongyloides ransomi*

In this study, the prevalence of *Strongyloides ransomi* infection in sows was also low (2.45 %).

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Based on the reproductive phase of the sows, no statistically significant differences were observed ($p>0.05$). The main sources of *Strongyloides ransomi* infection are milk, ingestion of L3 larvae with food/drink, and skin penetration (Oka & Dwinata, 2011). The low prevalence in this study was likely due to good husbandry. Based on the results of the interviews with the farmers, the farmers provided concentrate feed, rice bran, corn flour, and pellets. A total of 88% of farms implemented twice-daily pen cleaning management, and 76% had clean and dry pen flooring. In addition, 47% of the farmers disinfected once a week, and 35% disinfected every day. This indicates that the management pattern of breeding farms in Gianyar Regency has begun to implement semi-intensive to intensive husbandry practices.

The results of this study were lower than those reported by Muliani *et al.* (2019) in female pigs raised at the Suwung landfill in Denpasar, with a prevalence of 26.3%. Furthermore, the results of this study were lower than those found by Akbar *et al.* (2022) in female pigs slaughtered at the Pesanggaran Slaughterhouse, Denpasar City, with a prevalence of 80%. The lower results in this study compared to those reported by Muliani *et al.* (2019) are likely due to differences in management practices.

Pigs raised at the Suwung Denpasar landfill have damp, dirty pens and are fed with food waste. Feeding food waste is prone to contamination with infectious *Strongyloides ransomi* larvae, which can be a source of transmission to pigs. Infective larvae ingested with food or penetrating the skin will predilect the small intestine and can cause diarrhea, dehydration, and even death. Dirty, muddy, and damp housing conditions support the development of the infective stage of *Strongyloides ransomi* worms (Akbar *et al.*, 2022; Muliani *et al.*, 2019). In contrast, in this study, 76% of the farms had clean and dry housing conditions and fed concentrates, rice bran, and pellets. Compared to the report by Akbar *et al.* (2022), the results of this study were lower, possibly due to differences in the intensity of deworming. In the study by Akbar *et al.* (2022), deworming was not regularly administered. In this study, 82% of the farmers administered deworming medication regularly every 3 months.

Prevalence of *Trichuris suis*

The prevalence of Trichuris suis infection was the lowest in this study (0.49 %) and was only found in one sample from dry sows. This is thought to be due to the lower egg productivity of Trichuris suis compared to other worms. Female *Trichuris suis* worms can produce 3,000-20,000 eggs per day, which is much lower than female *Ascaris suum* worms, which can produce 200,000-1,000,000 eggs per day (Bowman, 2020). When compared to other studies, this prevalence is lower than that reported by Yoseph *et al.* (2018) in pigs raised at the Suwung landfill (55 %). A similar finding was observed when compared to the report by Suratma (2009) on young pigs in Denpasar City (32.67 %).

These differences are thought to be caused by differences in feed types and housing conditions between the studies. In the study by Yoseph *et al.* (2018), pigs were fed waste from landfills, and the pig pens were dirty, damp, rarely cleaned, and never disinfected. Housing conditions greatly influence and enable the development of worm eggs (Suratma, 2009). In this study, 88% of the farms cleaned the housing twice a day, and 47% of the farms disinfected once a week. In Suratma's (2009) study, pens with dirt floors showed a higher prevalence (52.70%) than those with cement floors (26.11%). Pens with cement floors are drier than those with dirt floors; therefore, worm eggs develop better in pens with dirt floors. In addition, dirt floors are more difficult to clean thoroughly than cement floors. In dirt pens, worm eggs can adhere better, increasing the likelihood of pig infections (Suratma, 2009). However, in this study, all the farms used cement or iron bar flooring.

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Infection Diversity

The diversity of gastrointestinal nematode infections in sows at pig breeding farms in Gianyar Regency shows that single infections are the most prevalent. Single infections were dominated by the Strongyl type, with a prevalence of 41.18%, possibly because Strongyl worms consist of various genera. This was followed by double infections, which were a combination of *Ascaris suum* and Strongyl infections, with a prevalence of 1.47%. Triple infections were dominated by a combination of *Ascaris suum, Trichuris suis*, and Strongyl infections, with a prevalence of 0.49%. The high rate of single infections is likely due to the fully developed immune system of the sows. Sows that are frequently exposed to certain parasites develop specific immunity to these parasites. Repeated exposure forms partial immunity that inhibits other species (Srisawangwong *et al.*, 2011). The low prevalence of mixed infections is likely due to the fact that pig breeding farms in Gianyar Regency have implemented semi-intensive to intensive farming systems. In line with the findings of Widayati *et al.* (2020), mixed infections were found to be more prevalent than single infections, which was caused by a free-range husbandry system, allowing mixed infections to occur.

The diversity of infections we reported was higher than that reported by Lee *et al.* (2022) in pigs in Korea, with a prevalence of single infection dominated by the Strongyl type at 3.3%, double infection with a combination of Strongyl type and *Ascaris suum* at 0.3%, and no triple infections. However, these infection diversity results are lower than those reported by Ojo Philip & Ojo Moradeyo (2022) for pigs in Nigeria, with a prevalence of single, double, and triple infections of 70.2%, 21.4%, and 8.4 %, respectively. The difference in infection diversity results in this study compared to those of Lee *et al.* (2022) and Ojo Philip & Ojo Moradeyo (2022) lies in the differences in the geographical and climatic conditions of the areas studied. In tropical climates with warm temperatures and high humidity, nematode eggs and infective larvae develop more rapidly and survive longer in the environment. In cold and dry seasons, the development and survival of larvae can be limited (Nielsen *et al.*, 2007).

CONCLUSION AND RECOMMENDATIONS

Conclusion

The prevalence of gastrointestinal nematode infections in sows at pig breeding farms in Gianyar Regency was 46.56%, consisting of Strongyl type (43.62%), *Ascaris suum* (2.94%), *Strongyloides ransomi* (2.45%), and *Trichuris suis* (0.49%). There was no difference in the prevalence of gastrointestinal nematode infections in sows during gestation, lactation, and dry phases statistically. Co-infections with nematodes infecting sows were also observed in this study.

Recommendations

Based on the results of this study, the prevalence of gastrointestinal nematode infection was still quite high. Farmers are advised to improve pen hygiene, keep the pigs dry, administer deworming medication regularly, and maintain biosecurity to break the nematode life cycle. Further research is needed to identify Strongyl species more specifically and to assess the effectiveness of anthelmintic programs. Additionally, a longitudinal study on the relationship between nematode infection and the reproductive performance and productivity of sows is warranted.

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Table

Table 1. Prevalence of gastrointestinal nematode infections in sows at pig breeding farms in Gianyar Regency.

Infection	Pregnant Sows		Lactating Sows		Dry phase Sows		Overall		p value
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	
Strongyl type	42	43.75	28	52.83	19	34.54	89	43.62	0.160
Ascaris suum	2	2.08	0	0	4	7,27	6	2.94	0.065
Strongyloides ransomi	4	4.16	1	1.88	0	0	5	2.45	0.268
Trichuris suis	0	0	0	0	1	1.81	1	0.49	0.256

Table 2. Diversity of gastrointestinal nematode infections in sows at pig breeding farms in Gianyar Regency.

Co-infection		Pregnant Sows		Lactating Sows		Dry phase Sows		Overall
		(n)	(%)	(n)	(%)	(n)	(%)	
Single	Strongyl type	41	42.71	27	50.94	16	29.09	41.18
	Strongyloides ransomi	4	4.17	0	0	0	0	1.96
	Ascaris suum	1	1.04	0	0	1	1.82	0.98
Double	*Ascaris suum* + Strongyl type	1	1.04	0	0	2	3.64	1.47
	Strongyloides ransomi + Strongyl type	0	0	1	1.89	0	0	0.49
Triple	*Ascaris suum*+*Trichuris suis*+ Strongyl type	0	0	0	0	1	1.82	0.49

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Figures

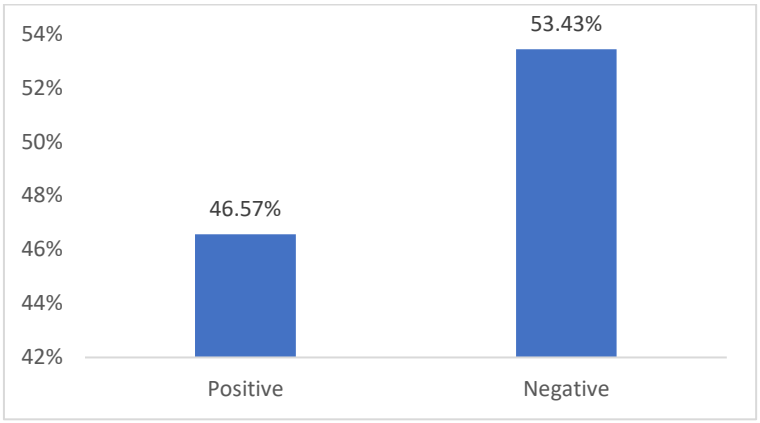

Figure 1. Histogram of gastrointestinal nematode prevalence in sows at a pig breeding farm in Gianyar Regency.

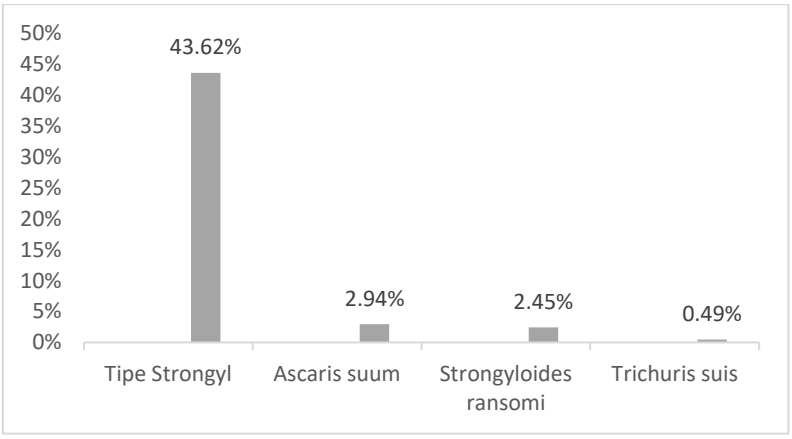

Figure 2. Histogram of the prevalence of gastrointestinal nematode infections by species in sows at a pig breeding farm in Gianyar Regency.

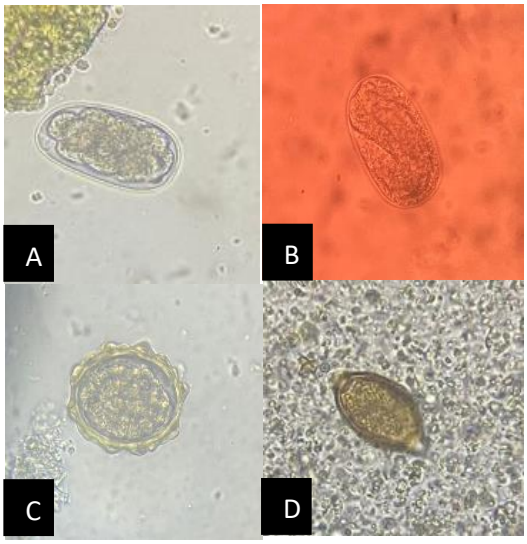

Figure 3. Identification of gastrointestinal nematode worm eggs in pigs (A) *Strongyl*-type (B) *Strongyloides ransomi* (C) *Ascaris suum* (D) *Trichuris suis* (400x magisnification)

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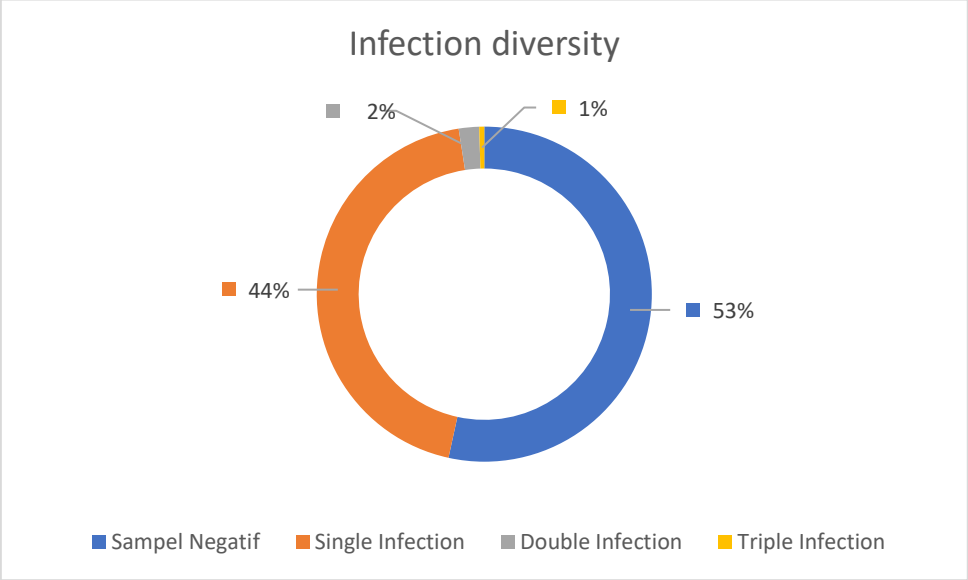

Figure 4. Diversity of gastrointestinal nematode infections in sows at a pig breeding farm in Gianyar Regency.

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