

The Prevalence and Risk Factors of Gastrointestinal Nematodes in Zebra Doves (*Geopelia striata*) Sold in Denpasar City

(PREVALENSI DAN FAKTOR RISIKO NEMATODA GASTRO-
INTESTINAL BURUNG PERKUTUT (*GEOPELIA STRIATA*)
YANG DIPERJUALBELIKAN DI KOTA DENPASAR

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ABSTRACT

The Zebra Dove (*Geopelia striata*) is a songbird commonly traded in Denpasar, Bali. The husbandry system and environmental conditions during the trading process have the potential to increase the risk of parasitic infections, including gastrointestinal nematodes. This study was aimed to identify the types of gastrointestinal nematodes, determine the prevalence of infection and analyze the risk factors associated with infection in Zebra Doves traded in Denpasar City. An observational study with a cross-sectional design was conducted. A total of 61 fecal samples were collected from markets and bird shops in four districts of Denpasar City and examined using direct smear and flotation methods. Parasites were identified microscopically based on morphology and morphometry using ImageJ software. Risk factor analysis was performed using the Chi-square test and Odds Ratio (OR) calculations. The results showed a prevalence of gastrointestinal nematode infection in Zebra Dove was 22.95% (14/61). In this study three genera of nematodes were identified including *Heterakis* spp., (16.39%), *Ascaridia* spp., (8.20%) and *Trichostrongylus* spp., (6.56%), occurring as both single and mixed infections. Statistical analysis showed that feed type was significantly associated ($p < 0.05$) with the prevalence of infection. Zebra Doves fed with commercial feed had a 3.488 times more likely to cause gastrointestinal nematode infection than those fed natural feed. In contrast, the maintenance system, age, administration of anthelmintic treatment, frequency of drinking water containers cleaning, and source of bird acquisition showed no significant associations. In conclusion, the prevalence of gastrointestinal nematode infection in Zebra Doves in Denpasar City was moderate and was influenced by dietary factors.

Keywords: Denpasar City; *Geopelia striata* or Zebra Dove; gastrointestinal nematodes; risk factors

ABSTRAK

Burung perkutut (*Geopelia striata*) merupakan salah satu burung kicau yang banyak diperdagangkan di Kota Denpasar, Bali. Sistem pemeliharaan dan kondisi lingkungan selama proses perdagangan berpotensi meningkatkan risiko infeksi parasit, termasuk nematoda gastrointestinal. Penelitian ini bertujuan untuk mengidentifikasi jenis nematoda gastrointestinal, menentukan prevalensi infeksi serta menganalisis faktor risiko yang berhubungan dengan kejadian infeksi pada burung perkutut yang diperjualbelikan di Kota Denpasar. Penelitian ini menggunakan rancangan observasional dengan pendekatan *cross-sectional*. Jumlah total sampel tinja burung perkutut yang dikumpulkan adalah 61 sampel, yang berasal dari pasar dan toko burung di empat kecamatan Kota Denpasar. Sampel tersebut diperiksa menggunakan metode natif dan apng (flotasi). Identifikasi parasit dilakukan secara mikroskopis berdasarkan morfologi dan morfometri dengan menggunakan aplikasi ImageJ. Analisis faktor risiko dilakukan menggunakan uji *Chi-square* dan perhitungan *Odds Ratio* (OR). Hasil penelitian menunjukkan prevalensi infeksi nematoda gastrointestinal burung perkutut sebesar 22,95% (14/61). Tiga jenis nematoda berhasil diidentifikasi, yaitu *Heterakis* spp., (16,39%), *Ascaridia* spp., (8,20%) dan *Trichostrongylus* spp., (6,56%), dengan ditemukannya infeksi tunggal maupun infeksi campuran. Hasil analisis statistika menunjukkan bahwa jenis pakan memiliki hubungan yang nyata ($p < 0,05$) dengan kejadian infeksi nematoda gastrointestinal. Burung perkutut yang diberi pakan komersil memiliki risiko infeksi nematoda gastrointestinal 3,488 kali lebih besar dibandingkan dengan burung yang diberi pakan alami. Faktor lain, seperti sistem pemeliharaan, umur, pemberian obat cacing, intensitas pembersihan wadah air minum dan asal muasal burung perkutut tidak menunjukkan hubungan signifikan. Dapat disimpulkan bahwa infeksi nematoda gastrointestinal pada burung perkutut yang diperjualbelikan di Kota Denpasar sangat umum terjadi dan dipengaruhi oleh faktor pakan.

Kata-kata kunci: burung perkutut (*Geopelia striata*); faktor risiko; Kota Denpasar; nematoda gastrointestinal

INTRODUCTION

The Zebra Dove (*Geopelia striata*) is a member of the Columbidae family, is widely distributed in Southeast Asia, including Indonesia (Suyapoh *et al.*, 2022). This species is widely known for its distinctive song, which has made it popular as a pet and competition bird (Suripto *et al.*, 2022). The high public interest in Zebra Doves has encouraged the development of small-to medium-scale breeding farms, with sales reaching hundreds of birds per month (Husaini and Kurniawati, 2022). Large-scale bird trade, particularly in Bird markets on the islands of Java and Bali, involves birds captured from various regions and then transported by intermediaries to be traded in bird markets located in various

major cities (Nijman *et al.*, 2021). These birds are generally kept in crowded cages and often in poor sanitary conditions. This increases the risk of transmitting various diseases, including gastrointestinal parasitic infections. Abdullah *et al.* (2024) reported that thousands of birds from various regions are traded together in markets across Java and Bali, thereby increasing the potential for disease transmission between individuals.

Birds can be affected by various diseases caused by infectious agents such as viruses, bacteria and parasites. One of the health problems commonly found in birds is parasitic infection, including gastrointestinal parasites that can cause health problems in various bird species (Melo *et al.*, 2021). Nematodes are one of the most common groups of parasites found in birds and often infect

the digestive tract (Otranto and Wall, 2024).

Nematodes are one of the most commonly reported groups of parasites affecting pigeons and doves, with species such as *Ascaridia columbae*, *Heterakis gallinarum* and *Capillaria* spp., (Salem *et al.*, 2022). A study by Suyapoh *et al.* (2022) in Thailand reported that 36.96% of Zebra Dove were infected with nematodes, mainly by *Ascaridia galli* followed by other nematodes such as *Heterakis gallinarum*, *Trichostrogylus tenuis*, *Syngamus* spp., and *Amidostomum* spp. Several types of nematodes in poultry are transmitted via the faecal-oral route (Talazadeh *et al.*, 2024). Gastrointestinal nematode infections in Zebra Doves can cause poor health and reduced productivity (Suyapoh *et al.*, 2022).

Studies on gastrointestinal parasites have been conducted on pigeons (*Columba livia*) in several regions of Indonesia. Study conducted by Pradita *et al.* (2012) reported that 96.1% of pigeons were infected with worms in the gastrointestinal tract. Additionally, pigeons in Tuban Regency, of East Java, showed a prevalence of gastrointestinal parasite infections of 81% (Ashfiyah *et al.*, 2022). These findings confirm that birds from the Columbidae family, including pigeons and doves, have a high potential to serve as hosts of gastrointestinal parasites. The high infection rate in pigeons is associated with poor maintenance management, inadequate cage sanitation and contamination of feed and drinking water, which allows parasite eggs to survive in the environment (Ashfiyah *et al.*, 2022). However, to the best of our knowledge, there have been no reports on the identification of gastrointestinal nematodes in doves in Bali, particularly in Denpasar. Therefore, this study was aimed to identify the types and prevalence of gastrointestinal nematode infections in Zebra Doves sold in Denpasar City and to determine the associated risk factors.

RESEARCH METHODS

Research Ethics Statement

This study was approved by the Research Ethics Committee of the Faculty of Veterinary Medicine, Udayana University (approval number: B/158/UN14.2.9/PT.01.04/2025).

Study Location and Time

Samples were collected from markets and Bird shops in four sub-districts in Denpasar City, namely North Denpasar, West Denpasar, East Denpasar and South Denpasar (8°39' S and 115°13' E). Denpasar has a tropical climate with an average monthly rainfall of around 244 mm, with the highest rainfall occurring in December. The average air temperature is around 29.8°C with an average minimum temperature of around 24.3°C. The study was conducted from September to December 2025.

Study Object

The object used in this study was a Zebra Dove. A total of 61 Zebra Doves fecal samples were used as study samples, consisting of 23 individually kept birds and 38 groups. The samples were collected from four subdistricts in Denpasar City, namely North Denpasar (18 samples), West Denpasar (17 samples), East Denpasar (15 samples) and South Denpasar (11 samples), which were selected because they represented bird trading centers. The sample size was determined based on availability in the field using purposive sampling without statistical sample size calculations, with 4–8 individual samples and 8–14 group samples taken per sub-district to increase the chances of detecting nematode eggs. During maintenance, the birds were fed natural feed in the form of grains and commercial feed in the form of millet and provided with drinking water in open containers. The cages were regularly cleaned with running water.

Equipment and Materials Used

The equipment used in this study included sample pots, applicator sticks, binocular microscopes, glass slides, cover glasses, test tubes, test tube racks, Pasteur pipet-

tes, spatulas, glass beakers, stirring rods, centrifuges, scales and mobile phone cameras. The materials used in this study consisted of 10% formalin, saturated sodium chloride (NaCl) solution, distilled water, tissue and gloves.

Study Design

This was an observational study conducted using a cross-sectional design, and purposive sampling was used.

Study Variables

The independent variables in this study were the determination of risk factors, which included group and individual management systems, age, deworming medication, feed, frequency of cleaning drinking areas and bird acquisition source. The dependent variable was the occurrence of gastrointestinal nematode infection in the Zebra Doves. Study population in this study was the Zebra Doves sold in Denpasar City.

Determination of Risk Factors

The risk factors analyzed in this study included several variables: (1) management systems, which were grouped into group and individual maintenance; (2) bird age, which was divided into juvenile (<6 months) and adult (≥ 6 months); (3) history of deworming, which was categorized as not administered and administered; (4) feed type, consisting of natural feed in the form of grains and commercial feed in the form of pellets; (5) frequency of cleaning drinking areas, differentiated into daily and every two days or more and (6) bird source, including wild, breeder, and commercial. These variables were selected because they are related to the transmission route of gastrointestinal nematodes, mainly through the ingestion of infectious eggs from feed, drinking water and the housing environment, and are influenced by stocking density, age-based immunity, and previous treatment. Risk factor data were collected using questionnaires via Google Forms based on interviews with bird sellers and direct observations in the field.

Fecal Collection and Examination

The procedure carried out in this study consisted of two stages, collection of fecal samples preserved in 10% formalin obtained from markets and Bird shops in Denpasar City and the examination of samples at the Parasitology Laboratory, Faculty of Veterinary Medicine, Udayana University. Fecal samples from Zebra Doves feces was performed using the wet mount method and saturated salt (NaCl) flotation (Zajac *et al.*, 2021), and the samples were examined using a microscope at 100–400 $\times$ magnification. The wet mount method is performed first as an initial screening to quickly detect the presence of eggs or parasitic structures. Next, the flotation technique is used to increase detection sensitivity by concentrating nematode eggs that may not be detected in direct examination. After microscopic observation, the eggs were measured using the ImageJ application (<https://imagej.net/ij/>) to distinguish between *Ascaridia* spp., and *Heterakis* spp., (Schneider *et al.*, 2012). Worm eggs were identified based on references from Zajac *et al.* (2021), Takano *et al.* (2024), and Otranto and Wall (2024). This study focused on determining the prevalence, identifying parasite eggs and analyzing the risk factors for gastrointestinal nematode infection in Zebra Doves sold in Denpasar City. Therefore, fecal examinations were conducted qualitatively without a quantitative calculation of infection intensity.

Data Analysis

The data obtained from the sample examination were analyzed descriptively. The prevalence of gastrointestinal nematode infection was calculated using the formula described by Thrusfield (2018). Inferential statistical analysis was also performed using the SPSS version 26.0 program with the Chi-square (X^2) test to determine the relationship between risk factors and the occurrence of gastrointestinal nematode infection in Zebra Doves, as well as the Mantel-Haenszel common odds ratio (OR) estimate calculation to determine the likelihood of infection in groups exposed to risk factors compared to groups not exposed (Priatna *et al.*, 2025).

RESULTS AND DISCUSSION

Results

Based on the examination of 61 samples of Zebra Doves feces consisting of 23 individual samples and 38 pooled samples from Bird shops and markets in Denpasar City, 14 samples were found to be positive for gastrointestinal nematode infection out of a total of 61 samples examined. Of the total number of positive samples, six positive samples came from individual samples, and eight positive samples came from pooled samples. These results indicate that the prevalence of gastrointestinal nematode infection in Zebra Doves is 22.95% (14/61). In addition, three types of worms were identified as infecting the digestive tract of the Zebra Doves, namely *Heterakis* spp., *Ascaridia* spp., and *Trichostrongylus* spp., (Figure 1). The prevalence of *Heterakis* spp., in Zebra Doves was 16.39% (10/61), *Ascaridia* spp., 8.20% (5/61) and *Trichostrongylus* spp., 6.56% (4/61) (Figure 2).

Based on the results of microscopic examination of Zebra Doves feces, morphometric measurements of the identified gastrointestinal nematode eggs were performed. The parameters measured included the length and width of the eggs for each nematode genus/class. The results of the morphometric measurements of nematode eggs are presented in Table 1.

Based on the examination results, single and mixed infections were observed. Single infections were dominated by *Heterakis* spp., with a prevalence of 9.83%, whereas mixed infections were dominated by a combination of *Heterakis* spp., and *Ascaridia* spp., with a prevalence of 6.56%. The pattern of gastrointestinal nematode infections in Zebra Doves traded in Denpasar City is presented in Table 2.

The results of the analysis using the Chi-square test (Table 3) showed that there was one variable that was significantly associated with the occurrence of gastrointestinal nematode infections in the Zebra Doves traded in Denpasar City, namely, the type of feed given. The feed type variable showed a

p-value of 0.043, with an Odds Ratio (OR) of 3.488. This indicates that Zebra Doves fed commercial feed had a 3.488-times higher risk of gastrointestinal nematode infection than birds fed natural feed. Meanwhile, the housing system, age, deworming, drinking water cleaning intensity and source of acquisition of the birds did not show a significant relationship ($p > 0.05$) with the incidence of gastrointestinal nematode infections.

Discussion

Three genera of gastrointestinal nematodes were identified in Zebra Doves sold in Denpasar City: *Heterakis* spp., *Ascaridia* spp., and *Trichostrongylus* spp. Morphometric measurements of *Heterakis* spp., eggs showed an mean size of $62.68 \times 41.44 \mu\text{m}$, with a range of $38.54\text{--}73.04 \times 21.61\text{--}50.41 \mu\text{m}$, consistent with the size range reported by Thienpont *et al.* (2003) and Otranto and Wall (2024). The morphological characteristics of the eggs, which are oval, thick shell and smaller than *Ascaridia* spp., eggs, support these identification results (Thienpont *et al.*, 2003).

The identified *Ascaridia* eggs had an mean size of $74.58 \times 44.85 \mu\text{m}$ with a range of $70.80\text{--}79.99 \times 41.39\text{--}52.68 \mu\text{m}$, consistent with the size range of *A. galli* and *A. columbae* reported by Thienpont *et al.* (2003) and Otranto and Wall (2024). The morphological characteristics of the eggs, which are elliptical in shape, thick-walled with three layers, larger than *Heterakis* eggs and contain unsegmented embryos, support the identification. Although these findings point more toward *A. galli*, definitive species identification still requires examination of adult worms and molecular analysis. *Trichostrongylus* spp., eggs had a mean size of $53.49 \times 30.90 \mu\text{m}$, with a range of $32.90\text{--}64.40 \times 17.19\text{--}38.09 \mu\text{m}$. Although smaller than the reference size, they were still close to the lower limit of the range reported in the literature (Otranto and Wall, 2024).

Table 1. Results of measuring nematode eggs infecting Zebra Dove in Denpasar City, Bali, Indonesia using ImageJ

Types of Worms	n	Average		Range	
		Length (µm)	Width (µm)	Length (µm)	Width (µm)
<i>Heterakis</i> spp.	9	62,68	41,44	38,54-73,04	21,61-50,42
<i>Ascaridia</i> spp.	6	74,58	44,85	70,80-79,99	41,39-52,68
<i>Trichostrongylus</i> spp.	4	53,49	30,90	32,90-64,40	17,19-38,09

Note: n= eggs sample

Table 2. Diversity of gastrointestinal nematode infections in Zebra Dove traded in Denpasar City, Bali, Indonesia (n=61).

Types of Worms	Positive sample	Prevalence (%)
<i>Heterakis</i> spp.	6	9,83
<i>Trichostrongylus</i> spp.	3	4,91
<i>Heterakis</i> spp. + <i>Ascaridia</i> spp.	4	6,56
<i>Ascaridia</i> spp. + <i>Trichostrongylus</i> spp.	1	1,64

Table 3. Risk factors for gastrointestinal nematode infection in Zebra Dove traded in Denpasar City, Bali, Indonesia

Risk Factor	Factor Category	Sample (n)	Positive (+)	Prevalence (%)	p-value	Odds Ratio	CI 95% Odds Ratio
Housing System	Group	38	8	21,05	0,650	0,756	0,224-2,545
	Individual	23	6	26,09			
Bird Age	<6 months	20	4	20,00	0,702	1,290	0,349-4,768
	≥6 months	41	10	24,39			
Anthelmintic Treatment	No treatment	35	7	20,00	0,525	0,679	0,205-2,250
	Administrated	26	7	26,92			
Type of Feed	Natural	36	5	13,89	0,043*	3,488	1,00-12,156
	Commercial	25	9	36,00			
Drinking Water	Daily	38	11	28,95	0,152	0,368	0,091-1,495
Container Cleaning Frequency	Every 2 days or more	23	3	13,04			
Origin of the Zebra Dove	Wild-caught	31	6	19,35	0,330	0,429	0,045-4,037
	Breeder	9	1	11,11		1,071	0,289-3,973
	Commercial	21	7	33,33		2,500	0,248-25,15

Note: *) indicates significance (p<0.05); CI: Confidence Interval.

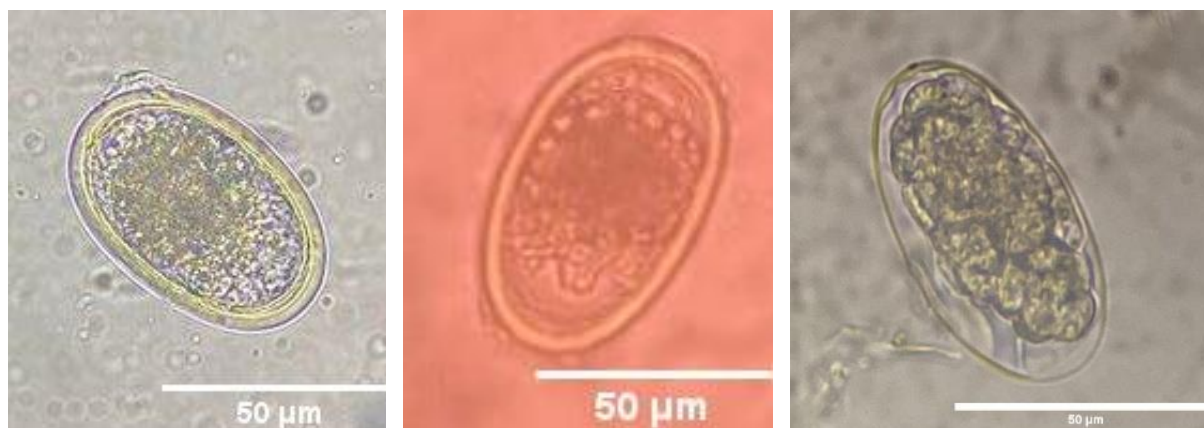


Figure 1. Identification results of gastrointestinal nematode eggs, namely (left) *Heterakis* spp. (62 × 40 µm), (centre) *Ascaridia* spp. (71 × 45 µm), and (right) *Trichostrongylus* spp. (65 × 35 µm).

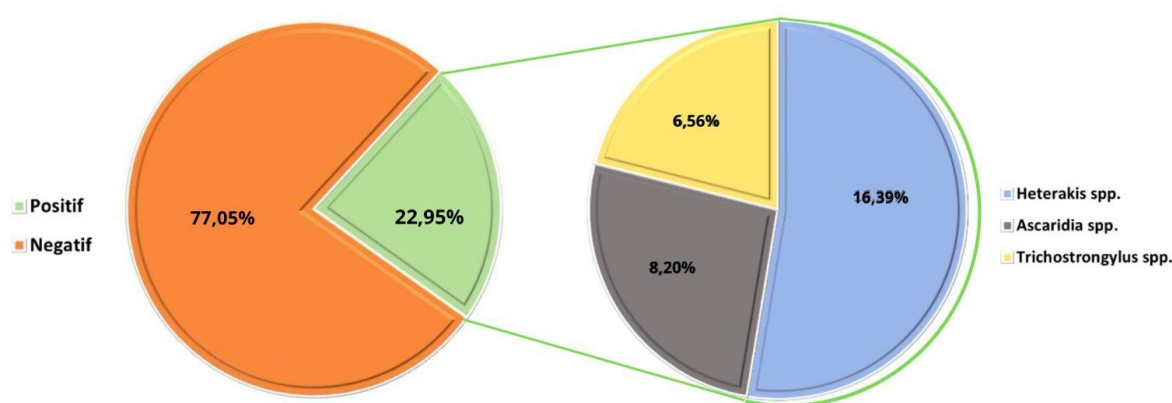


Figure 2. Circle diagram showing the prevalence of positive and negative samples of gastrointestinal nematodes in Zebra Doves traded in Denpasar City, Bali, Indonesia.

The morphological characteristics of the eggs, which are elliptical, thin-walled, and contain blastomeres, support these identification results (Thienpont *et al.*, 2003). These findings suggest a resemblance to with *Trichostrongylus tenuis*, which is known to infect the Zebra Doves, but definitive species identification still requires examination of adult worms and molecular testing. The presence of three types of gastrointestinal nematodes (*Heterakis* spp., *Ascaridia* spp., and *Trichostrongylus* spp.) in Zebra Doves in Denpasar City indicates exposure to infection; therefore, prevalence analysis is needed to assess the level of infection.

In this study, the prevalence of gastrointestinal nematode infection in Zebra Doves sold in Denpasar City was 22.95%. This prevalence is lower than that reported

by Suyapoh *et al.* (2022) in Thailand (36.96 %). However, this study had a higher prevalence than the study conducted by Kaeksi and Widiyono (2025) in the Yogya-karta Province, which reported a prevalence of 8.82%. The prevalence of nematodes in Zebra Doves in Denpasar City was categorized as moderate (22.95%) and was associated with husbandry patterns and environmental factors. The cage-based husbandry system with open feed that is rarely replaced has the potential to increase contamination with the infectious stage of nematodes through bird feeding activity (Suyapoh *et al.*, 2022). Additionally, the tropical climate of Denpasar, characterized by high temperatures and humidity, supports nematode egg viability, thereby increasing the likelihood of infection and reinfection (Winarso *et al.*,

2016).

Gastrointestinal nematode infections in Zebra Doves in this study were predominantly caused by *Heterakis* spp., with the highest prevalence of 16.40%. This dominance is related to the direct life cycle, transmission through embryonated eggs or paratenic hosts such as earthworms, and the high environmental resistance of the eggs (Cupo and Beckstead, 2019; Amer *et al.*, 2024; Vijayalingam *et al.*, 2020). This finding is consistent with that of Suyapoh *et al.* (2022), who reported that *H. gallinarum* has a low prevalence in Zebra Doves. The prevalence of *Ascaridia* spp. in this study was 8.20%, which is associated with their direct life cycle and fecal-oral transmission, as well as exposure to infectious eggs in a humid environment that allows for reinfection (Ritu *et al.*, 2024). This finding is consistent with that of Kaeksi and Widiyono (2025), who reported a prevalence of *Ascaridia* sp., of 8.82% in Zebra Doves.

Trichostrongylus spp., had a prevalence of 6.56%, indicating that it was not the dominant infection. This low prevalence may be attributed to the free-living larval stage in the environment, which is sensitive to temperature and humidity, resulting in a lower transmission rate than that of *Heterakis* and *Ascaridia* (Gyeltshen *et al.*, 2022; Suyapoh *et al.*, 2022). This finding is consistent with the report by Suyapoh *et al.* (2022), who stated that *T. tenuis* has a lower prevalence (2.17 %) than *A. galli* and *H. gallinarum*.

Based on the examination results, a single gastrointestinal nematode infection were observed involving *Heterakis* spp., and *Trichostrongylus* spp., *Heterakis* spp. Showed a higher prevalence at 9.83% (6/61), whereas *Trichostrongylus* spp., had a prevalence of 4.91% (3/61). The higher prevalence of *Heterakis* spp., may be attributed to differences in adaptability, infectivity and egg resistance. Thick-walled *Heterakis* eggs are more resistant and can survive longer under environmental conditions, increasing the likelihood of infecting a single host (Otranto and Wall, 2024)..

In addition to single infections, mixed gastrointestinal nematode infections were

identified, including co-infections of *Heterakis* spp., and *Ascaridia* spp., (6.56%, 4/61) and *Ascaridia* spp., and *Trichostrongylus* spp., (1.64%, 1/61). These mixed infections may occur due to exposure to various sources of contamination of nematode eggs or larvae in the same environment, as well as interactions between parasites and modulation of the host's immune response, which allows co-infection to occur (Bordes and Morand, 2011; Viney and Graham, 2013). These findings are consistent with those of Salem *et al.* (2022), who found mixed infections of *Heterakis* spp., and *Ascaridia* spp., in pigeons. Single infections usually have mild effects, such as digestive disorders and mild growth retardation, because only one parasite affects the host. On the other hand, mixed infections can have more severe effects, including significant physical deterioration, severe digestive disorders, and an increased risk of secondary infections due to the interaction of several parasite species simultaneously (Bordes and Morand, 2011). The type of feed showed a significant relationship ($p < 0.05$) with the incidence of gastrointestinal nematode infection in Zebra Doves in Denpasar City, where birds fed commercial feed had a 3.488 times higher risk of infection than birds fed natural feed. Commercial feed consists of manufactured pellets that are typically placed on the cage floor and may become contaminated with nematode eggs from feces and mechanical vectors, especially under damp cage conditions. The dense texture of commercial feed readily absorbs moisture, thereby supporting the attachment and survival of nematode eggs, whereas natural feed in the form of grains is relatively drier and therefore has a lower risk of contamination. These findings are consistent with those of Cantin-Rosas *et al.* (2025) and Suyapoh *et al.* (2022), who reported that feed can act as a medium for the fecal-oral transmission of gastrointestinal nematodes.

The results of the statistical analysis showed that the maintenance system, age of the birds, administration of anthelmintic treatment, frequency of drinking area cleaning, and source of bird acquisition were not

significantly associated ($p > 0.05$) with the prevalence of gastrointestinal nematode infection in Zebra Doves. The lack of significant association between the maintenance system and source of acquisition is thought to be because nematode transmission is more influenced by exposure to the same environment and feed after the birds are kept or traded, considering that nematode eggs are highly resistant and are transmitted via the fecal-oral route (Suyapoh *et al.*, 2022).

Age was also not a significant factor, possibly because both young and adult birds were kept in the same environment, resulting in relatively uniform exposure levels.. These findings are consistent with those of Kaeksi and Widiyono (2025) and Hanny *et al.* (2023), who stated that age is not a dominant risk factor for nematode infection in birds. The administration of deworming treatment was not significantly associated with infection. This may be attributed to the limited accuracy of treatment history data obtained through interviews and the failure to account for the frequency and schedule of medication administration, which may have introduced reporting bias (Shuford, *et al.*, 2016). The frequency of drinking water cleaning also did not show a significant associated with infection. This may be because nematode eggs are resistant to wet conditions and are difficult to inactivate through routine cleaning alone, thereby requiring more effective disinfection procedures (Maya *et al.*, 2012; Hansson *et al.*, 2025).

CONCLUSION

Gastrointestinal nematode infections in Zebra Doves sold in Denpasar were significantly prevalent and should be take into consideration. Feed type is a significant risk factor, indicating that feeding practices can modify the risk of gastrointestinal nematode infection.

SUGGESTION

Further molecular studies are recommended to confirm the identification of

intestinal worm species, particularly *Ascari- dia*, due to morphological similarities that can affect accurate diagnosis. Bird traders need to be provided with adequate information on intestinal worm infection control and better animal management practices. Zebra Doves traders are advised to reduce the incidence of infection by ensuring feed hygiene, as feed can be a source of contamination with nematode eggs and larvae and by implementing regular deworming.

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