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Prevalence of Endoparasite Infestation of Edible-Nest Swiftlet (*Aerodramus fuciphagus*) in Swiftlet Houses in Central Java, Indonesia

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ABSTRAK

Penelitian ini bertujuan untuk menentukan prevalensi infestasi endoparasit pada burung walet (*Aerodramus fuciphagus*) di Provinsi Jawa Tengah, Indonesia. Sebanyak 76 sampel feses segar burung walet (*A. fuciphagus*) dikoleksi dari beberapa rumah burung walet di Jawa Tengah. Metode deteksi endoparasit dalam penelitian ini menggunakan kombinasi metode natif, metode sedimentasi, dan metode apung. Berdasarkan hasil penelitian ini, prevalensi infestasi endoparasit pada burung walet (*A. fuciphagus*) di Jawa Tengah adalah 28%. Endoparasit yang ditemukan dalam penelitian ini antara lain *Tetrameres* spp. (7%), *Notocotylus* sp. (11%), dan *Raillietina* sp. (11%). Penelitian ini berhasil memberikan data kejadian infestasi endoparasit di burung walet (*A. fuciphagus*).

Kata Kunci: Kesehatan Masyarakat Veteriner, Nutrisi, Infeksi

ABSTRACT

This report represents the prevalence of endoparasite infestation in swiftlets (*Aerodramus fuciphagus*) in swiftlet houses in Central Java Province, Indonesia. A total of 76 samples of faeces of edible-nest swiftlet (*A. fuciphagus*) were collected from several swiftlet houses in Central Java. The endoparasite detection method in this study used a combination of the native method, the sedimentation method, and the floating method. Based on the results of this study, endoparasite infestation in edible-nest swiftlet (*A. fuciphagus*) in Central Java was 28%. Endoparasites found included *Tetrameres* spp. (7%), *Notocotylus* sp. (11%), and *Raillietina* sp. (11%). This study provides data on the incidence of endoparasite infestation in edible-nest swiftlet (*A. fuciphagus*).

Keyword: Veterinary Public Health, *Tetrameres*, *Notocotylus, Raillietina*

INTRODUCTION

The edible-nest swiftlet (*Aerodramus fuciphagus*) displays a rump that is either the same color as or slightly lighter than its dull, blackish-brown back and consistently lacks dark streaks on the shaft. This species of swiftlet is predominantly located in Java, Indonesia, where it forms natural nesting colonies in both inland caves and sea caves along coastal cliffs. It is also found in other regions such as Bali, Nusa Tenggara Barat, and Tanahjampea in South Sulawesi, as well as Nusa Tenggara Timur, Sumba, Sawu, Timur, and Flores, as described in a previous study (Cranbook et al., 2015). *A. fuciphagus* is now widely distributed across Southeast Asia, including Central Java Province, Indonesia. These swiftlets are known for their unique nests made from solidified saliva(Jessel et al., 2019), which are highly valued in the bird's nest industry for their culinary (Jamalluddin et al., 2019) and medicinal uses (Ningrum, 2023). Edible bird's nests are considered a delicacy in various Asian cultures (El Sheikha, 2021) and have significant economic importance (Adenan et al., 2020). Despite their economic importance, the swiftlets are susceptible to various health issues, including endoparasite infestation.

Limited research has focused on the prevalence of endoparasites in edible-nest swiftlets. Despite the economic importance of these swiftlets and their nests in the bird's nest industry, research efforts in this area have been limited. Endoparasites refer to internal parasites that inhabit the organs or tissues of their host organisms (Veronesi et al., 2023). In the case of edible-nest swiftlets, these endoparasites can potentially pose significant health risks and negatively impact the overall well-being of the bird population (Lymbery & Smit, 2023). They can impair the swiftlets' reproductive success (Sokół & Pluta, 2021), compromise their immune system (Fischer et al., 2023), and diminish their overall fitness. Understanding the prevalence of endoparasite infestation is crucial for effective conservation and management strategies. However, due to the unique nesting behaviours of swiftlets and the difficulty in obtaining samples, research on the prevalence and diversity of endoparasites in this species has been relatively scarce. By conducting this study on the prevalence of endoparasite infestation in edible-nest swiftlets in Central Java Province, Indonesia, valuable data can be generated to fill this knowledge gap. The findings of this research will provide insights into the incidence and distribution of endoparasites in the studied population, contributing to our understanding of the health status and potential threats faced by edible-nest swiftlets.

Moreover, the data obtained from this study can serve as a foundation for future research efforts aiming to explore the impacts of endoparasite infestation on swiftlet populations and develop effective control measures to mitigate potential risks. Overall, addressing the limited research on endoparasites in edible-nest swiftlets is vital for their conservation and the sustainable management of their populations. Understanding the prevalence of endoparasites in edible-nest swiftlets is crucial for effective management and conservation efforts. Endoparasite infestation is a significant concern in wildlife populations as it can negatively impact their health and survival. This study aimed to determine the prevalence of endoparasite infestation in edible-nest swiftlets (*A. fuciphagus*) in the Central Java Province of Indonesia.

MATERIALS AND METHODS

Sample collection

A total of 76 samples of fresh feces were collected during February 2023 from several swiftlet houses in Central Java (Figure 1) to assess the prevalence of endoparasite infestation. The samples were carefully obtained from the nests and preserved in 5% formaldehyde to ensure the integrity of any potential endoparasites. Individual samples were labelled and in a hand refrigerator and transported to the Parasitology Laboratory, Faculty of Veterinary Medicine, Universitas Wijaya Kusuma Surabaya.

Parasitological techniques

The study performed three methods involving the native method, centrifugation-sedimentation method, and centrifugation-flotation method to detect gastrointestinal endoparasites. The native method was performed by mixing the faeces with aquadest and homogenized. The sedimentation method was performed by a saturated solution of NaCl and centrifuged at 500 g for 1 min until the supernatant turned clear. The supernatant for the first tube was discarded, and the resultant fecal sediment was used for slide preparation and microscopic examination. The second tube was used for the flotation method. A saturated aqueous solution of zinc sulphate of the gravity of 1500 rpm for 10 min at 20°C was used. A 22 x 22 mm cover slip was placed on top of the meniscus. After 5 min, the coverslip was carefully removed by rapid inversion and placed on a slide containing a drop of Lugol's solution. The material obtained was examined under an optical microscope. Slides were

Figure 1 Swiftlet houses in Central Java, Indonesia

examined at the magnification of 40x, and parasite identification at the class or genus level was performed according to the morphology of characterized eggs (Thienpont et al., 2003)

Data analysis

The data obtained were then analyzed descriptively and the prevalence rates were calculated by the following formula (Fauzi et al., 2021):

$$Prevalence\ (\%) = \frac{Number\ of\ positive\ sampels}{Total\ sampels} \text{x } 100$$

RESULTS

The analysis of the 76 fecal samples revealed an overall endoparasite infestation rate of 28% (21/76) in edible-nest swiftlets (*A. fuciphagus*) obtained from swiftlet houses in Central Java Province, are shown in Table 1, according to the diagnostic method used. The study identified several endoparasite eggs from the genus of *Tetrameres* (7%), *Notocotylus* (11%), and *Raillietina* (11%) (Figure 2).

DISCUSSION

The prevalence and diversity of endoparasites detected in this study highlight the potential health risks faced by edible-nest swiftlets in Central Java. Endoparasite infestation can have detrimental effects on bird populations, such as reduced reproductive success, compromised immune function, and overall fitness decline (Poulin & de Angeli Dutra, 2021). Understanding the prevalence and types of endoparasites in swiftlets contributes to our knowledge of their ecological health and can aid in the development of appropriate management strategies. In this study, we successfully identified three endoparasites from different genera, namely *Raillietina* (Cestoda), *Notocotylus* (Trematoda), and *Tetrameres* (Nematoda). The majority of *Raillietina* spp. infect avian definitive hosts (Chaudhury, 2022), with their primary habitat being chicken farms (Jha, 2019). In addition to being found in chickens, some *Raillietina* species have also been found in wild Pangolin (Tuli et al., 2022), rodents (Sapp & Bradbury, 2020), and humans (Chaudhury, 2022). However, *Raillietina* has never been reported in swiftlets. Meanwhile, the genus *Notocotylus* was reported to inhabit the ceca and colon of chickens, rodents, shorebirds, and aquatic birds (Capasso et al., 2020), while there are no reports of *Notocotylus* in edible-nest swiftlets. Last, *Tetrameres* spp. are diminutive parasitic nematodes that have been reported to infest the proventriculus of various avian species, including chickens, turkeys, pigeons (Aziz, 2023), guinea fowls, ducks, pheasants, and quails but never reported in edible-nest swiftlets. *Tetrameres* spp. is considered an important endoparasitic in birds since this species causes tetrameriasis (Obalisa et al., 2015), and primarily

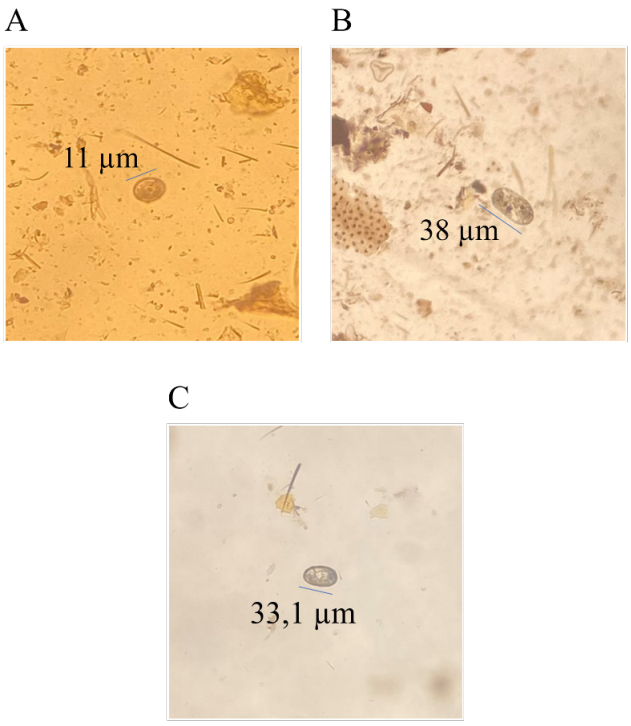

Figure 2. The prevalence of endoparasites in edible-nest swiftlets in %.

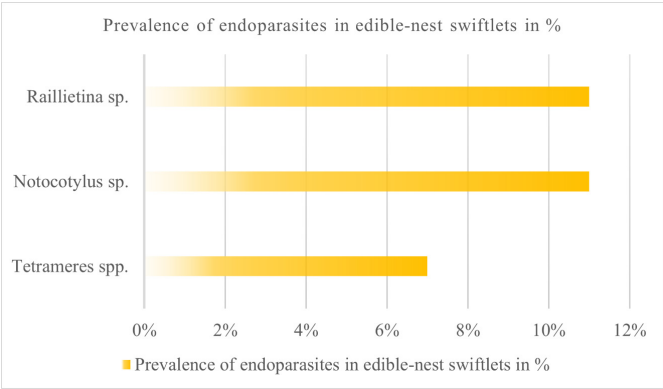

Figure 3 Endoparasite eggs based on fecal examinations. A) *Notocotylus* sp., B) *Tetrameres* spp., C) *Raillietina* sp., measurement using imageJ software.

causes outbreaks in chicken farms (Bolfa et al., 2019).

The infection of *Raillietina*, *Notocotylus*, and *Tetrameres* in swiftlets is likely caused by these swiftlets flying to search for food (Yaacob et al., 2021) in chicken farm areas, where flies and other insects, which are their food sources, are commonly found. Overall, the infection of the endoparasites *Raillietina*, *Notocotylus*, and *Tetrameres* can reduce the performance of swiftlets and may even lead to death, ultimately affecting the swiftlet population. These endoparasites are notably harmful and can lead to the development of disease in cases of severe infestation (Kalu et al., 2022). In instances of severe infestation, there can be consequences such as slowed growth, reduced egg production, and subsequent losses in meat and egg yields (Panich et al., 2022). In cases of chronic infestation, symptoms may include diarrhea, emaciation, and anemia, which is characterized by haemorrhage in the intestines (Kumar & Sarkhel, 2021). We suggest the most efficient method for controlling this issue involves disturbing the environment of intermediate hosts in close proximity to poultry farms.

This study also have limitations involved geographic limitation, a limited sample size, temporal limitation and environmental factors. The study was conducted only in Central Java, Indonesia. The results may not be generalizable to other regions where the environmental conditions and intermediate hosts may differ. Since the study might have a limited sample size, which can affect the reliability and generalizability of the findings. A larger sample size would provide more robust data. In addition, the present study might have been conducted over a short period, which may not account for seasonal variations in endoparasite prevalence and diversity. Longitudinal studies could provide a more comprehensive understanding. Last, this study suggests a link between chicken farms and the presence of parasites in swiftlets, but it does not thoroughly investigate other environmental factors that might contribute to endoparasite prevalence, such as climate, vegetation, or urbanization. By addressing these limitations in future research, a more comprehensive understanding of endoparasite infestation in edible-nest swiftlets can be achieved, leading to better management and conservation strategies.

This study provides valuable insights into the prevalence of endoparasite infestation in edible-nest swiftlets (*A. fuciphagus*) in Central Java Province, Indonesia. The identified endoparasite genus, including *Tetrameres* (7%), *Notocotylus* (11%), and *Raillietina* (11%), contribute to our understanding of the specific endoparasites affecting the swiftlet population. Further research on the impact of these endoparasites and the development of effective control measures are warranted to mitigate potential threats to swiftlet populations in Central Java and beyond.

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CONFLICT OF INTEREST

The authors state that they have no known conflicting financial interests or personal ties that may be seen as having influenced the work described in this study.

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