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Learning Bats Handling For Oral Swab Sampling

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Abstract:
Background. The only flying mammals, bats, play an essential role in their natural habitat. Based on the type of food, bats can be divided into two groups: fruit-eating bats and insect-eating bats. Bats rank second-highest in species diversity, with 1,439 worldwide and 239 in Indonesia. Known as reservoirs of viruses, including coronaviruses.
Aims. Bats are suspected to be related to COVID-19. Under the Research Innovation and Collaboration Program - Higher Education for Technology and Innovation Project (HETI) University of Lampung 2024-2025, and in collaboration with the Lampung Disease Investigation Centre, learning the procedures for handling bats properly so as not to physically harm bats in oral swab sampling and species recognition in Braja Harjosari, directly next to Way Kambas National Park was done.
Methods. The life-trapping technique uses a mist net. Bat handling for taking oral swab was carried out using the pinch grip method, which is holding both arms of the bat backwards utilizing the thumb and middle finger with the bat positioned facing upwards.
Conclusion. The bat's mouth is then blown open and a cotton swab is gently inserted into the bat's mouth. Afterwards, the bat is rested, given water drops, and released into nature. Oral swab samples from 10 individual bats: frugivorous bats, Cynopterus brachyotis (n = 8), Cynopterus horsfieldii (n = 1), and insectivorous bat, *Scotophilus kuhlii* (n = 1).

Keywords: Bats handling, Braja Harjosari, mist net, oral swab, coronaviruses

INTRODUCTION

Bats are the only mammals that can fly and are an essential component of biodiversity. Ecologically, bats play a vital role in pollination, seed dispersal, and pest control in their natural habitats (Santoso *et al.,* 2020). Based on the type of food, bats can be divided into two groups: frugivorous bats and insectivorous bats. Fruit-eating bats are generally herbivores that eat fruit, nectar, and pollen with a relatively large body size and body weight between 10 and 1500 grams (Nowak, 1994). Insectivorous bats are generally small and insectivorous. Insectivorous bats have a better echolocation system than frugivorous bats. Echolocation is the special ability of bats to capture reflected vibrations that come from the ultrasonic sounds they make to identify nearby objects. Most bats use short waves of constant frequency for echolocation signals. Although each sound frequency emitted by bats lasts only a very short time, the frequency is constant between 25 KHz and 150 KHz (Komarudin *et al*., 2018).

The habitat of fruit-eating bats is usually in large trees to hang, while insect-eating bats prefer places with small holes, tree trunks, bamboo gaps, dead trees, and house ceilings as their sleeping places (Prasetyo *et al.,* 2011). Bats rank second in species diversity after Rodentia, with 1,439 species worldwide and 239 in Indonesia, including 81 species of the frugivorous suborder and 158 of the insectivorous suborder (Maryanto *et al*., 2019).

Bats have a wide distribution to settlements supported by their flying ability. The adaptability of bats to residential environments such as houses, barns, agricultural fields, and gardens is very high, making these environments suitable for breeding (Platto *et al*., 2021). Bats are potential zoonotic pathogens and sylvatic disease reservoirs, including coronaviruses, which also cause Covid-19. Zoonoses are often caused by viruses that have long adapted to their natural hosts. Activities that bring wildlife and humans into contact with each other, such as trade, contribute to the spread of the virus. Wildlife trade is a key factor in the increase of viral infectious diseases (Piret & Boivin, 2021). The wildlife trade is one of the gateways for the spread of zoonotic viruses that have the potential to be transmitted. Thus, the interaction between human activities and bats is unavoidable and can trigger ecological infections.

Braja Harjosari is one of the settlements, buffer villages directly adjacent to Way Kambas National Park (WKNP). Given the village's landscape, the potential diversity of bats there will be even higher. In this study, preliminary surveys (life trapping), capture with mist nets, identification, and oral swab sampling were conducted. In taking oral swab samples, good and correct bat handling procedures are required to facilitate the sampling process. In addition, good handling of bats in sampling is important because it must still refer to and prioritize animal welfare principles where animals do not experience pain, fear, meet food and drink needs, and continue to behave normally after handling (Susanti & Widarto, 2020).

METHODS

This research was conducted in Braja Harjosari, Braja Selebah, East Lampung, under the Research Innovation and Collaboration Program of the Higher Education for Technology and Innovation (HETI) Project at the University of Lampung, in collaboration with the Lampung Disease Investigation Centre. Mist net, calico bag, caliper, pesola, and identification book were applied for life trapping. Masks, rubber gloves, cotton swabs, alcohol, cotton, and water were for oral swab sampling.

This research was conducted using a direct observation method through two stages. A preliminary survey was conducted to determine the natural habitat of bats (Figure 1). Site selection was based on the potential presence of bats, shade vegetation, and food and water availability, as well as secondary signs such as droppings, food scraps, and bat feces.

Figure 1. Site survey at Braja Harjosari, East Lampung

Data collection was done by life trapping, with mist nets stretched across the two poles installed in late afternoon (17.00) and checked every 15 minutes. The mist net was installed in the

gap between two trees (Figure 2), where bats might pass during foraging. If a bat was found to be trapped, it was immediately released from the net. Bats caught in the mist net need to be handled carefully and immediately placed into calico bags, with each bag containing one bat. Captured bats were identified using the book Field Guide to Bats in Indonesia by Suyanto (2001). Following species identification, oral swab samples were collected using proper handling procedures.

Figure 2. Mist net setting at Braja Harjosari, East Lampung

DISCUSSION

The life trapping of bats using mist nets was installed in 2 locations, in the settlement area and on the border of rubber plantations with settlements, and obtained 10 individuals consisting of 3 bat species: *Cynopterus brachyotis* (n = 8), *Cynopterus horsfieldii* (n = 1), and *Scotophillus kuhlii* (n = 1) (Table 1).

Table 1. Types of bats in Braja harjosari

No.	**Family**	**Species**		**(n)**
		Local Name	**Scientific Name**	
.1.	Pteropodidae	Codot Krawar	*Cynopterus brachyotis*	8
2.	Pteropodidae	Codot Horsfield	*Cynopterus horsfieldii*	1

3.	Vespertilionidae	-	*Scotophilus kuhlii*	1
Total				**10**

Handling procedures involve physically blocking and reducing bats' movement. Field techniques for interacting with mammals for good, safe, and correct handling need to be applied. Good safety standards apply to mammals and individuals with animal welfare as a priority (Chapman, 2018). This category of obstructing and reducing the physical actions of mammals uses manual techniques, such as touching, grasping, or hand manipulation, to manage each animal. Animal welfare principles must remain a reference in every mammal handling procedure (Susanti & Widarto, 2020). The stages of handling bats for oral swab sampling include preparation, implementation, and post-implementation.

Individual bats that have been identified are then briefly rested, either by holding them or putting them in a calico bag. After that, the bats were slowly removed from the calico bag (Figure 3).

Figure 3. Bat removed from calico bag

The bat-handling technique is performed using two methods: the pinch grip and the palm grip (Prastianingrum, 2008). In this study, the pinch grip method was used (Figure 4), which is holding both arms of the bat towards the back using the thumb and middle finger with the bat positioned facing up so that the face is visible, which makes it easier when taking oral swab samples (Figure 5).

Figure 4. Pinch Grip Method, Rear View

Figure 5. Pinch Grip Method, Front View

Then the bat's mouth was gently blown open, and a cotton swab was inserted approximately 2 cm deep into the bat's mouth by gently swabbing along the bat's mouth (Figure 6). After that, it was inserted into the VTM tube, the cotton swab was cut, and the VTM tube was closed again.

Figure 6. Oral Swab Sampling

After obtaining the bat's oral swab sample, the bat was rested for a few minutes and given drops of water carefully to keep the bat from experiencing post-handling stress. The bats were then released back to their natural habitat.

CONCLUSIONS

Oral swab from 10 individual bats, Cynopterus brachyotis (n = 8), Cynopterus horsfieldii (n = 1), and Scotophilus kuhlii (n = 1), was successfully done by the grip method.

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