**BEHAVIOR OF LUTUNG BUDENG (*Trachypithecus auratus*) IN ADINUSO FOREST
BATANG DISTRICT CENTRAL JAVA****PERILAKU LUTUNG BUDENG (*Trachypithecus auratus*) DI HUTAN ADINUSO
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ABSTRACT

Lutung Budeng (Trachypithecus auratus) is an endemic primate of Indonesia, especially Java, Bali, and Lombok, which is vulnerable. This study aimed to determine the behavior of Lutung Budeng in the Adinuso Subah forest, Batang Regency. The study was conducted from January to December 2019. Lutung Budeng behavior is observed directly in the field using the roaming or exploration method. The equipment used were the digital single-lens reflex camera of the Canon EOS 650 D, telephoto tamron 70-300 mm, tripod, Sony handycam HRD- PJ410, compass, and Nikon Binocular A211 16x50 mm. The recorded vocal of Lutung Budeng was analyzed using Audacity. The data observed were the behavior of moving places, feeding, grooming, resting, playing, and vocalization. The data obtained were analyzed by means of descriptive qualitative. The results showed that in the Adinuso forest, the feeding behavior of Lutung Budeng did not interact with visitors or humans to get feed. Lutung Budeng more often feeds young leaves. It can be concluded that the behavior of Lutung Budeng in Adinuso Subah forest, Batang Regency is relatively the same as the behavior of Lutung Budeng in general. The behavior of Lutung Budeng in the Adinuso forest includes moving places, feeding, resting, grooming, vocalization, and playing.

Keywords: Adinuso forest, behavior, Lutung Budeng

ABSTRAK

Lutung Budeng (Trachypithecus auratus) merupakan primata endemik Indonesia khususnya Jawa, Bali, dan Lombok yang rentan akan kepunahan. Penelitian ini bertujuan untuk mengetahui perilaku Lutung Budeng yang ada di hutan Adinuso Subah Kabupaten Batang. Penelitian dilakukan pada bulan Januari sampai dengan Desember 2019. Perilaku Lutung Budeng diamati secara langsung di lapangan dengan menggunakan metode jelajah atau eksplorasi. Alat yang digunakan yaitu kamera digital single lens reflex EOS Canon 650 D, lensa tele tamron 70-300 mm, tripod, Sony handycam HDR- PJ410 dan Binokular Nikon A211 16x50 mm. Suara Lutung Budeng yang terekam dianalisis menggunakan aplikasi Audacity. Data yang diamati yaitu perilaku berpindah tempat, makan, grooming, istirahat, bermain, dan bersuara. Data yang diperoleh dianalisis dengan cara deskriptif kualitatif. Hasil penelitian menunjukkan bahwa di hutan Adinuso perilaku makan Lutung Budeng tidak berinteraksi dengan pengunjung atau manusia untuk mendapatkan makanan, Lutung Budeng lebih sering terlihat memakan dedaunan yang masih muda. Dari hasil penelitian dapat disimpulkan bahwa perilaku Lutung Budeng di hutan Adinuso Subah Kabupaten Batang relatif sama dengan perilaku Lutung Budeng pada umumnya. Perilaku Lutung Budeng di hutan Adinuso meliputi perilaku berpindah tempat, makan, istirahat, grooming, bersuara, dan bermain.

Kata kunci: hutan Adinuso, Lutung Budeng, perilaku

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Biology* 9 (2): 162-169**INTRODUCTION**

Indonesia is called as a mega biodiversity country for its abundant biodiversity. A lot of diversity of genes to species found in Indonesia. One of the Diversity at the species was found in the primate group that lives in Indonesia. There are approximately 40 species, and 24 of them are endemic to Indonesia [1,2]. The International Union for conservation of nature and natural resources (IUCN) [3] and PROFAUNA [4] noted

that there are only 80% of the primate groups found in Indonesia, and it makes the primate group must be preserved or conserved to prevent their extinction. According to PROFAUNA [4] and Alikodra [5], many primate extinctions are caused by habitat destruction and wildlife illegal hunting. The primates that are vulnerable and currently protected are the Lutung Budeng [3]. Lutung Budeng (*Trachypithecus auratus*) is protected by the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number

P.106/ MENLHK / SETJEN / KUM.1 / 12/ 2018 concerning Protected Types of Plants and Animals [6].

One of the habitats for Lutung Budeng in Central Java is the Adinuso Forest, which is located in Subah District, Batang Regency, Central Java. This forest is a heterogeneous forest under the management of KPH Kendal and BKPH Subah, Central Java Province, which has an area of approximately 25 hectares. This forest has long been the habitat for Lutung Budeng, an endemic species of Java, Bali, and Lombok, where its population decreases [7,8,9].

Due to increasingly degraded habitat conditions, it is very necessary to save Lutung Budeng. The successful efforts to the conservation management of Lutung Budeng are due to the community's role. This effort requires information related to Lutung Budeng's behavior. Some of the observed behaviors were moving, resting, feeding, grooming, vocalization, and playing. It is expected that from this information, the specific habitat conditions, types of feed, behavior that is easily disturbed or not can be identified specifically. All of that information can be used as a reference for related parties to preserve and save Lutung Budeng (*T. auratus*).

METHODS

Description of the research location. The research location was in the Adinuso forest, Subah, Batang Regency, Central Java Province. Geographically, Adinuso forest was located at the coordinates of 6° 56' 0" - 7° 0' 0" South Latitude and 109° 50' 0" - 109° 55' 0" East Longitude. The area to the north is bordered by Gondang village, to the south by the village of Kemejing, to the east by the village of Subah, and to the west by the village of Durenombo and the village of Sengon. Adinuso forest distance from Semarang was approximately 71 km to the east, with about 2 hours. Access to the Adinuso forest was very easy, which is close to the *Pantura* road. *Pantura* is an abbreviation of the north coast and as the National Route in Java.

Equipment. The types of equipment used were the digital single-lens reflex camera of the Canon EOS 650 D, telephoto tamron 70-300 mm, tripod, Sony handycam HDR-PJ410, compass, and Nikon Binocular A211 16x50 mm.

Time. The study was conducted from January to December 2019.

Research procedures. The data collection was taken by the roaming or exploration method. The data were collected by directly observing the behavior of Lutung Budeng from 05.00 WIB to 18.00 WIB [9,10]. Lutung Budeng behavior that were observed included moving, feeding,

grooming, resting, playing, and making vocals. The first step of the work procedure in this study was to ensure an area of Lutung Budeng's nesting or sleeping. They usually slept in the trees around their habitat at night. After that, the next day, at 05.00 WIB, an exploration of the location where Lutung Budeng was sleeping was carried out. Then the Lutung Budeng's behaviors were observed by following a group of Lutung Budeng, starting from the tree where the Lutung Budeng slept until they got the tree as their next bed in the afternoon. The data on Lutung Budeng's behavior was then recorded and analyzed descriptively qualitatively.

Vocal acoustic analysis. The vocal of Lutung Budeng was recorded, and the data obtained were analyzed using the Audacity application to determine the vocal frequency and duration of Lutung Budeng. The frequency was based on the number of vocals every 1 min, whereas the duration of the vocal was based on the duration of the vocal of Lutung Budeng [11].

RESULTS AND DISCUSSION

From the observations, Lutung Budeng carried out several behaviors in their daily life. The Lutung Budeng behavior captured during data collection was moving, feeding, resting, vocalization, grooming, and playing.

Behavior of moving places. Lutung Budeng moved places in three ways: walking or running, jumping, and climbing (Table 1). Lutung Budeng walked or ran by taking a position on a tree branch with all four legs, then jumping from branch to branch. When jumping, Lutung Budeng pressed against a tree branch with the hind legs. The tree branches were still the place for Lutung Budeng to jump up and down, so the branches turn up and down, then the two hind legs press the flexed branches so they can move to other places. Lutung Budeng can also climb up the tree from a height of 25 m to a height of 35 m by crawling upwards with all four legs. This was in line with the statement by [5] that the primates' movement is usually in the form of walking, running, jumping, and climbing. Furthermore, [12] also stated that there were four movements that Lutung Budeng make, the first quadrupedally, which was walking and running continuously, usually moving horizontally using all four legs, the second leaping was a very fast jumping movement with the two hind legs. The front legs were usually used for landing if the movement was carried out continuously (hopping), and the third was climbing. Lutung Budeng climbing movement used all four legs, where the two front legs were used for supporting the body to lift upwards, and the rear leg functions to push the body from below. The fourth was arm-swinging which was also called brachiation, which moved to

hang only on one tree trunk in the direction of movement to the left and right.

The most frequent Lutung Budeng's behavior of moving in the Adinuso forest was walking and running on a branch and jumping from one branch to another (Table 1 and Figure 1). This result was in line with the statement by [13] that Lutung Budeng most often performed quadrupedal movements, namely running and walking, using all four legs horizontally or vertically. This statement was also supported by [14], who stated that Lutung carry out the movement of jumping and swinging by using the forelegs and hind leg when moving on tree branches. The behavior of Lutung Budeng moving in the Buru Masigit Kareumbi Park area, West Java, moves from one place to another by hanging or walking [8]. The position of the Lutung Budeng when moving from place to place could be seen in Figure 1.

Resting behavior. The research found three ways of Lutung Budeng resting behavior: sitting,

stilling, and sleeping (Table 2). When they were not moving, Lutung Budeng took a position on a tree branch and usually in a tree that was considered comfortable and lush. During the break, Lutung Budeng was in a sitting position gathered on a tree branch while cleaning their bodies. Some did not gather with their group, and they were sitting down but closing their eyes, the second one was lying down and leaning against a lush tree trunk. When sleeping, Lutung Budeng hugs a twig with his foreleg and hind leg hanging down. According to the statement [12], leaf-feeding monkeys rest by hugging a branch with their arms and legs hanging down. Furthermore, [15] strengthens the statement that Lutung Budeng made more use of their rest time by choosing a comfortable place, a tree with a large trunk or branch. Rest was done by sleeping for a while during the day or just sitting quietly. The position of the Lutung Budeng at rest could be seen in Figure 2.

Table 1. Lutung Budeng's behavior of moving places

Moving places by	Description
Walking or running	The first moving behavior was by walking or running on tree branches with all four legs.
Jumping	The second moving behavior was jumping from a branch to a branch or from a tree of <i>Segawe</i> or Saga (<i>Adenathera pavonia</i>) to a tree of teak (<i>Tectona grandis</i>). This moving place was done by jumping first and then pressing the tree branch with both hind legs. Some of them jumped on the branches, then the hind legs press so that the Lutung Budeng moves from one tree to another.
Climbing	The third behavior of moving place was climbing up the tree to a higher stratum from a height of 25 m to a height of 35 m by crawling upwards with all four legs.

Table 2. Lutung Budeng's resting behavior

Resting behavior by	Description
Sitting	The first resting behavior was sitting on a tree branch, gathering, staying silent, sitting in groups on a tree branch, cleaning themselves together, and sitting not in groups.
Laying down and leaning back	The second resting behavior was lying down and leaning back with the Lutung Budeng's back leaning against a lush tree trunk.
Sleeping	The third resting behavior was sleeping or lying on his stomach or hugging a branch with his foreleg and hind leg. There was also sleep with their foreleg and hind leg hanging.

Figure 1. Lutung Budeng's behavior of moving places. a) walking on the branch; b) jumping; c) climbing

Figure 2. Lutung Budeng's resting behavior. a) sitting; b) laying down; c) sitting in group; d) hugging branches

Feeding behavior. There were three stages of feeding behavior carried out by Lutung Budeng in the Adinuso forest. The first stage was holding the leaves with both or one of the forelegs. There was also holding with one of his hind legs on the leaves to feed. The second stage was plucking with his right foreleg or sometimes with his left foreleg and one hind leg holding the branch. The third stage is that the leaves are put into the mouth, bitten, chewed, and swallowed (Table 3). When feeding teak caterpillars, Lutung Budeng pulled the teak leaves first, then choose which caterpillars to feed, take them using his right or left foreleg, and then put them in the mouth chew and swallow them. Lutung Budeng fed on teak caterpillars when it was only caterpillar season which was from November to December. Lutung Budeng also fed the leaves

by feeding them directly without picking them first. This behavior was done by pulling the twig with both forelegs and one leg, then put the mouth closer to the leaves. Then, the leaves were fed, chewed, and swallowed. This statement was in line with [14] that stated the Lutung's feeding behavior was directly using the mouth or using the right foreleg or left foreleg, and sometimes they took feed using the hind leg and both forelegs. In accordance with [16] statement, plucking using both front legs was one of the feeding behavior of Lutung Budeng. This statement was supported by [17] that informed the Lutung Budeng fed using their two forelegs. The feeding behavior that Lutung Budeng often carries out was by sitting on a tree trunk and using their forelegs to put the feed into his mouth. The feeding behavior of Lutung

Budeng while sitting was also found in Pancuran 7 Baturaden area, Mount Slamet, Central Java [18]. The feeding behavior of Lutung Budeng could be seen in Figure 3.

Lutung is *folivorous* (leaf feeders). Generally, Lutung Budeng feeds are leaves, but Lutung Budeng digestion is very long, which allows it to feed young leaf buds, and under certain conditions, it feeds teak caterpillars. In accordance with the statement [14], Lutung fed young leaves or shoots of leaves, fruit, and flowers. Lutung Budeng fed young leaves gradually one by one or sometimes fed more than one, put them in the mouth, and chewed them. It was supported by [18] that the level of preference for Lutung Budeng to young leaves was 51.9% compared to fruit, which was 41.8%. Lutung Budeng in the Masigit Kareumbi Hunting Park Area, West Java, also fed leaves, fruit, and seeds [8].

Lutung Budeng (*T. auratus*) in the Adinuso forest fed on young leaves from segawe or saga trees (*Adenanthra pavonina*) and young leaves from teak trees (*Tectona grandis*). According to [19], the plant species used as a feed source for Lutung Budeng were dominated by *T. grandis* and *A. pavonina*.

Behavior of vocalization, grooming, and play. The vocalization of behavior, grooming, and playing was described in Table 4. At the time of observation, the male Lutung Budeng's voice as group leader read “*ghék'ghoghoghok ghék'ghoghoghok*”. When it made a vocal, the Lutung Budeng's body shakes, and the vocal signals that an enemy or Lutung Budeng was disturbed. The study of [20] found similar vocal of

the male Lutung Budeng group leader vocal “*Geko Geko*” when they felt threatened by another group of Lutung Budeng or other animals. This information was strengthened by the statement [21] that male Lutung Budeng vocal “*ok ek, ek ok*” and the vocal could signify Babies Lutung Budeng make “*cuiiiit*” vocal, usually when played chasing, scratching each other, and scuffling. The same study results in [21] showed that Lutung Budeng sometimes squeak. The results of the male Lutung Budeng in vocal spectrogram could be seen in Figure 4.

The average duration and frequency of Lutung Budeng's vocals were 0.55 s and 11 Hz (Table 5). Thus, Lutung Budeng vocal behavior was usually about 18-20 times within 30 minutes (with an erratic time). According to [9], the vocalization behavior of Lutung Budeng occurred for about 30 minutes. This statement was also supported by [21].

The grooming behavior carried out by Lutung Budeng were sitting together, where one sit and the other sits behind or beside. They looked for lice by using both forelegs to clean the body, and some scratched or rubbed other Lutung Budeng's body with one foreleg. Some Lutung Budeng cleaned themselves by rubbing the body. They scratched the body by using one foreleg while sunbathing (Table 4). Following the statement of [8], the grooming behavior was conducted through scratching the body and licking the fur. [14] supported this statement that the grooming behavior was by looking for lice or delousing the body.

Table 3. Lutung Budeng's feeding behavior

Feeding Behavior	Description
Holding	The first stage of feeding behavior was holding leaves with both or one forelegs, and there was also held with the hind legs.
Plucking	The feeding behavior in the second stage was plucking with their right foreleg or sometimes with their left foreleg and one of their legs holding a branch
Put food into the mouth	The third stage of feeding behavior was putting the leaves into the mouth, bitten, chewed, and swallowed.
Feed teak caterpillar	In the behavior of eating teak caterpillars, Lutung Budeng pulled teak leaves, then chooses which caterpillars to eat, then they took the caterpillars using their right or left forelegs then put them in their mouths, chewed, and swallowed (Lutung Budeng ate teak caterpillars during the rainy season).
Feed directly	The behavior of direct feeding was carried out by pulling a tree branch with both or one of the forelegs and hind legs, then Lutung Budeng's mouth approached the leaves to take directly using the mouth, chewed, and swallowed.

Figure 3. Lutung Budeng's feeding behavior a) feed leaves; b) pluck leaves

Note: axis-x: time (s) and axis-y: frequency (Hz)

Figure 4. Vocal spectrogram of male Lutung Budeng

Table 4. Lutung Budeng's vocalization, grooming, and playing behavior

Behavior	Description
Vocalization	The voice behavior of male Lutung Budeng group leader reads "ghek'ghoghoghok ghek'ghoghoghok". This vocal signals the group when there are enemies or if they feel annoyed. Babies of Lutung Budeng make a "cuiiit" vocal, usually when scratching, chasing or practicing scuffles.
Grooming	Grooming behavior is done by sitting together, one sitting and the other sitting behind him or beside him then looking for lice by using both forelegs to clean his friend's body and some scratching or rubbing his friend's body with one foreleg while sunbathing and some scratched themselves with one foreleg.
Playing	Playing behavior that is often carried out by Lutung Budeng's babies is by chasing from branch to branch. Then by clawing at each other, swinging on twigs and training in scuffles.

Table 5. The average duration and frequency of Lutung Budeng's vocalization behavior

Vocal	Average	Max	Min
Duration (s)	0.55	0.7	0.4
Frequency (Hz)	11	12	9

Playing behavior was usually carried out by young Lutung Budeng or teenage Lutung Budeng. When playing, young Lutung Budeng perform movements such as scratching each other, chasing each other, training fistfights, and swinging. When playing, Lutung Budeng will automatically make a

vocal "*cuiiit ... cuiiit ... cuiiit*" (Table 4). The same thing was found by [15] in Uolanang Kecubung Nature Reserve, Subah District, that young Lutung Budeng often did in the activity of playing. The results of the study confirmed another study by [8], who stated that the Lutung Budeng's playing

behavior was jumping and swinging on tree branches, chasing each other with other group members, and some wagging their tails. According to [22], playing behavior used the upper and middle trunk to practice running, fighting, jumping, and

climbing. This was usually done by teen Lutung Budeng. Pictures of Lutung Budeng when grooming and playing could be seen in Figure 5.

Figure 5. Lutung Budeng behavior a) grooming b) playing (swinging)

CONCLUSION

Based on the research results, it can be concluded that the behavior of Lutung Budeng in the Adinuso Subah forest in Batang Regency is relatively the same as the behavior of Lutung Budeng in general. Behaviors in the Adinuso forest include resting, moving places, feeding, grooming, playing, and vocalization.

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