

Behavior of Sumatran Lorises (*Nycticebus coucang*) in the Captive, Primate Research Center-IPB University

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Abstract

Lorises are protected and endangered animals, according to the IUCN and government regulations in permen LHK No. P.106/2018, because of poaching, habitat fragmentation, and illegal sales that occur. This study aims to determine the suitability of the cages by observing the behavior and use of the cages space by the Sumatran lorises in the Primate Research Center-IPB. The method used is Observation of daily behavior using the animal focal method sampling, namely a direct observation method using one individual and an instantaneous point sampling method, namely recording all behavior for a certain duration of time, which will produce data on the percentage of animal behavior every 10 minutes. The time resulting from observations of 3 individual lorises was 144 hours. The study results showed locomotion behavior at 46.69%, social behavior at 2.63%, elimination at 1.6%, rest at 25.11%, grooming at 6.16%, foraging at 2.4%, eating at 3.88%, and being alert at 11.53%. Lorises in Primate Research Center use the entire cages space provided to carry out active and inactive activities. The conservation aspect is sufficiently supportive of the housing and feed aspects provided.

Keywords: Behavior, Conservation, Lorises.

1. Introduction

Sumatran loris (*Nycticebus coucang*) is a Sumatran primate with an endangered status. The International Union for Conservation of Nature and Natural Resources (IUCN) in 2015 determined that the Sumatran lorises are listed in an endangered category and is included in the Appendix I category of the Convention on International Trade of Endangered Species of Flora and Fauna (CITES). Types of animals included in the Appendix I category are prohibited in all forms of international trade. Loss of habitat is not the only threat to lorises, but the biggest threat today is from the animal trade (Shepherd 2004). The wildlife trade has contributed to the threat of loris extinction, and the lack of public knowledge about animal protection has led to more animal trade. Other factors that can affect the decline in the lorises population are the lack of information and data regarding the lorises population in Indonesia and weak legal protection (Aditya 2015).

One of the efforts to ensure the preservation of wild animals, especially lorises, against the threat of extinction requires human intervention so that mutually beneficial conditions for humans and wild animals are achieved with captive breeding. Captive breeding suitable for endangered animals in their natural habitat is ex-situ captivity. However, ex-situ captivity has problems, namely information about good captive management or maximum environmental factors to support wildlife in captivity so they can live as prosperously as in the wild. Based on this, research is needed to be related to the factors supporting the success of captive breeding.

Primate Research Center-IPB University is an agency committed to advancing research on primates, which deals with biomedical and biological aspects and includes aspects of primate species conservation. The ex-situ captive breeding program implemented by the Primate Research Center is an effort to support the conservation of primates, especially endangered species such as lorises and several other primates.

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In efforts to make captive breeding successful, it is necessary to study the activities of the daily behavior of lorises to provide the information and data needed so that management and efficiency in managing and breeding run optimally (Gono *et al.* 2002). This research was conducted to determine the daily activities and use of the space for the sumatra lorises (*Nycticebus coucang*) in the captive Primate Research Center-IPB University.

2. Materials and Methods

2.1. Materials

The tools used in the research include headlamps, watches, RStudio, Microsoft Word 2021, and Microsoft Excel 2021. The material that became the object of observation was the sumatran lorises (*Nycticebus coucang*), which is located at the Primate Research Center (PRC) – IPB University.

2.2. Methods

The method used is observation of daily behavior using the animal focal method sampling, namely a direct observation method using one individual and an instantaneous point sampling method, namely recording all behavior for a certain duration of time which will produce data on the percentage of animal behavior every ten minutes, and the time resulting from observations of three individual lorises was 144 hours (Altmann 1974), namely the method of direct observation using an individual animal as the object and recording all behavior at a certain period of time, which will produce data on the percentage of animal behavior. As one example is moving, if the lorises makes a lot of movement or movement in the zones in the cage, it means the lorises is using the cage space. Observations were carried out on three individuals out of eight individuals in Primate Research Center captivity, 3 individuals were taken because the cages on the right side was filled with one lorises each, while

on the left side, it was filled with 1-2 lorises, which could result in bias in the resulting. Observations were made on one adult female lorises, one young female lorises, and one adult male lorises with a distance between the observer and the cages of 1-2 meters. According to the active time of the lorises in carrying out activities, behavior observations are carried out for 12 hours at 06.00 p.m-06.00 a.m and carried out four times a week. Thus, this study produced data on lorises behavior for 144 hours in the cage. The 144 hours period was obtained from 12 times observed night in three weeks. Observations were made by recording the frequency of behavior every 10-minute intervals. The behavior is locomotion behavior, social behavior, elimination, rest, grooming, foraging, eating, and being alert. Collecting data on the behavior of lorises is done by recording the behavior of one lorises and then tabulating it. Another method used in this observation is the method of an ethogram, namely diagrams, to simplify ongoing observation data to make it more efficient in the recording.

The environmental enrichment data taken was in the form of facilities provided by the manager to the cages whose zoning had been determined by the researcher. Environmental enrichment materials are known from observations, while environmental enrichment treatments are known by observing and carrying out maintenance, such as cleaning the cage and around the cages. Observation of the use of space is done by dividing the cages space horizontally. Other examples of enrichment are the addition of twigs to the cage, which are useful for moving lorises and live trees with thick leaves to hide in.

2.3. Data Analysis

Data analysis was carried out descriptively and quantitatively based on the results of direct observation directly at Primate Research Center-IPB. Descriptive analysis can interpret the results of observational data



Figure 1. Sumatran lorises cages at Primate Research Center

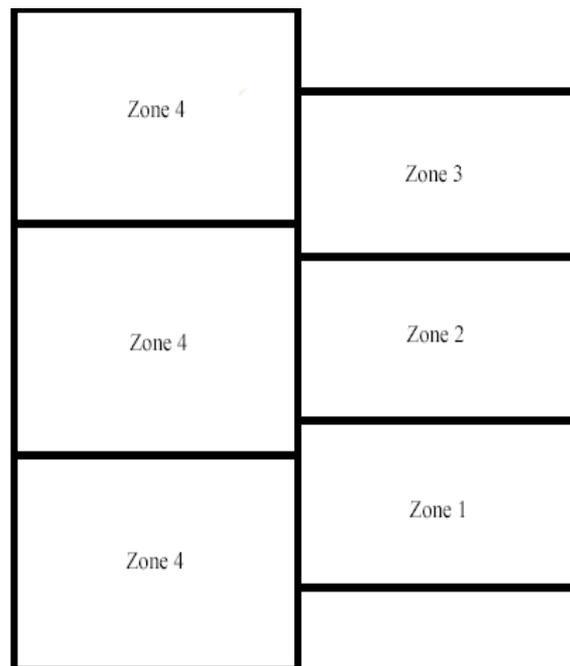


Figure 2. The distribution of zone for the sumatran lorises cages in Primate Research Center

in the form of diagrams, tables, photographs, and graphs so that percentages are obtained and can make an overview of the behavior patterns of lorises while in captivity.

Quantitative data analysis is done by recording the behavior patterns of the sumatra lorises during

the observation. Calculation of behavior during active and inactive lorises in the cages and use of space by lorises. Calculation of the percentage of lorises behavior and use of space while in the cages according to Eva *et al.* 2017 states that the formula is as follows :

$$\text{Percentage frequency of behavior } x = (\text{Frequency of behavior } x / \text{The total of all behavior frequencies } x) \times 100\%$$

$$\text{Percentage frequency zone } x = (\text{Frequency zone } x / \text{Total of all frequency zones } x) \times 100\%$$

All observed data is processed and tabulated using the software Microsoft Excel 2021 and R Studio. However, this method has a weakness where the duration of behavior is not identified so the resulting data does not have an accurate comparison.

3. Results

3.1. Sumatran Lorises Behavior

Based on observations of the behavior of the sumatran lorises in Primate Research Center- IPB captivity, there are 5 out of 9 animal behaviors, according to Scott (1972), including being alert which includes behavior investigative behavior, eating, and foraging are included in ingestive behavior, grooming, and social behavior are included in care-soliciting behavior, breaks are included in shelter-seeking behavior, elimination is included in elimination behavior, and locomotion. Observations were carried out at 10-minute intervals so that each lorises was observed doing something within one behavioral frequency. The dominant behavior of the sumatran lorises in the Primate Research Center cage includes locomotion, rest, and alertness. The behavior of the sumatran lorises is presented in Table 1.

3.2. Comparison of the Daily Behavior of Sumatran Lorises

The results of the behavior analysis of the sumatran lorises, there are differences between the behavior of male and female sumatran lorises in Primate Research Center (Figure 3). The behavior of male and female lorises 1 produces similar dominant behavior where locomotion behavior becomes the main dominant, but in females 2 the main dominant behavior is rest followed by locomotion and then alert.

3.3. Space Utilization Aspect

The results of data analysis (Figure 4), male and female lorises 1 in the Primate Research Center use all parts of the cage space for locomotion, foraging, and eating behavior, this is because the feed available in the cage is spread out. Different from female lorises 2 not using zone 1 due to unfavorable weather for female lorises 2 to explore during the study.

4. Discussion

The dominant behaviors performed by lorises in the cage are locomotion behavior, resting behavior, and alert behavior. The results of this study differ

Table 1. Sumatran lorises behavior frequency

Behavior	Frequency's	Percentage (%)
Alert	101	11.53
Eat	34	3.88
Look for something to eat	21	2.40
Grooming	54	6.16
Resting	220	25.11
Elimination	14	1.60
Social behavior	23	2.63
Locomotion	409	46.69
Total	876	100

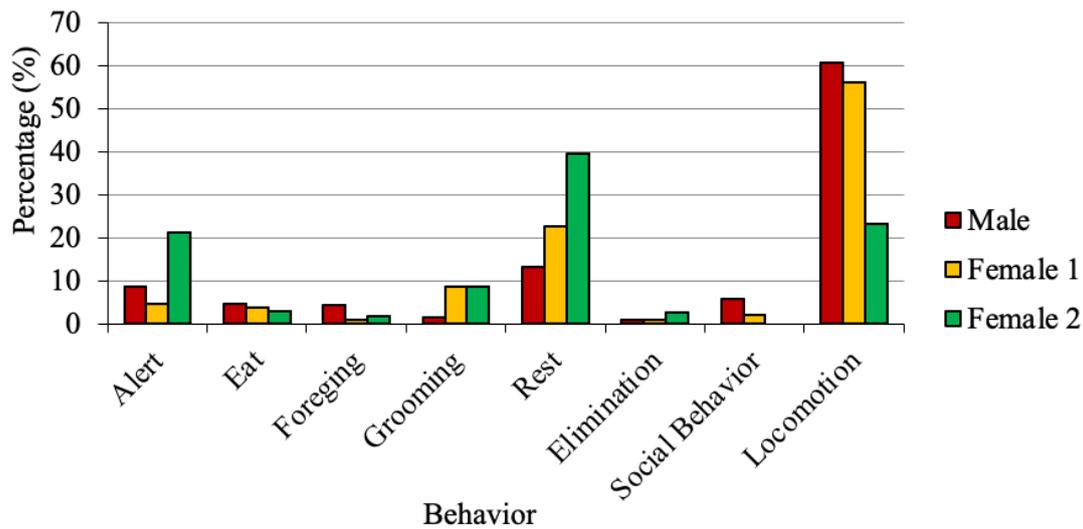


Figure 3. Percentage of daily loris behavior in Primate Research Center cages for each individual

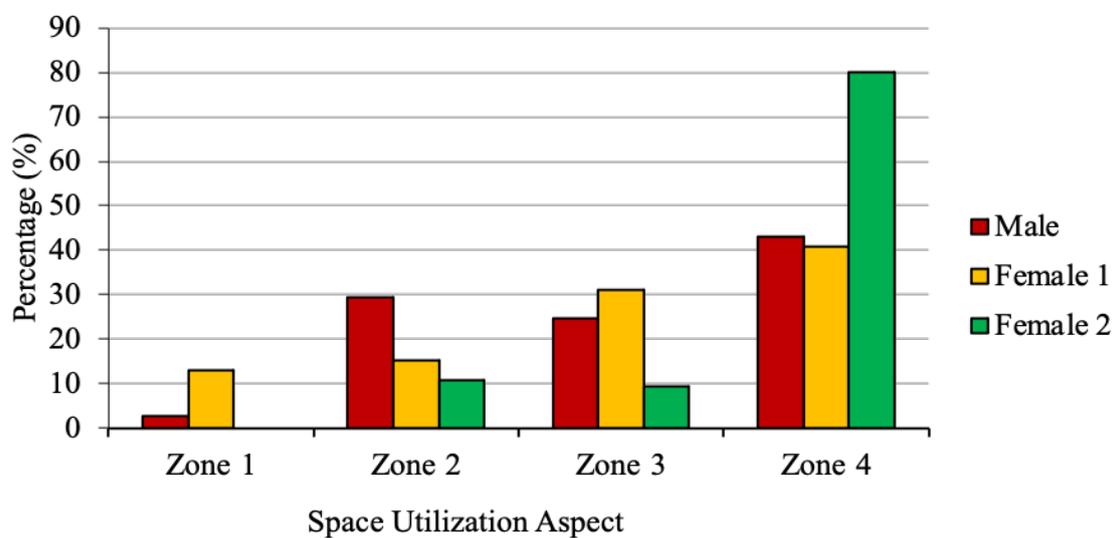


Figure 4. Frequency of space use by sumatra lorises in Primate Research Center

from the behavior of lorises in their natural habitat. The behavior of lorises in their natural habitat shows three dominant behaviors, namely moving, looking for food, and hiding behavior (Andre *et al.* 2019). One of many differences in behavior in natural habitats and in captivity can be caused by the provision of feed by managers so that in captivity, lorises do not spend too much energy and allocate time for other behaviors. This is in contrast to the natural habitat, which requires lorises to find their food to meet their needs. The most dominant behavior among the three behaviors is locomotion behavior. The frequency of

locomotion behavior was carried out 409 times to produce a percentage of 46.8%. Dominant locomotion behavior can be interpreted as a lorises in good health and actively moving in search of food to survive, besides that, the area of the cage and the presence of living plants in the cage can affect the motivation of the lorises to keep moving and make its movements freely (Eva *et al.* 2017).

The second dominant behavior is resting. Rest behavior has a frequency of 246 times with a percentage of the total behavior of 28.08%. Resting behavior is a silent position, generally with a sitting

posture curled up and eyes open (Rode-Margono *et al.* 2014). Resting behavior is the second dominant behavior related to the literature of Wiens (2002), namely the home range. Male lorises are larger than females, and the male loris' territory covers most of the area of the female and her young. In addition, the third individual is a loris that has just been released from its mother, so it has less cruising range and often rests or behaves inactively. The third dominant behavior is alert. Alert behavior is a silent behavior by actively observing the environment or observers (Rode-Margono *et al.* 2014).

The behavior of lorises in male and female 1 can be said to be normal. Sumatran lorises in Primate Research Center captive cages showed locomotion behavior of 60.62% in male lorises, female 1 lorises at 56.16%, and female lorises 2 at 23.29%. The intensity of locomotion behavior in individual male lorises is higher when compared to female lorises; this is in accordance with the literature of Wiens (2002), which states that the home range *N. Coucang* adult males are larger than the female's home range, and may even cover a portion of the female's and young's area. According to Nekaris and Bader (2007), lorises can move (locomotion) up to 0.4 km/hour every night. Migratory movements or locomotion are influenced by light intensity, where lorises tend to avoid conditions of complete darkness and very little light.

Resting behavior is an individual's condition of being in a state of rest in the same place (Bottcherlawet *al.* 2001), resting behavior was common on the branches, twigs, and sleeping boxes in the cage. These conditions include resting or sleeping, which, from the results during resting observations, obtained percentages of 13.36% for male lorises, 22.60% for female lorises 1, and 39.38% for female lorises 2. The rest percentage is different for female lorises 2 compared to male and female lorises 1, because female lorises 2 are lorises that have just been weaned

from their mothers. Apart from that, female lorises 2 is still relatively younger than the other lorises, causing her to roam less, so her prominent behavior is resting.

Lorises are solitary animals, so they often check (alert) the environment in which they live. Besides that, the alert behavior of lorises is caused by a response to the presence of predators, moonlight, and humans (Rode-Margono *et al.* 2014). The results of the behavioral study showed alert behavior with a percentage of 8.56% in males, 4.79% in females 1, and 21.23% in females 2. Vigilant behavior occurred more frequently in female lorises 2. Because that loris was attacked when the male loris was released into a large cage, and female loris 2 was not very familiar with her cage, so, there was more alert behavior compared to the other loris.

Grooming is defined as the behavior of self-cleaning other individuals by licking, using hands, feet, and biting (Fitch- Snyder and Schuzle 2001). grooming behavior is a behavior that is quite often carried out by lorises. Lorises perform grooming behavior shortly after waking or setting the sun and when going to rest or at sunrise (Pambudi 2008), besides Andre *et al.* (2019) state that grooming lorises is also often done after eating and moving. This behavior can be categorized into 2, namely auto-grooming and allogrooming. Auto-grooming the behavior of grooming oneself, whereas allogrooming is the behavior of grooming other individuals and is included in the social behavior of lorises (Wiens 2002). Observations on sumatran lorises in Primate Research Center captivity showed that probing behavior received 1.37% in males and 8.56% in both 1 and 2 females performing autog-rooming behavior

The social behavior of lorises in the Primate Research Center is nothing more than sexual behavior, namely approaching the opposite sex and licking the genitals of the opposite sex. The results showed low social behavior, with a percentage of 5.82% in male

lorises, 1.03% in female lorises 1, and 0% in female lorises 2. This is because male and female lorises 1 are mature and are reaching heat, while female lorises 2 are still very young compared to other lorises. These results are consistent with the literature of Duncan and Goodwin (1982), which states that male lorises carry out more social activities than females, besides this is supported by the literature of Wiens (2002), which states that lorises use 93.3% of their daily behavior to carry out their activities and 6.7% use lorises to carry out social behavior towards other individuals. Another social behavior is vocalization, but during the research, the type of sound issued by lorises only indicated that the lorises felt threatened and functioned as alarm calls.

Eating behavior was recorded based on selecting, biting, chewing, and swallowing food. In eating behavior, there is a percentage difference between males and females, where males have a percentage of 4.79%, female 1 has a percentage of 3.77%, and female 2 is 1.71%. According to Helmi (2020), lorises that get too much rest do not need much food. Foraging behavior in male and female lorises has a lower percentage of feeding behavior; the male loris gets a percentage of 4.45%, in female lorises 1 was 1.03%, and in female lorises 2 was 1.71%. During the observation, the researchers did not find any lorises drinking, this might have happened because the type of feed the lorises had contained quite a lot of water. The nature of lorises in movement causes them to be very efficient in using water and having enough metabolic water, but this still needs to be studied further. Asnawi (1991) states that lorises are very efficient in using water, so there is no need to provide water all the time, especially during the day when lorises only rest and lorises only drink at night. Foraging behavior in male and female sumatran lorises is carried out by walking while sniffing and looking their heads left and right. However, when they know of the existence of lorises

researchers, they tend to be silent and watch (alert) the researchers. This is supported by Nurcahayani's literature (2015), which states that lorises, which are the object of research, will tend to be quiet and not move when they are aware of the presence of researchers and hear noises.

Elimination behavior is divided into 2 parts, namely urination and defecation, where urination in primates has a close relationship with territorial (Lekagul and McNeely 1977). This urination behavior is one of the mechanisms for removing the remaining metabolic products. Besides that, stress can trigger lorises to urinate (Semiadi *et al.* 2002). Defecation behavior is the behavior of expelling digestive waste in the form of feces, in male lorises elimination behavior occurs with a percentage of 1.03%, in female 2 it is 1.03%, and in female lorises 2 it is 2.74%. Lorises tend to defecate in the same place as they previously defecated. For example, lorises in Primate Animal Study Centre captivity tend to defecate in their small cages, namely on twigs provided by the management, this is in line with Semiadi *et al.* (2002), which state that lorises are primates that defecate in the same place.

Each loris cage at the Primate Research Center consists of one shelter, one drinker site, one feeding site, twigs, tree trunks, and live plants. The function of the sleeping box is for the lorises to rest during the day. The sleeping box is made of a rectangular wooden block with a medium-sized hole that the lorises can enter so that when the lorises rests during the day it is not exposed to sunlight. The size of lorises cage provided is 60cm x 30 cm x 40 cm. The number of sleeping boxes in the Primate Research Center is sufficient because each loris gets one sleeping box in each cage. Tree trunks and branches are needed to keep the lorises up above and not down to the floor of the cage, in accordance with Huynh (1998) stating that lorises are arboreal animals that spend time and do activities at the top of the cage.

There is no difference in the use of space between male and female lorises 1. Dominant male and female lorises use zone 4 to carry out activities, zone 4 in the cage there are food boxes, tree trunks, and sleeping boxes (shelter) which is in zone 4, so the lorises tend to carry out their activities in zone 4. The female lorises 2 in the use of the cage space shows different results where the use of zone 4 differs quite a lot from the male and female lorises 1, this can be related to locomotion behavior in The female lorises 2 is very low so that the roaming area carried out by the female 2 is very narrow. In the next dominant, there are differences in the use of space in male and female lorises 1, male and female lorises 2 tend to use zone 2 more because there are tree trunks, and branches in zone 2, besides the dominant male loris uses zone 2 because the male lorises has been observed for some time approaching female 1 and this is related to social behavior (Figure 3). The second dominant use of space for female lorises is zone 3, because there is a live plant of the bird's nest fern (*Asplenium nidus*), which is used as a resting place by the female lorises during the day.

The lorises cage is designed to be safe and comfortable and resembles its natural habitat. Each cage is equipped with enrichment to support the positive behavior of lorises. The enrichment given to the lorises cage is in the form of trees, branches, and cross beams for the lorises to carry out their activities. Enrichment of the cage can be given to a tree with dense leaves that the lorises can use to hide among the branches of trees with dense leaves. This can be done because during the research, it was found that lorises sleep on plant bird's nest ferns (*Asplenium nidus*) in the Primate Research Center enclosure. The enrichment given in the form of plants will be better because it is used to find food, move, or sleep (Puspita 2017).

Feeding that is dominated by fruit can be replaced with high-fiber feed. According to Cabana and Plowman (2014) adding food in the form of tree sap and insects and reducing fruit will improve the health of lorises in captivity. In addition, according to Napier and Napier (1967), the feed for sumatran lorises in their natural habitat is animals such as insects, reptiles, bird eggs, seeds, and small mammals. This is in accordance with the situation when the observations were made. Lorises in the Primate Research Center cage were seen catching insects and eating geckos. Another enrichment that can be given is the provision of feed that is spread around the cage and also enrichment what is included in factory enrichment is applying odors from food. It can be concluded from this study that the daily behavior of the sumatran lorises in the Primate Research Center cage was normal in 2 of the 3 lorises that were the object of the study, this was because female individual 2 was still in the adaptation stage of the cage. Overall, the cage space in the Primate Research Center is used by the sumatran lorises to carry out its activities. The conservation aspect is sufficient from the housing and feed aspect for the sumatran lorises in Primate Research Center. Enrichment of the cage can be done by adding plants with dense leaves in the cage.

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