The Pattern on Nutritional Behavior of Javan Gibbon (*Hylobates moloch*) in Bandung 's Zoo

Astuti Kusumorini1[1], Wamaliah[2], Sekarwati Sukmaningrasa[3]
{astuti@uinsgd,ac,id[1], wamaliahalmuhajjir@ymail.com[2], sekar_rasa@yahoo.co.id[3] }

Department of Biology, Faculty of Science and Technology of UIN Sunan Gunung Djati [1234]

Abstract. Javan gibbon (*Hylobates moloch*) is one of the primate species endemic Javanese general scattered in the forests of West Java and Central Java part. Government Regulation No.7, 1999, stated that all types of families Hylobatidae primates, including the Javan gibbon (*Hylobates moloch*) is a protected species . In IUCN, *Hylobates moloch* included in the category of endangered species or threatened. Additionally *Hylobates moloch* included in Appendix I to the *Convention on International Trade for Endangered Species for Flora and Fauna* (CITES), which means the animal is in a category should not be traded commercially. The research was conducted in Bandung Zoo in January to February in 2017 with the aim to determine the pattern of nutrition daily behavior of Javan gibbon (*Hylobates moloch*). The method used in the data collection for this study was *adlibitum* method to record any behavior done. Data collection parameters are feeding activity, urination, and defecation. Observations were carried out from 05.00 am until 18.00 pm, the 10 minute observation time interval. As a frugivore, Javanese gibbons only eat fruits. In thirty days of observation, the Javan gibbon ate almost all of the observation time, which was 5.30 - 17.00. The peak of feeding activity in the four gibbons occurred simultaneously at 8:30 to 9:00 pm and the afternoon at 14:00 to 15:00. Female C has the highest feeding activity at 8.30 at 13.4% and is highest on all time. Very little drinking activity both duration and frequency. This is due to the fact that gibbon feeds are fruits that contain a lot of water. Only Female C drinks the most, especially at 5.30 and 16.30. Urination and defecation activities also occur throughout the observation period. The peak is in female C and the lowest in male gibbons

Keywords: Defecations, Nutitional Behavior, Feeding, Urination

1 Introduction

The extinction rate of living species in Indonesia is increasing and Indonesia is currently in the global spotlight due to its rapid deforestation and forest degredation which also results in a high rate of loss of living things. Indonesia has a wealth of flora and fauna and other wildlife that invite the attention and admiration of various parties both at home and abroad. One of the endemic fauna found in Indonesia, especially in Java, is Javan gibbon (Hylobates moloch). A breeding method such as a zoo is one place to care for and care for animals and ensure the preservation of primates including Javan gibbons (Hylobates moloch). Supriatna et al (2001 in Iskandar, 2006) stated that based on Indonesia's Primate Conservation Assessment and Management Plan Report, the population of Hylobates moloch is estimated to be between 400-2,000 individuals. According to Nijman (2004 in Iskandar, 2006) recent population data states that the population of these animals ranges from 4,000 to 4,500 individuals and 2,600-5,304 individuals, it is assumed that some of the population currently also live outside conservation areas which are generally in the form of production forests and plantations (Djanubudiman et al., 2004 in Iskandar, 2006).

These animals are thought to decline from time to time due to habitat destruction or capture. Habitat damage can threaten the condition of the population and can influence its behavior in finding a safe location from the disturbance to survive. Hylobates moloch is one part of Indonesia's total biodiversity that is continuously degraded. The decline in Javan gibbon population in their natural habitat can occur due to habitat destruction done by the community through the clearing of agricultural land and logging, which results in reduced living space (Iskandar, 2007 in Permanawati et al., 2009). Seeing the condition of biodiversity and the environment which has worsened from year to year, it is necessary to increase public awareness of the environment and biodiversity conservation in the present and the future. Maximum treatment is useful to prevent and defend these animals from extinction, both local extinction rates and species extinctions. In the framework of this animal conservation effort, it requires conservation efforts such as studies of various aspects of its life. Research on the life of Hylobates moloch in nature is very important in supporting conservation efforts for the survival of these primates. Nutrition in primates include the process of finding and selecting food, holding and ingestion, digestion, absorption, transportation to urination and defecation. Parameters that can be observed are, feeding, urination and defecation.defekasi.

2 Theory

There Behavior is an activity that needs to involve physiological functions included in the study of ethology. Each type of behavior involves the reception of senses through the five senses, the change of these stimuli into neural activities, the integration of nerve structures, and finally the activities of various motor organs, both internal and external (Tanudimadja and Kusumamihardja, 1985 in Mahardika, 2008).

Animal behavior is animal movements, and tends to be considered as a motion or change in motion, including from moving to not moving (Tinbergen, 1969 in Mahardika, 2008). This behavior includes movements at mealtimes, mating, sounding or making sounds, even this behavior can also be a form of silence. According to Craig (1981 in Mahardika, 2008), behavior is influenced by animal status, animal physiology, environment and local events. Her daily activities are influenced by nutrition levels, seasonal effects, health, new experiences and learning.

2.1 Time Pattern of Percentage of Hylobates moloch Activity during Research

Javan gibbons at the Bandung Zoo who are in open cages have 4 individuals, of which 4 are 3 females, 1 individual is male. At first in the open cage there were only 3 Javanese gibbon individuals, but then added 1 female individual, each individual has their own characteristics. The importance of comparing the behavior of each individual is to be able to distinguish the behavior or habits carried out by each individual, as well as the differences between males and females and be able to find out the differences in behavior that many or few do.

Time Pattern Percentage of Feeding Activity

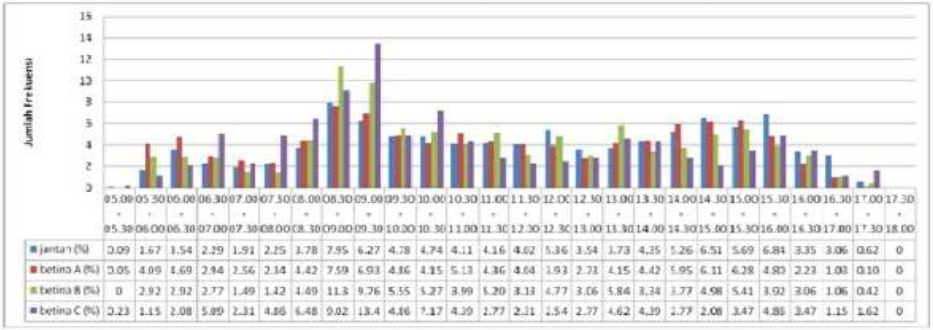


Fig. 1. Time Pattern Percentage of Feeding Activity

The time pattern of feeding activities, starts around 05.00-05.30 WIB after waking up from sleep, then increases at 08.00-09.30 WIB along with an increase in mobile activity after waking up and looking for food sources, then feeding activity decreases, and increases again in the afternoon at 14.00-16.00 WIB. For the highest activity of individual males is as much as 7.95% at 08.30-09.00 WIB, and the lowest activity as much as 0% at 17.30-18.00 WIB.

According to Priyanto (1978) in Arifin (2006) feeding activities under safe or normal conditions the Javan gibbon group showed that compared to the three female individuals, the highest feeding activity was female C as much as 13.4% at 09.00-09.30 WIB. So for the highest comparison of feeding activity between males and females, it was found that female individuals were 13.4% higher at 09.00-09.30 WIB compared with 7.59% male individuals at 08.00-09.00 WIB. This happens because the diets of males and females are different, at the time of feeding the male Javanese gibbons usually directly eat out of food at that time, whereas in the Javanese gibbons at the time of feeding, do not immediately eat up the feed, but a little- while occasionally interspersed with other activities such as locomotion and grooming

activities. This factor is the reason why the activity of female Javanese gibbon feeding is higher than male Javanese gibbon feeding activities.

Time Pattern Presentage of Drinking Activity

Drinking activities occur at all times at the time when it will start its activities until before bed. The highest drinking activity in male individuals is 11.9% at 07.00-07.30 WIB while the lowest activity is 0% for example at 05.00-05.30 WIB. When compared between female A, female B and female C, the highest drinking activity was obtained from female C, but this is not normal, it can be seen from the graph above that at 09.00-09.30 WIB until 16.00-16.30 WIB the percentage of drinking is 0% because at in the morning female C consumes a lot of feed. Percentage of the activity of drinking female C is not normal here occurs because female C is an individual who has just been put into an open cage, so the female C is still unable to adapt to individuals who have long lived in a cage.

But to compare the highest drinking activity between males and females, the comparison can be seen from the activities of individual females A 16.6% at 13.00-13.30 WIB and female B 11.3% at 12.00-12.30 WIB. But basically the highest drinking activity between male and female is female individual. This happens because the feed they consume, the more female gibbons consume feed with high water content, the drinking activity will be lower, because the water needs are fulfilled from the water content of feed ingredients so that from 09.30 West Indonesia Time to 16.00-16.30 West Indonesia Time do not do drinking activity, just sitting while occasionally grooming which over time will also reduce the need for water in the body, so that in the afternoon when the fluid in the body is reduced and the body needs water again then at 16:30 to 17:00 WIB, drinking activity in females rises.

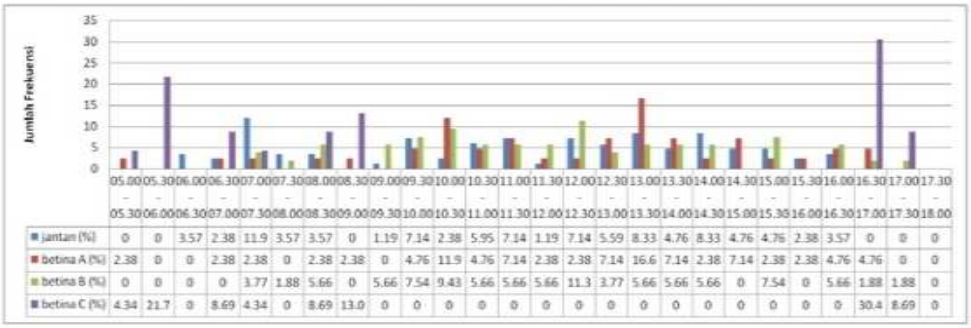
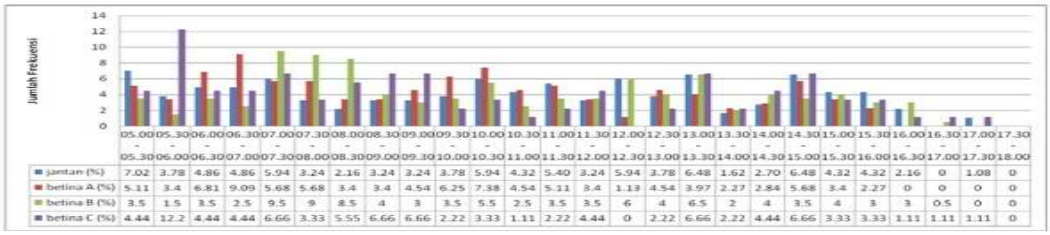


Fig.2. Time Pattern Presentage of Drinking Activity

Drinking activities carried out by Hylobates moloch is by entering the mouth into the drinking water (pool of water) then the water is inserted into the mouth through the tongue by sticking out his tongue. Sometimes also during rainy conditions, these animals drink drops of rainwater that is in the iron wire that was originally exposed to rainwater, then drink it after the rain subsides. The overall drinking percentage of Hylobates moloch at Bandung Zoo during the study was 0.13% for males, 0.08% for females A, 0.11% for females B and 0.17% for females C.

The need to drink Hylobates moloch is relatively small because it has been met with the type of food provided by Bandung Zoo officials. The food given is dominated by fruits such as bananas where in the ripe bananas, for 100 g the edible portion is roughly contained: 70 g of water; (Verheij and Coronel, 1997 in Rasmada, 2008).

Time Pattern Percentage of Urination Activity



	05.00 - 05.30	05.30 - 06.00	06.00 - 06.30	06.30 - 07.00	07.00 - 07.30	07.30 - 08.00	08.00 - 08.30	08.30 - 09.00	09.00 - 09.30	09.30 - 10.00	10.00 - 10.30	10.30 - 11.00	11.00 - 11.30	11.30 - 12.00	12.00 - 12.30	12.30 - 13.00	13.00 - 13.30	13.30 - 14.00	14.00 - 14.30	14.30 - 15.00	15.00 - 15.30	15.30 - 16.00	16.00 - 16.30	16.30 - 17.00	17.00 - 17.30	17.30 - 18.00
jantan (%)	7.02	3.78	4.86	4.86	5.94	3.24	2.16	3.24	3.24	3.78	5.94	4.32	5.40	3.24	5.94	3.78	6.48	1.62	2.70	6.48	4.32	4.32	2.16	0	1.08	0
betina A (%)	5.11	3.4	6.81	9.09	5.68	5.68	3.4	3.4	4.54	6.25	7.38	4.54	5.11	3.4	1.13	4.54	3.97	2.27	2.84	5.68	3.4	2.27	0	0	0	0
betina B (%)	3.5	1.5	3.5	2.5	9.5	9	8.5	4	3	3.5	5.5	2.5	3.5	3.5	6	4	6.5	2	4	3.5	4	3	3	0.5	0	0
betina C (%)	4.44	12.2	4.44	4.44	6.66	3.33	5.55	6.66	6.66	2.22	3.33	1.11	2.22	4.44	0	2.22	6.66	2.22	4.44	6.66	3.33	3.33	1.11	1.11	1.11	0

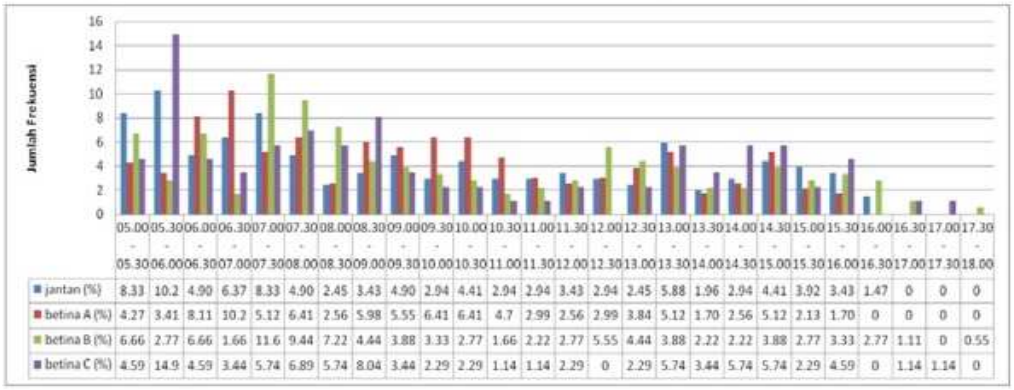
Fig.3 Time Pattern Percentage of Urination Activity

Urination activity basically occurs every time, starting from waking up to returning before going to sleep. For the highest urination activity in males as much as 7.02% at 05.00-05.30 WIB and the lowest as much as 0%, for example can be seen at 16.30-17.00 WIB. For the highest urination in females have different percentages. The highest urination ratio among the three female individuals was female C as much as 12.2% at 05.30-06.00 WIB and the lowest urination activity was 0% at 12.00-12.30 WIB and 17.30-18.00 WIB. Then if we compare with male individuals 7.02% at 05.00-05.30 West Indonesia Time, it is still seen that female individuals have high urine activity of 12.2% at 05.30-06.00 West Indonesia Time.

This difference is due to the intake of feed in the form of fresh fruits and vegetables consumed by males less when compared to the intake of feed consumed by female gibbons, so male urination activity is lower than female urination activity. The highest urination activity occurred at 05.30 - 06.00 West Indonesia Time, this might be due to the relatively low temperature, which ranged between 19 ° C and 89% humidity. According to Anggraeni (2006 in Mahardika, 2008) moving animals need energy, for that reason, they need to revamp the food substances in the body. If humidity is high, animals generally cannot sweat, due to the metabolic water that is obtained in many urine.

The urination behavior performed by Hylobates moloch is by tilting the back of his body (sitting cushion) and then removing urine. Urine is estimated at around 2 ml. The overall percentage of urine released during the study was 0.29% for males, 0.34% for females A, 0.47% for females B and 1.67% for femal

Time Pattern of Percentage of Defecation Activity



	05.00-05.30	05.30-06.00	06.00-06.30	06.30-07.00	07.00-07.30	07.30-08.00	08.00-08.30	08.30-09.00	09.00-09.30	09.30-10.00	10.00-10.30	10.30-11.00	11.00-11.30	11.30-12.00	12.00-12.30	12.30-13.00	13.00-13.30	13.30-14.00	14.00-14.30	14.30-15.00	15.00-15.30	15.30-16.00	16.00-16.30	16.30-17.00	17.00-17.30	17.30-18.00
jantan (%)	8.33	10.2	4.90	6.37	8.33	4.90	2.45	3.43	4.90	2.94	4.41	2.94	2.94	3.43	2.94	2.45	5.88	1.96	2.94	4.41	3.92	3.43	1.47	0	0	0
betina A (%)	4.27	3.41	8.11	10.2	5.12	6.41	2.56	5.98	5.55	6.41	6.41	4.7	2.99	2.56	2.99	3.84	5.12	1.70	2.56	5.12	2.13	1.70	0	0	0	0
betina B (%)	6.66	2.77	6.66	1.66	11.6	9.44	7.22	4.44	3.88	3.33	2.77	1.66	2.22	2.77	5.55	4.44	3.88	2.22	2.22	3.88	2.77	3.33	2.77	1.11	0	0.55
betina C (%)	4.59	14.9	4.59	3.44	5.74	6.89	5.74	8.04	3.44	2.29	2.29	1.14	1.14	2.29	0	2.29	5.74	3.44	5.74	5.74	2.29	4.59	0	1.14	1.14	0

Fig.4 Time Pattern of Percentage of Defecation Activity

Defecation activities also occur all the time, starting from waking up to returning to bed. The highest defecation activity usually occurs in the morning and will decrease in the afternoon. The highest defecation activity was 10.2% for males at 05.30-06.00 WIB and the lowest in the afternoon was 0% starting at 16.30-18.00 WIB. Comparison of the highest defecation activity between the three females obtained the highest activity in female C as much as 14.9% at 05.00-05.30 WIB and the lowest as much as 0% for example at 12.00-12.30 WIB. Likewise, if compared between male and female individuals, the highest defecation activity was 14.9% female individuals at 05.00-05.30 WIB.

The high defecation activity of female Javan gibbon may be due to the digestibility of gibbon gibbon which is lower than the digestibility of gibbon gibbon, and also caused by the consumption of gibbon gibbon females which are indeed higher than the gibbon gibbon consumption. The amount of defecation activity is released in the morning, due to metabolism in the body where yesterday's food that was eaten has not been digested properly, this is in accordance with Pratiwi's opinion (2008) that the high defecation activity is caused by the metabolic results of feed consumption on the previous day which is not digested and not used anymore by the body, so it must be removed in the morning.

Defecation behavior carried out by Hylobates moloch also by tipping the back of his body (sitting cushion) and then remove the dirt. The percentage of overall defecation released during the study was 0.32% for males, 0.45% for females A, 0.40% for females B and 0.64% for females C. The urination and defecation behavior is often carried out almost simultaneously according Pratiwi (2008) states that the average defecation activity begins with urination activity.

From the results of research on Hylobates moloch produced several suggestions, namely:

1. There is a need for further and long-term research to monitor the development of the daily activities of Hylobates moloch at the Bandung Zoo
2. Appeal to the Bandung Zoo to pay more attention to the open Hylobates moloch enclosure by adding several branches of wood or trees in it, to support the behavior and activities of Hylobates moloch.

Acknowledgments

Thank you to various parties who have supported the author to complete the Final Assignment Research, namely: Mr. H. Dadang Danumihardja as Chairperson of Tamansari Bandung Wildlife Foundation, Zoologi Garden, who has deigned and provided an opportunity for the author to carry out the final project research. Ms. Nurul Hayati as a staff of Tamansari Bandung Wildlife Foundation Zoologi Garden who has given time for a smooth process in her final assignment research and acceptance. Mrs. Effy Sofiyanty, drh., And Mr. Yaya for their kindness who have provided useful advice, motivation, discussion and guidance.

References

[1] M. Ario, A dan Ida Yuniati, "Perkembangan Perilaku Owa Jawa Pada Masas Rehabilitasi di Pusat Penyelamatan dan Rehabilitasi Owa Jawa (Javan Gibbon Center).," 2003.

[2] A. P. DHARMA, "ANALISIS TINGKAH LAKU DAN MANAJEMEN PENANGKARAN OWA JAWA (Hylobates moloch Audebert , 1798)," Tesis, 2015.

[3] A. Ario, "Husbandry Manual for the Javan Gibbon (Hylobates moloch). Leif Cocks. Hal: 11," 2008.

[4] A. Ario, "Aktivitas Harian Owa Jawa (Hylobates moloch Audebert, 1798) Rehabilitan di Blok Hutan Patiwel, Taman Nasional Gunung Gede Pagrango.," 2009.

[5] S. P. Ayu, "Perilaku Harian Dua Owa Jawa (Hylobates moloch Audebert , 1798) Betina di Pusat Penyelamatan dan Rehabilitasi Owa Jawa (Javan Gibbon Center).," 2006.

[6] D. Iskandar, "Penangkaran Owa Jawa (Hylobates moloch) Di Taman Ragunan Margasatwa Jakarta. Skripsi. Institut Pertanian Bogor.," 2002.

[7] S. Iskandar, "Penggunaan Habitat Owa Jawa (Hylobates moloch Audebert, 1798) Di Hutan Rasamala (Altingia excelsa Noronha 1790) Taman Nasional Gunung Gede Pangrango, Jawa Barat.," 2006.

[8] N. Kurniawati, "Pengamatan Aktivitas Harian Pasangan Owa Jawa (Hylobates moloch Audebert , 1798) di Javan Gibbon Center Taman Nasional Gunung Gede Pangrango.," 2009.

[9] Y. Mahardika, "Pemilihan Pakan Dan Aktivitas Makan Owa Jawa (Hylobates moloch) Pada Siang Hari Di Penangkaran Pusat Penyelamatan Satwa, Gadog – Ciawi. Skripsi.Institut Pertanian Bogor.," 2008.

[10] A. Permana, "Perilaku Harian Owa Jawa (Hylobtes Moloch Audebert, 1798) Di Pusat Penyelamatan Dan Rehabilitasi Owa Jawa (Javan Gibbon Center), Bodogol, Sukabumi.," 2012.

[11] W. Pramesywari, "Implementasi Medik Konservasi Pada Owa Jawa (Hylobates moloch Audebert, 1798): Stud1 Kasus Pada Empat Lembaga Konservasi Eksitu Di Indonesia. Skripsi.Institut Pertanian Bogor.," 2008.

[12] A. N. Pratiwi, "Aktivitas Pola Makan Dan Pemilihan Pakan Pada Lutung Kelabu Betina (Trachypithecus Cristatus, Raffles 1812) Di Pusat Penyelamatan Satwa Gadog Ciawi – Bogor. Skripsi. Institut Pertanian Bogor.," 2008.

[13] A. S. Putri, "Pola Penggunaan Ruang Owa Jawa (Hylobates moloch Audebert, 1798) Berdasarkan Perilaku Bersuara Di Taman Nasional Gunung Halimun - Salak," 2009.

[14] "Provinsi Jawa Barat. Skripsi. Departemen Konservasi Sumberdaya Hutan Dan Ekowisata Fakultas Kehutanan Institut Pertanian Bogor."

[15] D. A. Rahman, "Studi Perilaku Dan Pakan Owa Jawa (Hylobates moloch) Di Pusat Studi Satwa Primata IPB dan Taman Nasional Gunung Gede Pangrango : Penyiapan Pelepasliaran. Tesis. Institut Pertanian Bogor.," 2011.