Analysis of Captive Breeding Management of Silvery Gibbon *(Hylobates moloch* Audebert 1798)

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Abstract

Captive breeding is aimed to intensively breed wild animals in the cage for biomedical research interests and to protect endangered species. The Primate Research Center of Bogor Agricultural University (PSSP-IPB) in collaboration with Taman Safari Indonesia (TSI) has established an ex-situ captive breeding of the javan gibbon and has succeeded in breeding the species. Due to the limitation of cages at PSSP IPB, the whole family of the Javan gibbon was moved to TSI, and therefore the research was conducted at TSI from February to July 2013. The objective of the research was to analyze the breeding management of the species. The results showed that the transfer of the Javan gibbon from PSSP-IPB to TSI had resulted in the changes of breeding management including cage system, environmental enrichment, feeding system, sanitation, and health control. Human resources and reproductive management in captivity of TSI and USDP-IPB did not significantly change since the animals had two nurses and one veterinarian, and the Javan gibbon in two other locations had already succeeded in delivering a baby.
***Keywords**: captive breeding management, ex-situ, Hylobates moloch*

Introduction

Captive breeding is an attempt to breed wild animals intensively in the cage. The breeding of primates in captivity has two objectives: to produce animals for biomedical research interests and to protect endangered wildlife species (De Mello 1991; Iskandar 2007). The Javan gibbon (Hylobates moloch) is one of the primates that belong to the category of endangered species in Indonesia since this animal can only be found in certain areas in West Java and Central Java (Roos *et al.* 2014).

One way to increase the Javan gibbon population in Indonesia is by carrying out captive breeding as has been done by Primate Research Center of Bogor Agricultural University (USDP- IPB) in Bogor. According to Thohari (1985) and Jarkasih (2005), breeding technology includes a number of aspects such as housing, food, reproduction, and health. Captive wildlife breeding is considered successful if the animal reproductive technology has been understood, and the animals in the captive breeding have bred successfully.

The Javan gibbon female in captivity at USDP-IPB from 2003 has successfully given birth to 5 young gibbons. The first offspring is OJ, the second is JLO, the third is OLA (Riendriasari et al. 2009), who died of bacterial infection, the fourth is OO, and the fifth is Ano (Nuraisah *et al*. 2011). As OJ was getting older and mature, he needed a spouse. If the animals were not separated, it was feared that in-breeding might occur between one child and another child, or even between a parent and a child. That is why, they were moved from USDP-IPB to Taman Safari Indonesia (TSI). This study aimed to obtain and analyze information on the management of the Javan gibbon captive breeding at USDP-IPB in the period 2003-2013 and post-transfer to TSI in 2013. There is still no information on the change in the Javan gibbon management after moving to a new breeding location. Therefore, it is necessary to conduct research on captive management of the Javan gibbon in TSI.

Materials and Methods

The study of the Javan gibbon captive management was conducted from February to July 2013 in TSI, Bogor, West Java. The research was focused on the Javan gibbon family that were moved from USDP-IPB to TSI. They consisted of Ari (the father), Mimis (the mother), OJ (almost mature male), OO and Ano (both still very young). Meanwhile, JLO (almost mature female) was not observed since she was separately placed in an individual cage. The equipment used in this study included thermometer, digital camera of Casio brand, measuring tool, watch, and stationery.

The primary data on captive management were obtained not only from direct observation but also from the identification of breeding facilities as well as animal-caring methods in TSI, including housing, environmental enrichment, feed provision, health control, sanitation, human resources, and reproduction. The secondary data were obtained from the previous studies at USDP-IPB, among others, by Iskandar (2007) and Rahman (2011). In addition, the interviews with officials, documents, and relevant literature from a variety of sources had also contributed to the secondary data.

The data were analyzed descriptively in order to get treatment information showing a general overview of the state of captive management of the Javan gibbon. The aspects of the captive management analyzed included housing, environmental enrichment, feed provision, health control, sanitation, human resources, and reproduction.

Results and Discussion

Cage Management

There are two kinds of the Javan gibbon cages in TSI. The first cage is rectangular-shaped with an average volume of 78.804 m / individual, and the second cage is similar to the natural habitat of the animal, which is located at the mountain slope where there are plenty of shade trees with an ambient temperature of around 16-25^{0}C. Meanwhile, the Javan gibbon cage at USDP-IPB (Rahman, 2011) is divided into two rectangular-shaped enclosures with an average volume of 30.415 m^3/individual, which are located in the middle of office and residential areas so that the condition is more noisy and hotter with an ambient temperature of about 20 -25^{0}C. Both breeding locations have a partition made of stainless steel wire that separates the cages. The size of the cage in TSI is 2.5 times wider and the condition is more comfortable for the Javan gibbon to do their daily activities such as swinging, jumping, hanging, climbing up or down, etc.

Environmental Enrichment

Environmentally, TSI management made an effort to enrich the cages of the Javan gibbon so that the conditions of the cages resemble their natural habitat. The types of enrichment in each cage of the Javan gibbon in TSI are the use of different materials with different numbers. The enrichment includes 2 wooden boxes, 2 wooden trunks, and 2 wooden seats; 1 plastic feed box, 2 aluminum water boxes, 1 rubber tire, and 1 piece of rope. In the meantime, at USDP-IPB (Rahman, 2011), the enrichment includes 2 wooden boxes and 2 wooden seats, 1 plastic feed box and 1 plastic water container, 1 aluminum water container, and 5 steel chains.

Table 1. Types and number of environmental enrichment elements in TSI and USD

Type of environmental enrichment	TSI	PSSP-IPB (Rahman 2011)
Number of types	7 types	6 types
Number of the same types	4 types (wooden box, seat, feed box, water box)	
Number of different types	3 types (rope, tree trunk, rubber, tire)	2 types (chain, water container)

Each type of the environmental enrichment has different functions, for example, a wooden box is used as a replacement for a tree to sleep for a rest, while the ropes, chains, and water containers are used to help the animals with swinging movements.

Feeding

The feeding techniques in TSI are in the form of fruits, vegetables and feed additives (monkey chow) by means of separation or sorting the fresh feed from the rotten feed. Then the fresh fruit is cut into several parts (skins and seeds are not discarded), while the vegetables are cut on the hard parts of the stem and the roots. The food materials that have been cut are weighed so that the weight of the feed given is according to the number of individuals in each cage and the feed is put into a plastic basin.

Table 2 showed that TSI had more types of feed for the Javan gibbon (15 types) than USDP- IPB did (13 types). There were 10 feed types which were the same and there were different types of feed (5 types in TSI and 3 types in USDP-IPB). The Javan gibbon favorite types of feed in TSI and USDP-IPB were bananas, oranges, and *kangkung,* probably because of their sweet taste and soft texture, or maybe because the feeds have compatibility with the characteristics of the Javan gibbon that consume lots of fruits

that contain carbohydrates (banana), vitamin (orange), and fiber *(kangkung)*. The types of feeds that the animals disliked both in TSI and in USDP-IPB were dominated by plant types because the feed types have sour taste, rough skin texture, and a lot of fiber, making it difficult for the body to digest.

Table 2. Feeding of the Javan gibbon in TSI and USDP-IPB

No	Type	TSI	USDP-IPB (Rahman (2011)
1.	Feeding time	Morning and afternoon	
2.	Number of feed types	15 types	13 types
3.	Feed of the same types	10 types (banana, apple, orange, salak, guava, monkey chow, long bean, spinach, *kangkung*, and *kemang* leaves)	
4.	Feed of different types	5 types (rambutan, mango, *kesemek* fruit, celery leaves, daun mede)	3 types (carrot, sawi, and green bean)
5.	Types of favorite feeds	banana, orange, and *kangkung*	
6.	Types of disliked feeds	celery, cashew leaves, long bean and mango	Green bean, carrot, and long bean.

Health Control

TSI has more types of health support facilities for Javan gibbon than USDP-IPB does. There are 8 types which are the same and there are different kinds of support facilities (6 types in TSI and 2 types in USDP-IPB). The types of supporting facilities can be seen in Table 3 below.

Table 3. Types of the Javan gibbon health support facilities in TSI and USDP-IPB

No	Type of facility	TSI	USDP-IPB
1.	Number of facility types	14 types	10 types
2.	Types of the same facilities	8 types (individual cage, necropsy room, crematory room, operating room, pathology room, quarantine room, operational vehicle, and library)	
3.	Types of different facilities	6 types (animal hospital, room medicine, nursery, in-patient room, x-ray room, CR room (Computeres Rountsen))	2 types (microbiology room and immunology room)

To prevent bacteria or diseases from attacking the Javan gibbon in TSI, the officers wash the surface (skin) of feed with clean water, clean cages and provide adequate nutrition. In addition, the officers also clean their boots whenever they want to enter the cages by putting their boots in a container which already contains a mixture of water and disinfectant that is placed in front of the entrance (footbath) to prevent dirt (germs) from being carried over into the cages. The daily check of the Javan gibbon health in TSI and USDP-IPB is performed by a nurse twice a day i.e. in the morning and afternoon by checking the physical condition of the animals (sores, hair loss), appetite (weak), residual stool (feces and urine) and cage facilities. If the Javan gibbon is sick, the nurse will contact the vetenarian to provide health care. In both captive locations, the Javan gibbon obtained the same health control.

Sanitation

The cleaning of the Javan gibbon cages in TSI used a wet system (using water) once a day, in the morning by sweeping the remaining stool (feces, urine, and food scraps) and scrubbing it using water. The disinfectant is applied once a week prior to the feeding to prevent bacteria that can endanger the health of the Javan gibbon. These results differed from Rahman (2011) in USDP-IPB who stated that cage cleaning should be done with a wet system (using water) twice a day i.e. in the morning and afternoon.

Human Resources (HR)

In the execution of daily tasks, the officers in TSI and USDP-IPB were accompanied by two nurses (senior high school graduates) and one veterinarian (S1 graduate) who has good skills in health care of the Javan gibbon with 10 working hours a day.

Reproduction

In TSI, Ari and Mimis had 14 times mating, and on July 9, 2013 the mother gave birth to a baby. The time interval between mating activity and the birth of a baby in TSI was only 4 days before giving birth.

Iskandar (2007) stated that the birth interval between the first and the second child at USDP-IPB was about 14 months, whereas in TSI the birth interval between the fifth and the sixth child was 24 months. This shows that the older the mother, the longer birth interval. The birth interval between one child and another at USDP-IPB and in TSI was faster than the previous statement which mentioned 2-3 years (CBSG 1994; Campbell, 2008) and 3-4 years (Supriatna and Wahyono 2000). With the birth of the babies, the Javan gibbon breeding in both locations (TSI and USDP-IPB) was considered successful.

Conclusion and Recommendation

The transfer of the Javan gibbon from USDP-IPB to TSI was followed by the changes in the management of cages, environmental enrichment, feeding, sanitation, and health control. These changes affected the behavior of the animals observed in moving, playing, sounding, browsing, eating, defecating, breastfeeding, and breastsucking. It is suggested to increase the Javan gibbon breeding techniques, especially during the care of the young and the mating method to accelerate population growth along with the management of adequate cage enrichment in terms of the area size and the existing facilities to avoid the appearance of abnormal behavior.

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