

## DIURNAL ACTIVITY OF CRESTED SERPENT-EAGLE (*Spilornis cheela*) IN PUSAT SUAKA SATWA ELANG JAWA

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### ABSTRACT

Human activity such a deforestation, the extent of hunting and illegal trade of pets nowadays makes Crested Serpent-eagle's population in its natural habitat is threatened. To overcome the problem, a rehabilitation is needed to keep its sustainability. Diurnal activity observation is important in the rehabilitation process, because the result can be the standard for the eagle to completing a rehabilitation process and become a determining factor whether the eagle can move to the next rehabilitation stage and whether the animal can be released or not. Pusat Suaka Satwa Elang Jawa (PSSEJ) is one of rehabilitation centres specially established for mountain eagles which conduct eagles' rehabilitation and release. This research aims at observing the diurnal activities of Crested Serpent-eagle which are in different rehabilitation stages. The observation was conducted during 10 days in September-October 2021 from 08.00 a.m until 04.00 p.m. The method used in this research was ad libitum sampling and focal animal sampling in PSSEJ quarantine and training cage. Based on the observation, it is concluded that there were three categories of Crested Serpent-eagles' activity observed in quarantine cage and training cage. These activities include perching activities, moving activities and hunting activities. Each activity in each cage has a different percentage, but perching activity has the largest presentation in both cages, namely 92.11% in quarantine cages and 81.79% in training cages. This difference is caused by the rehabilitation stages which has been passed by the eagles, the size of the cage, and the environment condition

Key words: Crested Serpent-eagle, Diurnal Activity, Rehabilitation

### INTRODUCTION

Raptors is a top predator which is also a bioindicator of an environmental change of an ecosystem (Donazar et al. 2016). One of the raptors which is generally found in Indonesian forests is Crested Serpent-eagle (*Spilornis cheela*) (Prawiradilaga et al. 2003). Recently, the population of raptors in this nature becomes more threatened because of deforestation, hunting and illegal trade for pets (Purwanto et al. 2015). Around 2.471 individuals of raptors including Crested Serpent-eagle were illegally traded in black market via social media (Gunawan et al. 2017). In fact, all species of raptors are protected by the government under Government Regulation of the Republic of Indonesia No. 7 1999 and are listed in Appendix II of CITES, which if trade continues without strict legal regulations, the population will be threatened with extinction (Rakhman et al. 2012).

Although protected by law, there are still many people who keep raptors as pets. As a result, raptors has changed in their behavior because they are placed in cages that are limited in size and often interact with humans so that they become tame (Safanah et al. 2018). Wild bird are naturally very sensitive to the presence of humans and tend to avoid when they know the presence of humans around them. Therefore, rehabilitation process is needed to restore their nature so that wild animals can adapt and survive in their habitat after being released into the wild (Winarno and Harianto 2018). Wildlife

rehabilitation is an activity of providing temporary special care and treatment to animals that are sick, injured or have inappropriate behavior which will then be released into their native habitat (Miller 2012).

Pusat Suaka Satwa Elang Jawa (PSSEJ) is one of rehabilitation centres specially established for mountain eagles which conduct eagles' rehabilitation and release. Before being released back into the wild, the eagles at PSSEJ go through four stages of rehabilitation consisting of the transit, quarantine, training and flight training stages. Behavioral observation of each eagle being rehabilitated at PSSEJ needs to be done to see the progress of the rehabilitation process. In addition, the observation result can be important factors that determine whether the individual can move on to the next stage of rehabilitation (Zufitrianto 2021).

Regarding those situation above, it is important to observe the diurnal activities of the Crested Serpent-eagle which is being rehabilitated. Therefore, the purpose of this research was to observe the diurnal activities of the Crested Serpent-eagle in different stages of rehabilitation at PSSEJ. Observation on individuals in quarantine cages can help to determine whether these individuals can be transferred to training cages or not. Meanwhile, observation on individuals in training cages can help to determine whether these individuals are ready to be released into the wild.

**RESEARCH METHOD**

This research was conducted in September-October 2021 at PSSEJ which is located on Loji, Cijeruk District, Kabupaten Bogor, Jawa Barat (Figure 1). Data collection was carried out in one of the PSSEJ quarantine cage and PSSEJ training cage (Figure 2) for 10 days from 08.00 a.m - 04.00 p.m with a total observation time of 60 hours.

Observations for the first 5 days were carried out in a quarantine cage measuring 2 x 1 x 2 m with iron materials and fence nets. Quarantine cages function for eagles in the early stages of rehabilitation by being treated with feeding models, perches, and responses to humans. Observations 5 days later were carried out in training cage measuring 20 x 10 x 15 m with iron material and fence nets. The training cage serves to improve hunting abilities, abilities, feeding, and flight abilities through the treatment given at the training stage. Both locations are facing east, far from residential areas and close to forest ecosystems (Zufitrianto 2021).

Primary data retrieval in the form of frequency and description of the Crested Serpent-eagles' diurnal activities were taken by ad libitum sampling and focal animal sampling methods. Ad libitum sampling

observing and describing the observed animal behavior. While, focal animal sampling was observing individual animals in a specific time unit and recording their behavior or activities (Altmann 1974).

Observations are made directly by one observer from inside the observation tent with camouflage at a distance of 5 m between the observer and the object during observation in quarantine cage and with a distance 15 m between the observer and the object during observation in training cage. The observer observes every movement of the object and records its frequency and description on a tally sheet. The frequency of Crested Serpent-eagles' activities was analyzed using a formula Sudjana (2016) as follows:

$$\text{Relative Frequency} = \frac{\text{frequency of an activity}}{\text{frequency of whole activities}} \times 100\%$$

In addition to primary data, secondary data was taken in the form of measurements of environmental parameters consisting of humidity and temperature around the cage using hygrometer and stopwatch. Temperature and humidity measurements were measured every observation in the morning, afternoon and evening with 3 repetitions of measurements at each time.



Figure 1. PSSEJ map: PSSEJ is located at Resort PTNW Salak 1, Gunung Halimun Salak National Park. The entrance gate is through Cijeruk District



Figure 2. (a) Quarantine Cage and (b) Training Cage.

Table 1. Crested Serpent-eagle as the research object

Cage	Object	Gender	Age	Name
Quarantine	1	Female	Adult	Reni
Training	1	male	Adult	Wijaya

## RESULT AND DISCUSSION

Crested Serpent-eagle placed in quarantine cages were healthy and did not carry viruses/diseases after being checked at the transit stage. The purpose of eagles' placement in quarantine cages is to assess their behavior and abilities. In general, the behaviors and abilities that were assessed were eating behavior, perching and response to humans. This assessment aims to determine what kind of treatment will be given to the eagle. In the quarantine cage there were two types of perch, namely upper and lower strata perch to train eagle perching behavior. If after a month or so the eagle shows a change in behavior and shows good health examination results, the eagle can be transferred to the training cage to enter the next stage of rehabilitation. However, if after monitoring the eagle does not show a change in behavior, the eagle will be placed in a display cage for conservation education facilities.

Crested Serpent-eagle in the training cages are eagles that show good behavior and health after going through the quarantine stage. At this stage the eagles are improved its natural abilities in order to survive in the wild. Skills improved include the ability to fly, hunt and perch in the upper perch strata and not depend on humans. The training cage is located in the forest area of Gunung Halimun Salak National Park which is the habitat of wild eagles, in which the floor of the cage is left overgrown with shrubs. In addition, there are trees that function as natural perches. The training cage is made as natural as possible in the hope of helping the eagles to quickly recognize and familiarize themselves with their native habitat. The duration of the training stage is influenced by the species of eagles, age and

background of the eagles before entering the rehabilitation center. During the training phase, the raptor keeper also assesses the eagles' behavior to determine readiness for release. If the eagle is declared ready to be released based on the existing criteria and indicators, the eagles will be moved to the cage or flight training stage (Zufitrianto 2021).

Based on the observations, the activities observed in the two cages were categorized into three activities, namely perching activities, moving activities and hunting activities. Perching is an activity in which the bird stands on one or two legs with its eyes open. Moving activity is an activity to move from one place to another (Putra et al. 2014). Hunting activities are done by raptors to fulfill their energy needs. Preying activities are also very important for ecosystem balance, specifically to control the population of prey animals (Rahmadiana et al. 2018).

Crested Serpent-eagle in each cages have various activity frequency percentage. Aside from environmental condition, the difference of each eagle's activity frequency is due to the fact that those eagles are in different stages of rehabilitation. The placement of those eagles in the cages during the rehabilitation stage is adjusted with the behavior and ability of each eagle based on assessment conducted by raptor keepers. The size of cages also affects the frequency of eagle's activities. Smaller cage size would limit the eagle's movement; hence, it would spend more time perching. On the other side, bigger cage size would allow the eagle to move more freely. Spacious cage is also very helpful in letting the eagle to train, to bring back its natural behavior, and to adjust to its surrounding environment (Miller 2012).

An individual named Reni kept in quarantine cage is a female Crested Serpent-eagle that came from BKSDA Semarang’s submission in December 11<sup>th</sup>, 2020. The percentage of Crested Serpent-eagle’s activity in quarantine cage is 92.11% perching, 4.39% moving, and 3.6% hunting (Figure 3). Another individual named Wijaya in the training cage is a male Crested Serpent-eagle, originated from Yayasan Konservasi Alam Yogyakarta and transferred to PSSEJ on February 6<sup>th</sup>, 2021. Wijaya have been kept in training cage for around 5 months. The percentage of Crested Serpent-eagle behavior in training cage is 81.79% perching, 16,9% moving, and 1.31% hunting (Figure 3).

Crested Serpent-eagle’s perching activities in quarantine and training cage have biggest percentage compared to other activities. It is similar to eagle’s behavior in its natural habitat, in accordance with a research conducted by Sitorus and Hernowo (2017) that states wild eagles spent more time to perch than to move, such as flying and hunting. However, perching activity in quarantine is bigger compared to training cage as quarantine cage has smaller size that could limit the eagle’s movement. Raptor’s resting activities on a perch is beneficial for the animal to manage its bodily metabolism rate as a mechanism to stabilize body’s temperature, so that physiological process could occur optimally (Safanah et al. 2018).

Crested Serpent-eagle in quarantine cage have higher activity frequency on 09.00-11.00 a.m and lowest activity frequency on 03.00-04.00 p.m. On the other side, Crested Serpent Eagle in training cage has highest activity frequency on 08.00 a.m and lowest activity frequency on 03.00-04.00 p.m. Crested Serpent-eagle’s highest activity frequency in quarantine cage is similar to raptors in their natural habitat that has highest activity frequency on 09.00-11.30 a.m (Rahmadiana et al. 2018). The frequency rate of eagle’s activities is affected by environmental conditions. Clear weather would cause the activity frequency to be higher, while cloudy weather would cause the eagles to spend more time perching. Eagles utilizes temperature and thermal current for their activities, especially flying; so the decrease in

environmental temperature would also lessen its activities (Harianto et al. 2015). Environmental condition in quarantine cage has daily average temperature of 23°C with the average humidity of 85%. Meanwhile the environmental condition in training cage has daily average temperature of 23°C and average humidity of 83%.

**1. Perching Activities**

Based on observation, there are twelve activities done by Crested Serpent-eagle in quarantine cage while perching. Beside the dominant activities (Figure 4), other observed activities include lifting one leg (1.20%), grooming (3.50%), beak scratching (0.10%), moving tail (4.12%), flapping wings (0.36%), stretching wings (2.56%), shaking body (0.65%), and perching on net (0.10%).

Based on observation, there are twelve activities done by Crested Serpent-eagle in trainig cage while perching. Beside the dominant activities (Figure 5), other activities observed include lifting one leg (1.17%), grooming (5.18%), making noise (5.18%), stretching wings (2.14%), turning body (4.59%), shaking body (2.19%), flapping wings (4.38%), and perching on net (0.32%).

Crested Serpent-eagle would occasionally lift one of its leg when relaxing with their legs covered by feathers and turning head when perching. They would occasionally shake their body or groom their feather to clean them from mites. Aside from relaxing, eagles would also be on standby through observing its surroundings. Therefore, the activities of turning head became the most observed activity. After meals, Crested Serpent-eagle would scratch its beak to the perch to clean it from food residue. The eagle would also scretch and flap its wings once in a while on the perch or when they land on a net and move its tail after fying or after they turn their body. Crested Serpent-eagle in training cage spent more time on perch or moving around to the nearest cage.

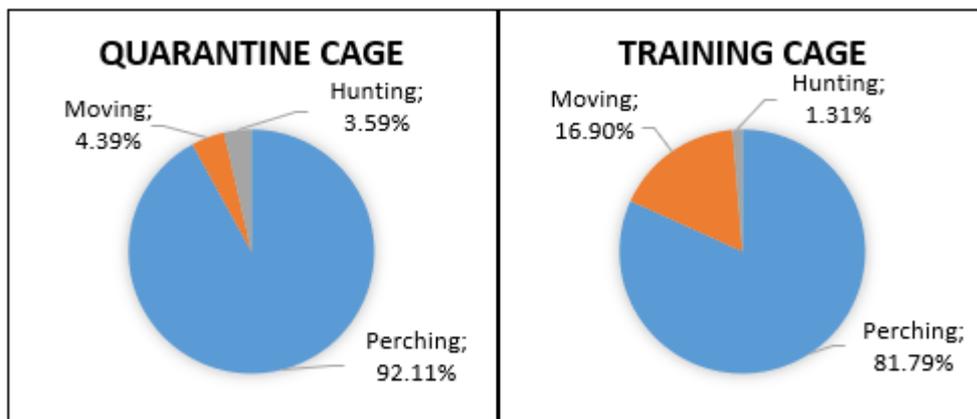


Figure 3. Comparison of activity percentage.

During observation, Crested Serpent-eagle in quarantine cage does not make any noise. On the other side, the eagle in training cage is shown to produce more noises during daytime. The sound produced is squeaky and loud (MacKinnon et al. 2010). Each individual of Crested Serpent-eagle possesses different unique sound, though generally they have 13 vocal pattern that consists of long and short vocal (Dermi et al. 2018). Crested Serpent-eagle in quarantine cage would oftenly turn their body until they find a stationary position on the perch. It is due to the fact that the perch on the cage is a floating perch; quite different to the one in training cage that is a natural perch taken from a tree branch. Crested Serpent-eagle in training cage was observed to stretch its wings for several times during morning time to sunbath. This activity is not observed to Crested Serpent-eagle in quarantine cage.

**2. Moving Activity**

The percentage of the Crested Serpent-eagles' moving activity in the quarantine cage was lower than those in the training cage. The Crested Serpent-eagle in the training cage has more types of moving activities. This is influenced by the smaller size of the quarantine cages among the training cages as well because the eagles that are still in the quarantine cages are eagles that have just received basic training in the rehabilitation stage. Based on observations, it shows that there were four moving activities carried out by the Crested Serpent-eagle in the quarantine cage. The dominant moving activity was walking on the perch by 87.76% (Figure 6). Based on observations, it shows that there were six activities carried out by the Crested Serpent-eagle in the training cage while perched. These

dominant activities are flying between near perches 23.26%, and jumping on perches 24.81% (Figure 7).

The Crested Serpent-eagle in both cages were observed to fly close between the perch and the net. However, in the quarantine cage, this activity occurred only when the raptor keeper came to provide food. Crested Serpent-eagle in quarantine cages are rarely observed flying between perches, which is in contrast to eagles in training cages that are often observed flying between perches near and far. This is because the training cage has more perches, while the quarantine cage only has two types of perches. The Crested Serpent-eagle in the quarantine cage cannot fly around the quarantine cage because of its limited area. In contrast to the Crested Serpent-eagle in the training cage, which was occasionally observed flying around the cage. When flying around the cage, the eagles occasionally land on the perch first before continuing to fly around the cage because they cannot circle the cage in one flight. The Crested Serpent-eagle fly from the perch to the cage floor only when they are about to grab prey. The Crested Serpent-eagle in the training cage will fly back to the upper perch when they have successfully grabbed their prey, but the eagles in the quarantine cage will only fly back to the perch when they have finished eating on the cage floor. The Crested Serpent-eagle in the quarantine cage do not jump on the perch and mostly walk on the perch. One of the factors is that the perch is hovering and unstable, so it is difficult for the eagles to jump on the perch. It is in contrast to the Crested Serpent-eagles in the training cage which occasionally jump on the perch or between perches to change places because the cage has a sturdy and greater number of perches.

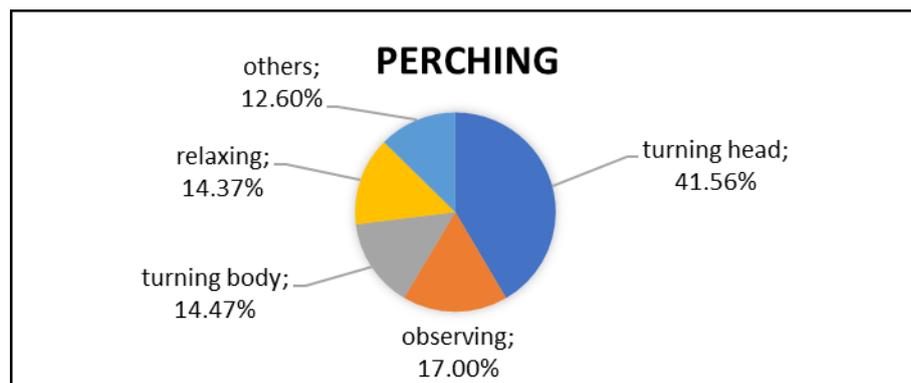


Figure 4. Percentage of perching activities in quarantine cage.

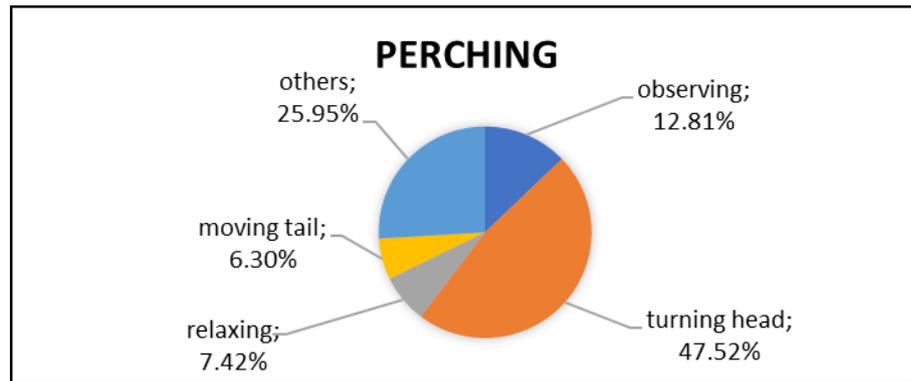


Figure 5. Percentage of perching activities in training cage.

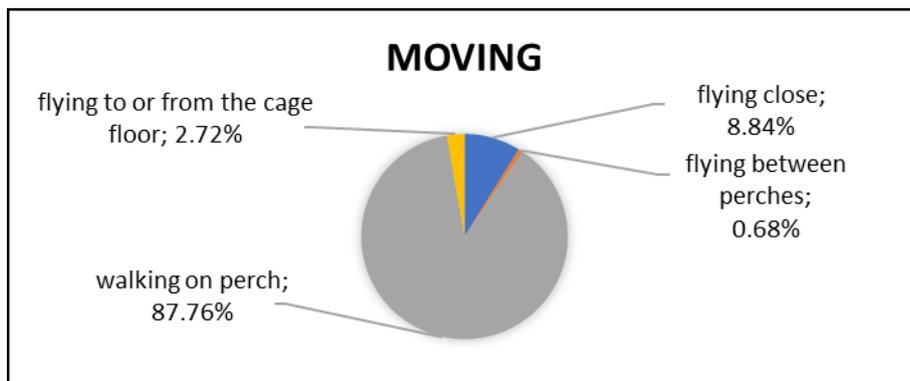


Figure 6. Percentage of moving activities in quarantine cage.

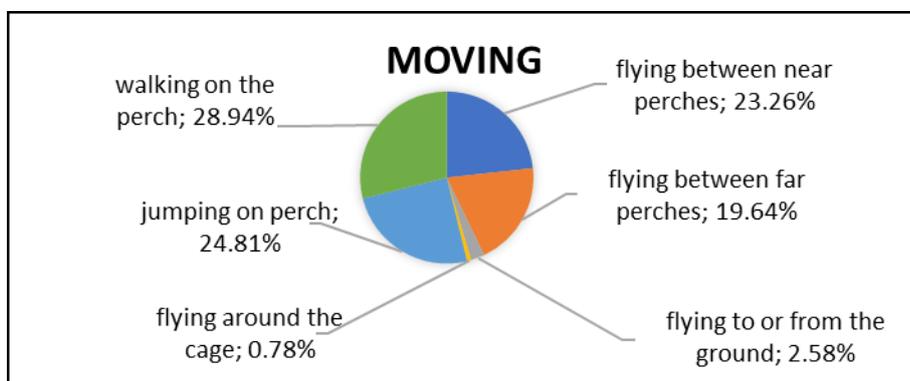


Figure 7. Percentage of moving activities in training cage.

### 3. *Hunting Activity*

Hunting ability is one of the main indicators determine eagle readiness for release (Ulumiyah et al. 2018). Crested Serpent-eagle would hunt using perch hunting method (Gokula 2012). Perch hunting is a method of hunting that is conducted by perching while observing prey at the same time (Harianto et al. 2015). When alive prey are put inside the cage by raptor keepers, Crested Serpent-eagle would observe the prey for a while as they observe their surrounding. Then if they consider it safe, Crested Serpent-eagle would snatch the prey, bring it to a safer place then shred the prey and feed on it as they observe around. Crested

Serpent-eagles in PSSEJ are fed once a day. Feed given to the eagles are alive prey such mices, guinea pigs, or white rat. According to Utami (2002), an eagle's need for food is 20-30% of its weight. Alive prey given to an eagle would weight around 300 grams. This weight is equalized to a guinea pig, a white rat or two mices (Zufitrianto 2021). As they are being fed with mices, Crested Serpent-eagle would immediately snatch the prey, grip them then eat it whole. However, if they are being fed with white rat or guinea pigs, after they snatch and grip the prey, Crested Serpent-eagle would shred its prey first then eat it little by little. The digestion waste would be disposed in form of feces in an indefinite period of time.

Based on observation, there are seven activities done by Crested Serpent-eagle in quarantine cage that are categorized into hunting activities. The dominating activities are feeding (62.50%), defecation (10.83%), and shredding prey (10.00%) (Figure 8).

Defecation is an activity of metabolism or digestion waste product disposal in solid form (Sawitri and Takandjandji 2010). Crested Serpent-eagle in quarantine cage would be observed to be spitting pellets or juice of undigested food waste such as the feathers and bones of its prey. On the early stage of quarantine, the eagles would be given several types of feed to observe their feeding habit before they admitted to the rehabilitation center. Eagles that have just entered quarantine stage would be given live feed; if the eagles do not respond they would be given dead feed. If the eagles are still not responding, they would be given slaughtered feed, and if the eagles still hesitant to feed it could be ensured that the eagles were fed minced meat. Once the type of feed discovered, the eagles would be fed according to its ability and the feed type would be changed gradually. As for feeding model treatment stages would be upgraded gradually, starting from minced feed/hand-fed, slaughtered feed, dead

feed, until finally live feed. Furthermore, the eagles would also be trained to be able to feed on high level of perches. The training was conducted by putting slaughtered feeds on perches. This treatment would be given along with model feeding (Zufitrianto 2021).

Crested Serpent-eagle in quarantine cages are observed to not being able to eat their prey on the perches yet. During observation, Crested Serpent-eagle are observed to still feed on the floor. However, these Crested Serpent-eagle have already capable to eat live feed.

Based on observation, there are six activities done by Crested Serpent-eagle in training cage during hunting process. The dominating activities was shredding prey (43.33%) (Figure 9).

Crested Serpent-eagle in training cage would bring their prey to the perch before eating them in the top perch. Occasionally, the prey would be brought to the perch in a long time to make sure that the surrounding is completely safe to eat and no one is watching. Crested Serpent-eagle normally will wait for a peaceful environment to eat their prey (Sawitri and Takandjandji 2010).

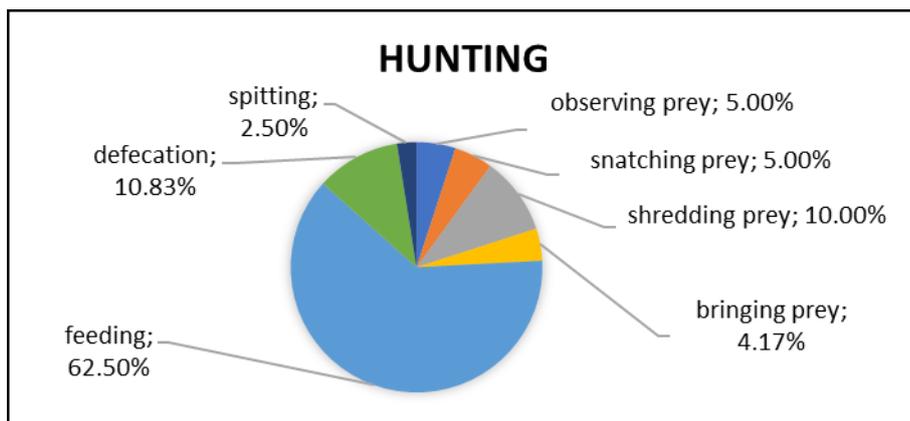


Figure 8. Percentage of hunting activities in quarantine cage.

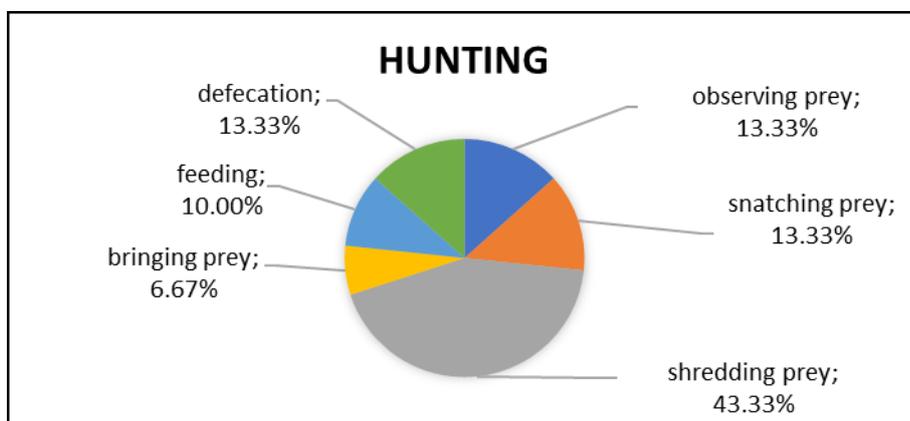


Figure 9. Percentage of hunting activities in training cage.

## CONCLUSION

Based on the observation, it could be concluded that there were three categories of Crested Serpent-eagles' activity observed in quarantine cage and training cage. These activities include perching activities, moving activities and hunting activities. Each activity in each cage has a different percentage, but perching activity has the largest presentation in both cages, namely 92.11% in quarantine cages and 81.79% in training cages. There are several activities that could only be observed in one of the cages, such as flying around inside the cage, jump along the perches, and sunbathing that are only found in training cage while spitting pellets would only be observed in quarantine cage. Those are caused by the fact that the eagles are in different stages of rehabilitation, in which cage placement in these stages adjusted with the behaviors and abilities of the eagles based on assessment conducted by raptor keepers. Moreover, the size of the cages and weather also affect the eagles' activities.

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