

## A Study on the Daily Ethology of Adult Timor Deer (*Cervus Timorensis*) Based on Sex at the Jatilengger Captivity, Blitar Regency

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### ABSTRACT

*This study aims to analyze the daily behavior of Timor deer (*Cervus timorensis*) based on sex at the Jatilengger Deer Captivity, Blitar Regency. The research subjects consisted of 16 adult deer (8 males and 8 females) aged over 2.5 years. Observations were conducted using the scan sampling method through direct observation and CCTV monitoring during for 24 hours in 30 day which is three observation periods: morning, noon, and night. The behavioral variables observed included ingestive, locomotion, resting, grooming, fighting, investigative, and rubbing behaviors. The results showed that ingestive activity was the most dominant behavior performed by Timor deer, followed by locomotion, resting, investigative, grooming, fighting, and rubbing. The high frequency of ingestive activity indicates that the feed provided in captivity has not fully met the nutritional needs of the deer. In addition, ingestive behavior was often accompanied by locomotion, reflecting the social nature of Timor deer as gregarious animals. Resting behavior occurred most frequently in the morning for basking and at noon for sheltering, often followed by grooming behavior, which increased in the afternoon. Investigative behavior tended to be more frequently performed by females but also increased when visitors arrived or during feeding times. Fighting behavior occurred only among males, particularly during feeding. Overall, Timor deer in the Jatilengger Captivity spent most of their time feeding and moving in search of food, indicating that the management of the captivity is still suboptimal, as reflected by the insufficient fulfillment of feed requirements.*

**Keywords:** *Timor Deer; Daily Behavior; Ex-Situ.*

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### INTRODUCTION

Ethology is a branch of zoology that studies animal behavior (Zebua, 2022). Ethology aims to understand and observe how animals adapt to their environment, including in reproduction, social interactions, and daily activity patterns. According to Maha et al. (2021), Indonesia is a country with a wealth of fauna spread across various islands in the archipelago. One of the endemic animals that has high conservation, economic, and cultural value is the Timor deer (*Cervus timorensis*).

The Timor deer is an endemic mammal that is one of the native deer species in Indonesia belonging to the Cervidae family. The Timor deer originated from the island of Timor and several areas in Nusa Tenggara, but now it has spread to various other regions in Indonesia, such as Java and Kalimantan, and even abroad, such as Australia and Papua New Guinea. The Timor deer has a small body size, a concave forehead, short legs, relatively large incisors, a long tail, and brownish-yellow fur or hair (Maha et al., 2021). This species lives in groups with a fairly structured social hierarchy led by male deer with branched antlers, which are used as a sign of the male deer's power as the leader of the group.

Based on the IUCN Red List category, since 2008 the Timor deer has been classified as vulnerable. This status is due to the fact that the total native population of Timor deer in its native range is estimated to be less than 10,000 mature individuals, and is thought to have declined over three generations as a result of habitat loss and hunting by local communities (IUCN, 2015). Breeding is an effort to protect the deer population so that its existence is maintained, one of which is ex-situ breeding. One of the ex-situ breeding sites that is still a breeding site and an ecotourism park is the Deer Breeding Center in Jatilengger, Blitar Regency. The Jatilengger Breeding Center has a deer population of 126, consisting of 33 males, 64 females, and 29 fawns.

The complexity of the breeding center's facilities does not guarantee that management practices are being implemented properly. Good management is a crucial factor in breeding because if management

practices do not meet animal welfare standards, they can reduce the reproductive quality of the animals being conserved. A deer breeding program is highly dependent on the management practices applied, both in terms of maintenance and reproduction (Setiawan et al., 2015). The implementation of management practices such as providing quality food, shelter, and health services is one way to maintain appropriate management for conservation efforts. One way to determine whether the management practices applied in breeding are appropriate is to observe the daily behavior of deer under various microclimatic conditions measured by temperature and humidity.

## METHOD

This study was conducted at the Jatilengger Deer Breeding Center (Kesambi Trees Park) located in Jatianom, Pongkok District, Blitar Regency, East Java. The research was conducted for 24 hours, divided into 4 sessions, namely 00:00-06:00 WIB, 06:00-12:00 WIB, 12:00-18:00 WIB, 18:00-24:00 WIB for 30 days, starting on October 4, 2025, to November 2, 2025. The tools used in this study were CCTV, mobile phones, cameras, laptops, observation tables, spray paint, hygrometer, and writing instruments. The objects observed were 16 Timor deer (8 adult males and 8 adult females) in the Jatilengger Breeding Center.

Primary data, which contained information about the daily behavior of deer, included their daily movements, which comprised feeding behavior, locomotion, resting behavior, grooming behavior, investigative behavior, fighting behavior, and rubbing behavior. Secondary data included population structure (adult male and female) and microclimate (temperature and humidity). The data was obtained using the scan sampling method. Scan sampling involves recording all types of daily activities and behaviors of deer (adult males and females) that are the objects of study (Withaningsih, 2020). After that, it was analyzed using descriptive analysis methods with the help of images, diagrams, and explanatory descriptions. Observations were made directly and assisted by using a monitor screen connected directly to CCTV.

## RESULT AND DISCUSSION

This section presents the results obtained from observations conducted on the number of Timor deer performing various daily behaviors during each observation session. The observed behaviors included ingestive, locomotion, resting, grooming, fighting, investigative behavior, and rubbing, recorded through direct observation and CCTV monitoring. Each type of behavior was tabulated according to the observation period and analyzed using descriptive analysis to illustrate the daily activity patterns and the differences in behavioral frequency among individuals and between sexes.

**Table 1.** Average Deer Timor behavior

Behavior	Time	Average							
		00.00-06.00	Presentase (%)	06.00-12.00	Presentase (%)	12.00-18.00	Presentase (%)	18.00-24.00	Presentase (%)
	Temperature	23,8		26,3		29,0		25,5	
	Humidity	88,7		82,3		72,6		85,0	
Ingestif	Male	0,4 ± 2,80	4,6	4,2 ± 2,80	52,5	7,9 ± 2,80	98,5	2,1 ± 2,80	26,5
	Female	0,4 ± 2,74	5	4,3 ± 2,74	53,1	7,87 ± 2,74	98,3	2,5 ± 2,74	30,8
Locomotion	Male	0 ± 3,24	0	3,9 ± 3,24	48,5	8 ± 3,24	100	0,3 ± 3,24	3,3
	Female	0 ± 3,21	0	4 ± 3,21	49,8	7,9 ± 3,21	98,3	0,3 ± 3,21	3,3
Resting	Male	0,5 ± 2,15	5,8	4,7 ± 2,15	59	4,4 ± 2,15	55	0,05 ± 2,15	0,6
	Female	0,8 ± 2,39	9,8	5,4 ± 2,39	67,1	5 ± 2,39	62,3	0,1 ± 2,39	1,7
Grooming	Male	0,2 ± 1,55	2,7	2,7 ± 1,55	33,8	3,6 ± 1,55	45,2	0,05 ± 1,55	0,6
	Female	0,1 ± 1,36	0,8	0,9 ± 1,36	11,5	3,4 ± 1,36	42,7	0,07 ± 1,36	0,08
Fighting	Male	0,1 ± 0,86	3,1	0,9 ± 0,86	10,6	2,2 ± 0,86	26,9	0,1 ± 0,86	1,0
	Female	0	0	0	0	0	0	0	0
Rubbing	Male	0 ± 0,28	0	0,5 ± 0,28	5,8	0,6 ± 0,28	7,9	0,07 ± 0,28	0,0
	Female	0	0	0	0	0	0	0	0
Investigative	Male	1,2 ± 1,45	3,1	3,2 ± 1,45	35,4	4,0 ± 1,45	46,5	1,5 ± 1,45	7,1
	Female	1,4 ± 1,86	3,5	3,9 ± 1,86	45,6	4,8 ± 1,86	61,5	2,2 ± 1,86	14

Based on the data in (Table 1), deer feeding behavior shows varying activity patterns between males and females at different observation times. In the early morning (00:00–06:00), feeding activity was very low, at  $0.4 \pm 2.80$  for males and  $0.4 \pm 2.74$  for females, only about 4.6% and 5% of total daily activity at a temperature of 23.8°C and humidity of 88.7%. Feeding activity increased significantly in the morning to afternoon (06:00–12:00) to  $4.2 \pm 2.80$  for males and  $4.3 \pm 2.74$  for females, with more than half of the population participating (52.5% and 53.1%) at a temperature of 26.2°C and humidity of 82.3%. Peak

feeding activity occurred in the afternoon to evening (12:00–18:00) with the highest frequency of  $7.9 \pm 2.80$  for males and  $7.87 \pm 2.74$  for females (98.5% and 98.3%) even though the temperature reached 29°C with the lowest humidity of 72.6%. Activity then decreased at night (18:00–24:00) to  $2.1 \pm 2.80$  for males and  $2.5 \pm 2.74$  for females (26.5% and 30.8%) at a temperature of 25.5°C and humidity of 85.0%. Overall, the period from noon to evening was the main feeding time with the participation of almost the entire population, followed by secondary activity in the morning, while minimal activity occurred in the early morning.

Based on observation data (Table 1) of deer locomotion behavior at various times of the day (WIB), there are differences in activity patterns between males and females. In the early morning period (00:00–06:00), no locomotor activity was found in either sex ( $0 \pm 3.24$  for males and  $0 \pm 3.21$  for females), which means that no individuals moved during the six hours of observation under conditions of 23.8°C temperature and 88.7% humidity. Locomotor activity began to increase in the morning to noon (06:00–12:00) with a frequency of  $3.9 \pm 3.24$  for males and  $4 \pm 3.21$  for females, indicating that almost the entire deer population began to move at a temperature of 26.2°C and humidity of 82.3%, with activity percentages reaching 48.5% for males and 49.8% for females. The peak of locomotor activity occurred in the afternoon to evening (12:00–18:00) with the highest frequency of  $8 \pm 3.24$  for males and  $7.9 \pm 3.21$  for females, indicating that all males and almost all females were actively moving even though the temperature reached its highest point of 29°C and the lowest humidity of 72.6%, with activity percentages of 100% and 98.3%, respectively. Activity then decreased dramatically at night (6:00 p.m.–12:00 a.m.) to  $0.3 \pm 3.24$  for males and  $0.3 \pm 3.21$  for females (3.3%), indicating that only a small proportion of individuals were moving at a temperature of 25.5°C and humidity of 85.0%. This pattern shows that deer are more collectively active during the day until the afternoon with the participation of almost the entire population, even though the temperature and humidity conditions are not optimal.

Based on observation data (Table 1) of deer resting behavior at various times of the day, there appears to be a variation in resting patterns between males and females. In the early morning period (00:00–06:00), resting activity was relatively low, with a frequency of  $0.5 \pm 2.15$  for males and  $0.8 \pm 2.39$  for females, meaning that only a small proportion of individuals rested, accounting for 5.8% and 9.8% of total daily activity at a temperature of 23.8°C and humidity of 88.7%. Resting activity increased significantly in the morning to afternoon (06:00–12:00) with the highest frequency of  $4.7 \pm 2.15$  for males and  $5.4 \pm 2.39$  for females, indicating that almost the entire population rested, with a percentage of 59% for males and 67.1% for females, at a temperature of 26.2°C and humidity of 82.3%. In the afternoon to evening (12:00–18:00), the resting frequency decreased slightly to  $4.4 \pm 2.15$  for males and  $5 \pm 2.39$  for females, but more than half of the population was still resting (55% and 62.3%) even though the temperature reached a peak of 29°C with the lowest humidity of 72.6%. A drastic decrease occurred at night (18:00–24:00) with a frequency of only  $0.05 \pm 2.15$  for males and  $0.1 \pm 2.39$  for females (0.6% and 1.7%) at a temperature of 25.5°C and humidity of 85.0%, indicating that almost no individuals rested during this period.

Based on observation data (Table 1) of deer grooming behavior at various times of the day, there appears to be a variation in self-care activity patterns between males and females. In the early morning period (00:00–06:00), grooming activity was very low, with a frequency of  $0.2 \pm 1.55$  for males and  $0.1 \pm 1.36$  for females, meaning that only a small proportion of individuals groomed themselves, accounting for 2.7% and 0.8% of total daily activity at a temperature of 23.8°C and humidity of 88.7%. Grooming activity increased significantly in the morning to afternoon (06:00–12:00) with a frequency of  $2.7 \pm 1.55$  for males and  $0.9 \pm 1.36$  for females, indicating that about one-third of the male population engaged in self-care, while only a small proportion of females were involved, with percentages of 33.8% and 11.5%, respectively, at a temperature of 26.2°C and humidity of 82.3%. Peak grooming activity occurred from noon to evening (12:00–18:00) with the highest frequency of  $3.6 \pm 1.55$  for males and  $3.4 \pm 1.36$  for females, indicating that nearly half of the population groomed themselves (45.2% and 42.7%) despite temperatures reaching a high of 29°C with the lowest humidity of 72.6%. Grooming activity then decreased dramatically at night (6:00 PM–12:00 AM) to  $0.05 \pm 1.55$  for males and  $0.07 \pm 1.36$  for females (0.6% and 0.8%) at a temperature of 25.5°C and humidity of 85.0%, indicating that almost no individuals groomed during this period.

Based on observation data (Table 1) regarding deer fighting behavior at various times of the day, there is a very clear difference in aggressive activity between male and female deer. During the early morning period (00:00–06:00), fighting activity showed a very low frequency of  $0.1 \pm 0.86$  for males and 0 for females, meaning that only a small proportion of the eight male deer were involved in aggressive behavior, with a percentage of 3.1%. while no females exhibited this behavior at a temperature of 23.8°C

and humidity of 88.7%. Fighting activity increased in the morning to afternoon (06:00–12:00) with a frequency of  $0.9 \pm 0.86$  for males and remained 0 for females, indicating that about one-eighth of the male population was involved with a percentage of 10.6%, while females did not show any aggressive behavior at all. Microclimate conditions during this period, namely a temperature of 26.2°C and humidity of 82.3%, appeared to trigger an increase in aggressive activity in males. The peak of fighting behavior occurred from noon to evening (12:00–18:00) with the highest frequency of  $2.2 \pm 0.86$  for males and 0 for females, which means that about a quarter of the male population was involved in fighting with a percentage of 26.9%, despite temperatures reaching a high of 29°C and humidity dropping to a low of 72.6%. Fighting activity then decreased dramatically at night (6:00 p.m. to midnight) to  $0.1 \pm 0.86$  for males and 0 for females (1.0% and 0%), indicating that only a small proportion of males remained aggressive at a temperature of 25.5°C and humidity of 85.0%.

Based on observation data (Table 1) of rubbing behavior in deer at various times of the day, it appears that this activity has a very specific and limited pattern. In the early morning period (00:00–06:00), no rubbing activity was found with a frequency of  $0 \pm 0.28$ , meaning that none of the eight deer individuals rubbed their bodies or antlers during the six hours of observation, with a percentage of 0% at a temperature of 23.8°C and humidity of 88.7%. Rubbing activity began to appear in the morning to afternoon (06:00–12:00) with a frequency of  $0.5 \pm 0.28$  in males, indicating that only a small proportion of males began to exhibit this behavior with a percentage of 5.8%, at a temperature of 26.2°C and humidity of 82.3%, which seemed to support the emergence of this behavior. The peak of rubbing activity occurred from noon to evening (12:00–18:00) with the highest frequency of  $0.6 \pm 0.28$  for males, which means that less than one-tenth of the male population performed this behavior with a percentage of 7.9%, even though the temperature reached its highest point of 29°C with the lowest humidity of 72.6%. Rubbing activity then decreased to almost nothing at night (6:00 PM–12:00 AM) with a frequency of  $0.07 \pm 0.28$  (0.0%) at a temperature of 25.5°C and humidity of 85.0%. This pattern indicates that rubbing behavior is a very rare activity, with less than 10% of the male population engaging in it during the day.

Based on observation data (Table 1) of deer investigative behavior at various times of the day, there appears to be a pattern of exploratory activity that varies between male and female deer. In the early morning (00:00–06:00), investigative activity was still low, with a frequency of  $1.2 \pm 1.45$  in males and  $1.4 \pm 1.86$  in females, or about 15.2% and 18.1% of total daily activity under conditions of 23.8°C temperature and 88.7% humidity. Activity increased significantly from morning to noon (06:00–12:00) with a frequency of  $3.2 \pm 1.45$  in males and  $3.9 \pm 1.86$  in females, indicating the participation of approximately 40% of males and nearly 50% of females under a temperature of 26.2°C and humidity of 82.3%, which appears to be the optimal time for investigative activity. Peak activity occurred in the afternoon to evening (12:00–18:00) with the highest frequency of  $4.0 \pm 1.45$  for males and  $4.8 \pm 1.86$  for females (50.0% and 59.4%), even though the temperature reached 29°C and the lowest humidity was 72.6%. Activity then decreased at night (18:00–24:00) to  $1.5 \pm 1.45$  for males and  $2.2 \pm 1.86$  for females (18.8% and 27.3%) under conditions of 25.5°C temperature and 85.0% humidity. Overall, the period from noon to evening was the main time for investigative activity, with female deer showing higher frequencies in all observation periods.

## Discussion

This section presents the results obtained from observations made on the number of Timor deer engaging in various daily behaviors during each observation session. The behaviors observed included feeding, moving, resting, grooming, fighting, investigative behavior, and rubbing, which were recorded through direct observation and CCTV monitoring.

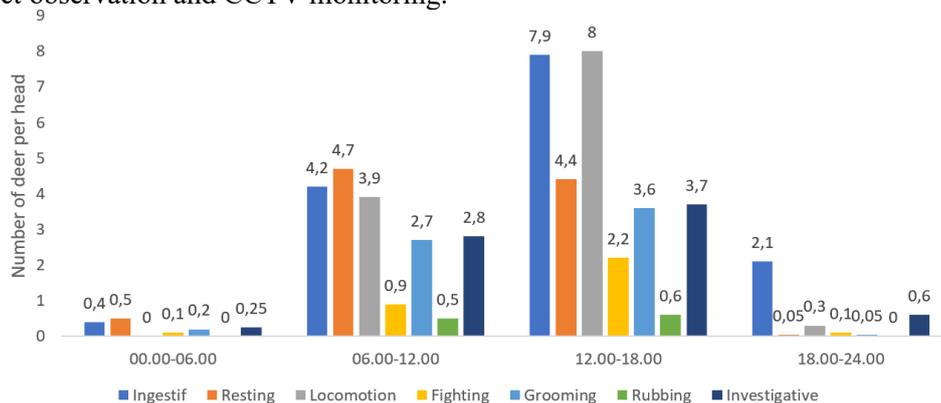
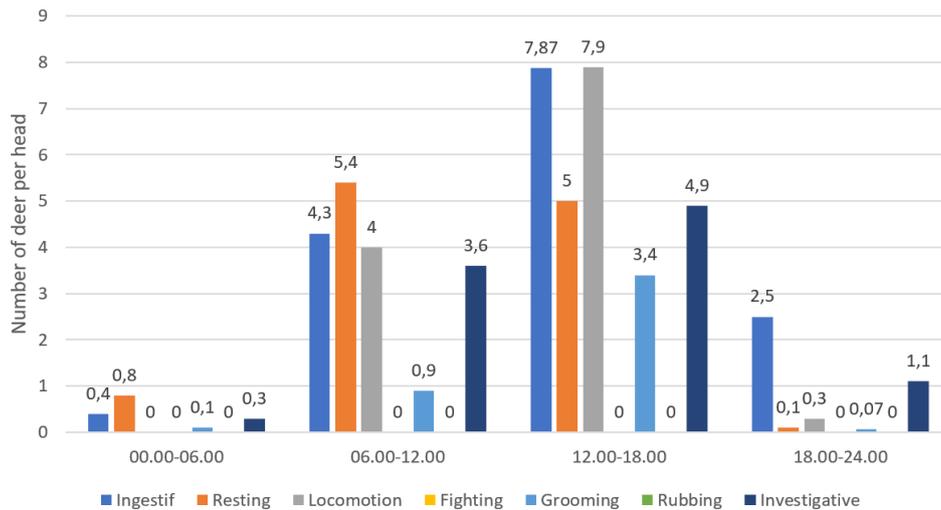


Figure 1. Average male dialy behavior



**Figure 2.** Average female daily behavior

Deer feeding activity patterns peaked between 12:00 and 18:00, when almost the entire population of 7.9 males (Figure 1) and 7.87 females (Figure 2) were feeding. The daily activity of Timor deer occurs more in areas under tree shade, with a peak in the afternoon until early evening (Ali, 2019; Aminullah et al., 2022). This indicates that Timor deer tend to carry out their main feeding activity during the day when food is easily accessible and environmental conditions support social activity (Moitleti et al., 2020). The high feeding activity at a temperature of around 29°C was due to energy requirements after morning rest and the availability of fresh food, while low feeding activity in the early morning (00:00–06:00) indicated that deer preferred to rest due to low temperatures, high humidity, and limited visibility. The patterns between males and females show similarities without significant differences in each time range, with almost the entire population involved at peak activity. The presence of visitors also affects feeding activity levels, where some deer are accustomed to and even approach visitors carrying food, in line with the opinion of Kasiyati et al. (2024) that the feeding behavior of Timor deer on weekdays and weekends is influenced by the number of visitors. Feeding activities by visitors on weekends increased the frequency and duration of deer feeding. At night (6:00 p.m.–12:00 a.m.), females showed slightly higher feeding activity, namely 2.5 deer (Figure 1) or 30.8% compared to males at 2.1 deer (Figure 2) or 26.5%, reflecting the physiological adaptation of females in meeting their energy needs for reproduction and lactation. The dominance of feeding activity during the day (98.3–98.5%) indicates that feed availability and quality are the main factors influencing deer feeding times, rather than environmental temperature or humidity.

The activity patterns of Timor deer (*Cervus timorensis*) show that peak movement occurs between noon and evening (12:00–18:00 WIB), with all male deer and almost all female deer participating in this activity. During the observation period from morning to afternoon, male deer moved more than females because, in addition to foraging, males also moved to mark their territory by rubbing their antlers on nearby tree trunks (Putri et al., 2023). The high activity during this period indicates that deer are more active when light is at its maximum, despite high ambient temperatures and low humidity, reflecting the deer's ability to adapt to environmental conditions by increasing locomotor activity as needed to forage and explore their enclosure. Timor deer move by walking or running to find food in the form of vegetation from the surrounding grass (Alfarizi and Musyarrafah, 2023), while also reflecting strong social behavior within their group, where most individuals move together at the same time. The absence of locomotor activity in the early morning (12:00 a.m.–6:00 a.m.) and decreased activity at night (6:00 p.m.–12:00 a.m.) indicate that deer use this time to rest and conserve energy due to low temperatures and increased humidity. The activity patterns between males and females are almost similar, with males showing a slightly higher tendency to move due to their dominant nature in guarding their territory and observing their surroundings. Overall, the locomotion patterns of Timor deer in captivity are greatly influenced by time, microclimate conditions, and social dynamics within the group, with adult males showing the highest level of activity because, in addition to foraging, they also move around to chase away other males (Sofyan and Setiawan, 2018).

The resting activity pattern of Timor deer (*Cervus timorensis*) peaks in the morning (06:00–12:00 WIB) with almost the entire population of 4.7 males (Figure 1) and 5.4 females (Figure 2) out of 8 individuals resting. Resting behavior in captivity tends to be done in groups under the roof of the cage or under the shade of trees (Putri et al., 2023), indicating physiological adaptation after feeding activities in

the morning to reduce heat stress and maintain body energy balance. Female deer show a greater number of individuals resting than males, especially in the morning. According to Dewi et al. (2024), deer rest without shade in the morning and evening, while during the day they rest in the shade to avoid sun exposure and maintain a stable body temperature. Differences in body size and energy requirements between males and females affect the allocation of activity time, where females with smaller body mass are more sensitive to temperature changes and require longer rest periods to maintain thermoregulatory efficiency. The dominance of resting activity in the morning to midday (59–67.1%) indicates that microclimate factors, particularly environmental temperature, play a major role in determining the collective resting patterns of deer, compared to nighttime, which is more commonly used for feeding and movement.

Timor deer grooming activity peaks between 12:00 p.m. and 6:00 p.m., with nearly half of the population of 3.6 males (Figure 1) and 3.4 females (Figure 2) engaging in this activity. This indicates that grooming is more common during the day when the temperature is around 29°C and blood-sucking insects are more active. Grooming activity serves to reduce ectoparasite disturbance while also aiding in the body's thermoregulation process. Grooming is a social behavior involving contact with the fingers, teeth, and tongue, divided into autogrooming (cleaning oneself) and allogrooming (cleaning each other). Autogrooming is performed when deer graze, such as cleaning food residue by rubbing their mouths against their legs (Latifah, 2022), while in captivity, deer also lick their tails, backs, and sniff their young (Murpreatiwi et al., 2023). This activity is important for maintaining skin cleanliness and physiological comfort, while low grooming in the early morning and evening (00:00–06:00 and 18:00–24:00) indicates the influence of external factors such as decreased light intensity and insect activity. Male deer show a higher grooming frequency than females, especially in the morning (2.7 vs. 0.9 deer, or 33.8% vs. 11.5%), with adult males grooming most frequently (Sofyan and Setiawan, 2018). According to Aliansyah et al. (2025), male deer are more active due to the need for coat maintenance and competitive social behavior that requires peak physical condition. However, at midday (12:00–18:00), the difference becomes small (45.2% vs. 42.7%), indicating that environmental factors such as temperature and insect disturbances are more dominant in triggering grooming behavior than biological factors.

Timor deer fighting activity peaks between 12:00 p.m. and 6:00 p.m., with about a quarter of the male population (2.2 deer) involved, while females do not exhibit this behavior at all, indicating that Timor deer aggression is closely related to social competition for food, territory, and females. Fighting behavior is generally carried out to compete for power, females, or food (Pudjirahaju et al., 2023), and often occurs to drive other deer away from food sources, as explained by Amiati et al. (2015) that adult male deer tend to be more dominant in competition for food. The high level of fighting activity at a temperature of around 29°C is related to increased general activity in the population, which triggers direct interactions between individuals. The low level of fighting activity in the early morning and at night indicates that this behavior occurs more frequently when visibility is high because it involves visual cues such as body posture, head movements, or antler fighting, which require sufficient lighting. In addition, at night, food availability decreases, reducing the likelihood of fighting. The absence of fighting behavior in females reinforces that this behavior is a competitive strategy specific to males to maintain dominance and social position within the group, while females tend to avoid physical conflict. The concentration of fighting activity during the day (26.9%) also shows that social factors such as dominance hierarchy and interactions between males are more influential than environmental factors, such as the rainy season, which marks the beginning of the mating season and triggers aggressive behavior in Timor deer, in line with the statement by Gusmalinda et al. (2018) that antler fighting between males is a form of competition.

The rubbing activity pattern peaked between 12:00 and 18:00, with only a small portion of the male population (0.6 individuals or 7.9%)(Figure 1). Rubbing behavior is also performed to sharpen the male's antlers, which are used as weapons for self-defense and fighting with other deer (Withaningsih et al., 2020). The low frequency of this behavior compared to other activities indicates that rubbing is a specific behavior that requires certain social conditions, such as the presence of competing males or a period of increased testosterone when entering the mating season. Observations show that only male deer engage in rubbing, while females do not exhibit this behavior at all. This indicates a difference in behavior related to morphology between the two sexes. In addition, rubbing behavior is mostly performed by adult male deer with large antlers. In a study by Maretta et al. (2021), the behavior of playing alone in the form of butting trees was observed in 0.79% of adult male deer, 0% of adult female deer, 0% of adolescent male deer, and 0% of adolescent female deer. This behavior only occurs in adult male deer because the antlers of juvenile deer are still vulnerable to friction or impact, which can damage their shape. Thus, this behavior can be categorized as a form of non-routine social activity that plays an important role in the communication

mechanism and male dominance behavior within the Timor deer group in captivity.

Investigative activity is a condition in which deer focus their hearing to be alert and analyze potential threats, characterized by stopping activity, raising their heads, and staring in the direction considered dangerous (Kabo et al., 2025). This behavior peaks between 12:00 p.m. and 6:00 p.m. with about half to more than half of the population involved. This activity indicates an increase in deer alertness during the day to detect the presence of visitors or unfamiliar sounds, and often coincides with feeding times (Alfarizi and Musyarrafah, 2023). The high level of investigative activity at the highest temperatures reflects an increase in population activity as a form of adaptation to the environment, while in the early morning this behavior is also quite high in response to surrounding conditions. Female deer show a higher frequency of investigative behavior than males throughout the entire period, especially during peak activity (59.4% vs. 50.0%), indicating a greater level of vigilance in maintaining environmental safety and protecting their young. This is in line with the research by Moileti et al. (2020) that the investigative behavior of males and females ranges from 7.41–7.87% of total daily activity, with a higher percentage for females. This activity often occurs collectively when deer detect the arrival of feed from the main gate or the presence of many visitors in the enclosure, especially in females who are more sensitive to environmental disturbances. Proudman et al. (2020) also reported that deer adjust their vigilance behavior based on the pattern of threats from humans and predators.

## CONCLUSION

This study successfully identified the daily behavior patterns of adult Timor deer (*Cervus timorensis*) at the Jatilengger Breeding Center based on gender, with ingestive activity being the dominant behavior that peaked in the afternoon (12:00-18:00 WIB), followed by locomotion, resting, investigative behavior, grooming, fighting, and rubbing. The high frequency of ingestive and locomotion activities indicates that breeding management, particularly in meeting feeding needs, is still not optimal and needs to be improved to enhance animal welfare, as confirmed through interviews with managers who stated that budget constraints were the main obstacle to maximizing the deer's needs. Behavioral differences based on sex show that males are more dominant in fighting and rubbing behaviors, while females have higher levels of alertness (investigative), reflecting their respective social and reproductive roles in the group. The high level of investigative behavior also indicates that the presence of visitors is still considered a threat to some deer, although others have adapted and consider visitors as an additional source of food. This study provides basic information on the ex-situ ethology of Timor deer that can be used as a reference in improving captive breeding management practices, and recommends that relevant parties such as the Forest Protection Unit (KPH) actively participate in supporting conservation efforts at the Jatilengger Deer Breeding Center by assisting in the development of more sustainable management programs.

## REFERENCES

- Alfarizi, B. L., and Musyarrafah, A. N. (2023). Studi Perilaku Harian Rusa Timor (*Cervus timorensis*) di Kawasan Savana Bekol Taman Nasional Baluran Situbondo. *Evolusi: Journal Of Mathematics And Sciences*, 7(1), 24-31.
- Amiati, A.D., Masyud, B., Garsetiasih, R. (2015). Pengaruh Pengunjung Terhadap Perilaku dan Pola Konsumsi Rusa Timor (*Rusa timorensis* de Blainville 1822) di Penangkaran Hutan Penelitian Dramaga. *Jurnal Plasma Nutfah*, 21(2), 47–60.
- Aminullah, M. A., Syaputra, M., & Sari, D. P. (2022). Nutrisi pakan dan aktivitas makan rusa timor (*rusa timorensis*) di penangkaran rusa wisma daerah kabupaten sumbawa. *IWORS 2025*, 1(1), 77-85.
- Dewi, B. S., Nurjanah, S. N., Iswandaru, D., dan Harianto, S. P. 2024. Studi Perilaku Harian Rusa Timor (*Cervus timorensis*) Di Penangkaran Rusa Universitas Lampung. *Journal Of People, Forest And Environment*, 4(1), 45-55.
- Fauzi, F., Madiyahati, M., Rizal, M., & Luhan, G. (2022). Aktivitas Harian Rusa Sambar (*Cervus unicolor* Kerr.) di Penangkaran Rusa Nanga Bulik Kabupaten Lamandau. *Jurnal Hutan Tropis*, 10(3), 284-294.
- IUCN. (2015). International Union for Conservation of Nature and Natural Reserves. *The Redlist of Threatened Species*. Diakses: 05 juni 2018 <http://www.iucnredlist.org>.

- Kasiyati, K., Husna, N. L., Djaelani, M. A., Setiawan, H. T., Puri, N. L., dan Alrais, A. (2024). Studi Perilaku Harian Rusa Timor (*Cervus timorensis*) di Lembaga Konservasi PT Taman Satwa Semarang. *Jurnal Sain Veteriner*, 42(2), 202-211.
- Kobu, T., Leo, N. M., & Manu, C. M. (2025). Perilaku Harian Rusa Timor (*Cervus Timorensis*) Di Taman Nasional Manupeu Tanah Daru Sumba Tengah Nusa Tenggara Timur. *JUPENJI: Jurnal Pendidikan Jompa Indonesia*, 4(3), 27-37.
- Latifah, L. (2022). Social behavior of Timor Deer (*Cervus Timorensis*, de Blainville 1822) in Menjangan Island, West Bali National Park. *Biogenesis: Jurnal Ilmiah Biologi*, 10(2), 190-195.
- Maha, I. T., Manafe, R. Y., Amalo, F. A., dan Selan, Y. N. 2021. Karakteristik Morfologi Rusa Timor (*Rusa Timorensis*) dengan Pemeliharaan Ex Situ Di Kota Kupang. *Jurnal Acta Veterinaria Indonesiana*, 9(1), 1-13.
- Maretta, G., Agustin, K. S., Putri, C. T., dan Sofyan, I. (2022). Daily Behavior of the Timor Deer (*Cervus timorensis*) at The Tahura of Wan Abdul Rachman Lampung of Tahura in Year 2021. *Jurnal Pembelajaran Dan Biologi Nukleus*, 8(2), 263-272.
- Moileti, A. A., Seran, W., dan Kaho, N. P. R. (2020). Perilaku Harian Rusa Timor (*Rusa Timorensis*) Di Taman Wisata Alam Pulau Menipo, Kabupaten Kupang Nusa Tenggara Timur. *Jurnal Wana Lestari*, 2(01), 11-20.
- Murpratiwi, N. S., & Nurliani, A. (2023). Studi Perilaku Harian Rusa Sambar (*Cervus Unicolor*) Di Penangkaran Rusa Sambar Edupark, Banjarbaru. *Bioscientiae*, 20(2), 81-94.
- Proudman, N. J., Churski, M., Bubnicki, J. W., Nilsson, J. Å., & Kuijper, D. P. J. (2020). *Rusa merah menyesuaikan perilaku kewaspadaan berdasarkan pola risiko spasial-temporal dari pemburu manusia dan predator alami*. *Wildlife Research*, 48(2), 163-174.  
<https://doi.org/10.1071/WR20059>
- Pudjirahaju, A., Ma'rifah, S., Sujoko, H., Astuti, M. H., & Mardian. (2023). Aktivitas harian Rusa Sambar di penangkaran ex-situ Provinsi Kalimantan Tengah. *Buletin Veteriner Udayana*, 16(3), 497–505.  
<https://pdfs.semanticscholar.org/f04f/e42029d1cb63906cd998f3d7e5df93ea8dd4.pdf>
- Putri, A. F., Zega, D. J., dan Atifah, Y. (2023). Perilaku Rusa Timor (*Cervus Timorensis*) Di Penangkaran Rusa Fakultas Peternakan Unand. *Jurnal Prosiding Seminar Nasional Biologi*. 3(1), 672-676.
- Setiawan, A., Suryanto, E., dan Herawati, E. Y. (2015). Aktivitas harian Rusa Timor (*Cervus timorensis*) di Taman Wisata Alam Gunung Baung, Jawa Timur. *Buletin Veteriner Udayana*, 7(2), 145–153. Universitas Udayana.
- Sofyan I. dan Setiawan, A. (2018). Studi Perilaku Harian Rusa Timor (*Cervus Timorensis*) Di Penangkaran Rusa Tahura Wan Abdul Rachman. Lampung. *Journal Biologi Eksperimen dan Keanekaragaman Hayati*, 5(1), 67-76.
- Sofyan, I. (2018). *Studi perilaku harian Rusa Timor (Cervus timorensis) di penangkaran*. *Jurnal Biologi Tropis*, 18(2), 45–52.
- Withaningsih, S., Parikesit, dan Fazriani, Y.N. (2020). Pola Aktivitas Harian Rusa (*Cervus Timorensis*, Blainville, 1822) Di Penangkaran Rusa Cagar Alam Pananjung Pangandaran. *Jurnal Biotika*. 18(1), 17-24.
- Zebua, E. N. K. (2022). Studi Etologi Semut Rangrang (*Oecophylla Smaragdina*) pada Kondisi Habitat yang B