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## Daily Behavior of Male and Female Nuri Talaud (*Eos Histrio Talautensis*, Muller Pls 1776) in Captivity

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### Abstract

Nuri talaud or talaud parrot (*Eos histrio talautensis*, Muller PLS 1776) is included on the list of protected wild species. Conservation is an alternative way to save this species from extinction. This study aimed to determine the daily behavior of male and female talaud parrots (*Eos histrio talautensis*, Muller PLS 1776) in captivity. The variables observed included moving behavior, feeding, body care and rest. This study used a descriptive method with direct observations of individual bird behavior. Focal animal sampling was used as a method for recording behavior, which means observing one individual for a certain amount of frequency and recording all examples of behavior. Observations were made on 2 birds of male and female sexes. Every individual bird was observed every day from 6:00 a.m. to 6:00 p.m. The male and female talaud parrots showed differences in locomotive behavior, ingestive and body care and resting. The difference in the duration of behavior can be used as an indicator to determine the sex of talaud parrot for reproductive purposes.

**Keywords:** daily behavior; Nuri talaud; captivity.

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## **1. Introduction**

Talaud parrot (*Eos histrio talautensis*, Muller PLS 1776) is a bird that belongs to an endemic species. This bird, which is an animal protected by the government (PP No. 7 of 1999 concerning Preservation of the Types of Plant and Wildlife), has an endangered status according to the IUCN (International Union for Conservation of Nature and Natural Resources) Red List [1] and has entered the List of Appendices I of CITES (Convention on International Trade on Endangered Species of Flora and Fauna). The decrease in population due to uncontrolled human activities through illegal hunting or disrupting of forest functions for human interest as plantation land and illegal logging and government's inconsistency on implementing the rules. For conservation efforts to protect Talaud parrot from the threat of population decline, it is necessary to conduct breeding efforts. Daily behavior is one of the factors that need to be understood in the success of a breeding effort in terms of matchmaking for breeding. Because talaud parrot is a monomorphic bird, it is difficult to distinguish the sex (male and female) by naked eye because the morphology is the same, so it is difficult to choose the partner to be mated. One way to distinguish male and female sex of talaud parrots is by observing their behavior. Male and female talaud parrots generally have the same daily behavior but with a different duration of behavior. Based on behavioral differences, there will be several kinds of daily behavior that can be used as indicators in determining the sexes of talaud parrots. Research on the daily behavior of the male and female talaud parrots in captivity is expected to help provide input to the bird lovers. Observation of daily behavior in captivity is the main step to determine policies in managing wild animals to determine breeding systems that are in accordance with ex-situ conservation programs [18].

## **2, Materials and Methods**

This research was conducted from September 2016 to March 2017 through habitat observations in SM Karakelang, Talaud Islands and observations at the Conservation Center of Natural Resources in Manado, North Sulawesi. The objects used were two talaud parrots—one male and one female—in a cage measuring 3 m x 1.5 m x 3 m equipped with a nest, perch, bathing container, drinking container, and feeding container. The tools used in the study were a digital camera, CCTV, watch, hygrometer.

## **3, Research Methods**

Observations of daily behavior were carried out every day for 12 hours starting from 6:00 a.m. to 6:00 p.m. using a Focal Animal Sampling method [3] which used CCTV. The observed variables included daily behavior of moving, feeding, body care and resting in the form of bathing, tracing, cleaning the feet, cleaning the hair, cleaning the beak, scratching, resting on the back, stretching the wings and tail, hanging, eating, drinking, biting the perch, pecking, climbing, jumping, flying, walking that is done per day into the ethogram table [10]. An ethogram is a list of definitions of behavior that are appropriate and related to a particular species (talaud parrot) which are usually grouped into categories according to the types of behavior (Table 1). Taking pictures used a digital camera. The average calculation of daily behavior and percentage used the formula [15]. Behavioral data obtained from observations were processed into a proportion of behavioral categories. The results of the calculation of these proportions were then presented in the form of Tables and Graphs with their description.

$$Pt = \frac{\text{Amount of behavior duration}}{\text{Amount of duration of all types of behavior}} \times 100$$

**Table 1:** Etogram of Talaud Parrots

Type of Behavior	Behavior	Behavior Description
Locomotive	Walking	The bird behavior when stepping foot slowly on the perch.
	Flying	The bird behavior in time of getting shocked, avoiding the keeper and looking for a place to rest, eat and drink and bathe with the front body being bent at the beginning of the flight.
	Jumping	The bird behavior when moving places in short distances.
	Climbing	The bird behavior when walking on the frame or wire wall when taking food.
Ingestive	Pecking	The bird behavior when eating food.
	Biting perches	The bird behavior while perching after eating behavior.
	Using feet to eat	The bird behavior when taking food.
	Drinking	The bird behavior when using papillae to take drinking water.
Istirahat	Hanging	The bird behavior performing activities on the perch or on the walls of the frames.
	Stretching the wings, tail	The bird behavior after resting or doing other behaviors to stretch muscles.
	Resting	The bird behavior on the perch when resting and being alert.
	Scratching	The bird behavior when cleaning its body by using its finger nails.
Perawatan tubuh	Cleaning the beak	The bird behavior when cleaning its beak by rubbing it on the perch.
	Feather	The bird behavior when cleaning its feathers with its beak.
	Legs	The bird behavior when cleaning its legs with its beak.
	Tracing	The bird behavior when cleaning its body with its beak.
	Bathing	The bird behavior when cleaning its body with its beak.
		The bird behavior when cleaning its feathers and cooling the temperature of its body by dipping it in the bath

#### 4. Results and Discussion

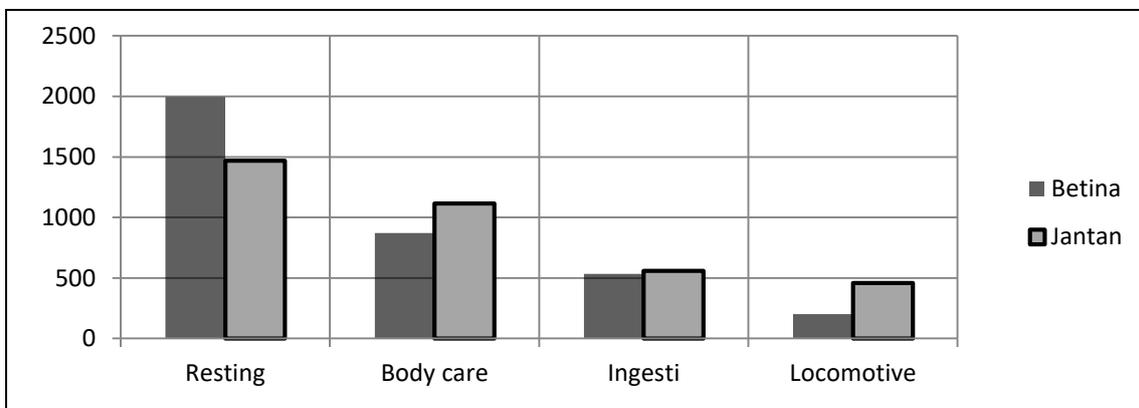
##### 4.1. Behavior of Nuri Talaud

The observation results in Table 1 showed the duration and percentage of daily behavior of adult male and female Nuri Talaud during observation at the cage of BKSDA Manado for 12 hours starting from 6:00 to 18:00. Based on Figure 1 the daily behavior was categorized into four types of main daily behavior, namely locomotive, feeding (ingestive) and body care and resting.

**Table 2:** Average, Percentage of Male and Female Nuri Talaud Daily Behavior

Behavior	Male		Female		Amount	%
	(minutes)	%	(minutes)	%		
Resting	1467.4	40.8	1995.7	55.4	3463.1	48.1
Body care	1115.6	31.0	870.8	24.2	1986.4	27.6
Feeding (Ingestive)	557.2	15.5	532	14.8	1089.2	15.1
Moving (Locomotive)	458.7	12.7	201.5	5.6	660.2	9.2

Resting behavior (hanging, stretching wings and tail, perching) was the highest daily behavior of 3641.1 minutes with a percentage of 48.1% of 7200 minutes (male and female). The average resting behavior of Nuri Talaud for male was 1467.4 minutes (40.8%) and female 1995.7 minutes (55.4%).



**Figure 1:** Daily Behavior of Nuri Talaud

Treatment cleanses the body (scratching, cleaning the beak, feathers, legs and bathing) was the second highest feeding behavior. The average duration for the male was 1986.4 minutes (27.6%). The average duration of body cleaning behavior for the male was 1115.6 minutes (31.0%) and for the female 870.8 minutes (24.2%). Feeding behavior (pecking, biting, using feet,) was the third highest, namely 1089.2 minutes with a percentage of 15.1% from 7200 minutes (male and female). For feeding behavior, the average duration for the male was 557.2 minutes (15.5%) and for the female was 532 minutes (14.8%). Moving behavior (walking, flying, jumping, climbing) was the fourth highest behavior, namely 660.2 minutes with a percentage of 9.2% from 7200 minutes (male and

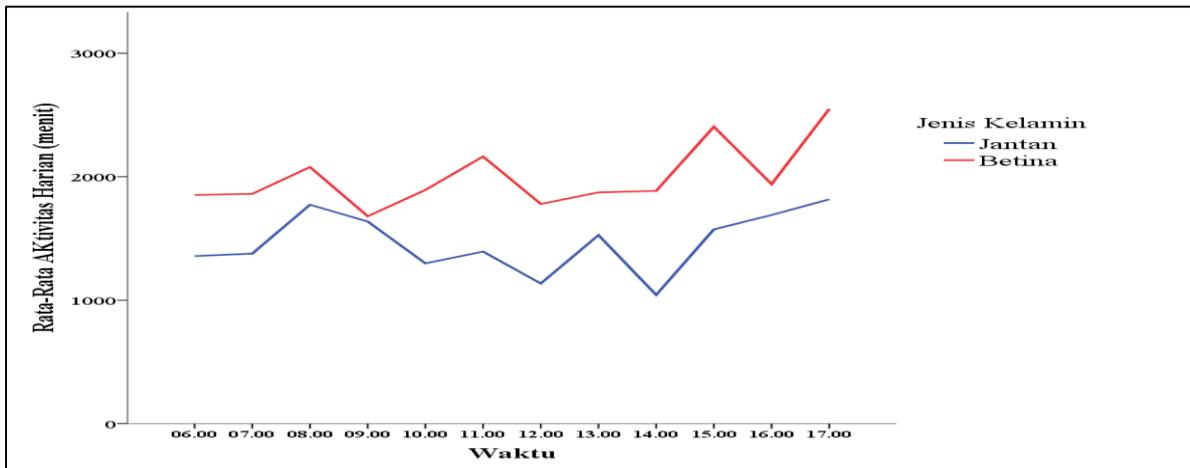
female). The average duration of moving behavior for the male was 458.7 minutes (12.7%) and for the female s 201.5 minutes (5.6%).

**Table 2:** Daily Behavior (minutes) and Percentage (%) of Female and Male Nuri Talaud

Behavior		Male		Female		Test t
		(minutes)	(%)	(minutes)	(%)	
Resting	Hanging	42,3	1,2	509,5	14,2	**
	Stretching wings and tail	102,1	2,8	64,1	1,8	tn
	Perching	1323,9	36,8	1422,1	39,5	tn
Body	Rubbing	277,4	7,7	94,5	2,6	**
Care	Cleaning the beak	163,2	4,5	126,2	3,5	tn
	Cleaning the feathers	114,8	3,2	91,8	2,6	tn
	Cleaning feet	20	0,6	5	0,1	**
Feeding	Tracing	428,7	11,9	549	15,3	tn
	Bathing	111,5	3,1	4,3	0,1	**
	Pecting	291,7	8,1	348,8	9,7	tn
Moving	Biting the perch	85,6	2,4	79,5	2,2	tn
	Using feet	3,7	0,1	2,2	0,1	tn
	Drinking	176,2	4,9	101,5	2,8	tn
	Walking	280,3	7,8	47,1	1,3	*
Moving	Flying	10,8	0,3	13,1	0,4	tn
	Jumping	6,9	0,2	2,5	0,1	tn
	Cleaning	160,7	4,5	138,8	3,9	tn

#### 4.2. Resting Behavior

Observation results as recorded in Table 2 show that the bird resting behavior include hanging, stretching wings and tail and perching. The duration of hanging behavior for the male was 42.3 minutes (1.2%) and for the female 509.5 minutes (14.2%), which was significantly different ( $p < 0.01$ ) based on the average difference test. The duration of stretching wings and tail behavior for the male was 102.1 minutes (2.8%) and for the female 64.1 minutes (1.8%), which was not different ( $p > 0.05$ ) based on the average difference test. The average duration of silent behavior on the perch for the male was 1323.9 minutes (36.8%) and for the female 1422.1 minutes (39.5%), which was not different based on the difference test. ( $P > 0.05$ ). Figure 2 indicates that in the 12-hour observation, the female bird had an average resting activity longer than the male.

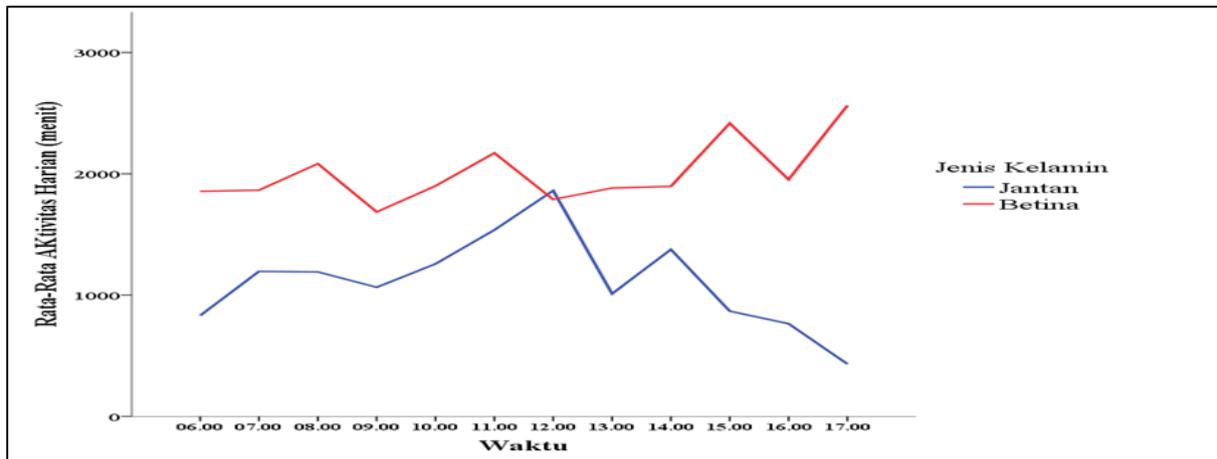


**Figure 2:** Resting Behavior of Nuri Talaud

The resting behavior of the male and female birds tended to experience the same fluctuation in observation for 12 hours. In the afternoon, the resting behavior of the male and female tended to be longer than in the morning and afternoon. The behavior of stretching the wings and tail was done to relax the body after a break and occurred briefly two to three times after resting. The wiggling movement was done to relax tense muscles to stabilize the body's condition, which is in line with the statement of Priyono and his colleagues in [11].

#### 4.3. Body Care Behavior

The results of observations on body care behavior in Table 2 included such behavior as scratching, cleaning the beak, cleaning the hair, cleaning the feet, tracing and bathing. The average duration of scratching behavior for the male was 277.4 minutes (7.7%) and for the female 94.5 minutes (2.6%). The scratching behavior of the male was higher than the female, and the analysis result of the difference test was that the average male and female scratching behavior was significantly different ( $p < 0.01$ ). The average duration of cleaning behavior for the male was 163.2 minutes (4.5%) and for the female 126.2 minutes (3.5%). The beak cleaning behavior of the male was higher than the female, and the analysis result of the difference test was not different ( $p > 0.05$ ). The average duration of feather cleaning behavior for the male was 114.8 minutes (3.2%) and for the female 91.8 minutes (2.6%). The average feather cleaning behavior of the male was higher than the female, and the analysis result of the difference test was not different ( $p > 0.05$ ). The average duration of feet cleaning behavior for the male was 20 minutes (0.6%) and for the female 5 minutes (0.1%). The average feet cleaning behavior of the male was higher than the female, and the analysis result of the difference test was significantly different ( $p < 0.01$ ). The average duration of tracing behavior for the male was 428.7 minutes (11.9%) and for the female 549 minutes (15.3%). The male tracing behavior was higher than the female, and the analysis result of the difference test showed that the average male and female tracing behavior was not different ( $p > 0.05$ ). The average duration of bathing behavior for the male bird was 111.5 minutes (3.1%) and for the female 4.3 minutes (0.1%). The male bathing behavior was higher than the female, and the analysis result of the difference test was significantly different ( $p < 0.01$ ). In Figure 3, it can be seen that in observation for 12 hours, the female bird had an average activity of body care behavior longer than the male. By late afternoon, the female bird tended to experience increased body care behavior, while male bird tended to do it briefly.

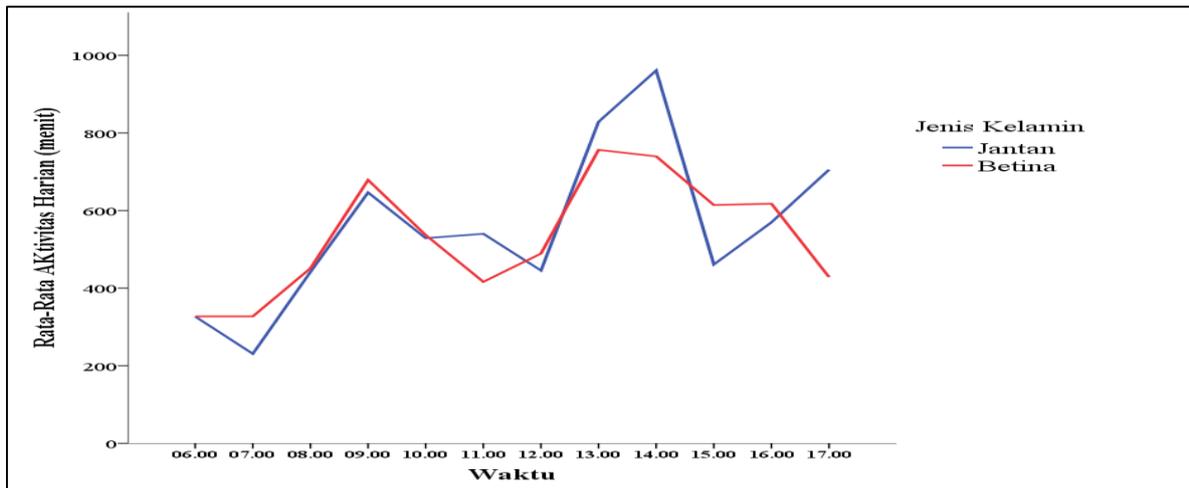


**Figure 3: Body Care Behavior of Nuri Talaud**

Bathing behavior in its habitat uses some of the moisture in the leaves while in captivity a bath container is prepared. Usually the bathing behavior is carried out before noon when the air temperature starts to rise or when the behavior is high so that it affects the body temperature. This behavior is preceded by dipping the lower half of the beak, and finally inserting the body part by way of submerging it until the body is submerged.

#### **4.4. Eating Behavior**

The observations results in Table 2 included such eating behavior as pecking, biting, using feet and drinking. The average duration of pecking behavior for the male bird was 291.7 minutes (8.1%) and for the female 348.8 minutes (9.7%). The male pecking behavior was lower than the female. The average duration of biting behavior for the male was 85.6 minutes (2.4%) and for the female 79.5 minutes (2.2%). The male biting behavior was higher than the female. The average duration of eating behavior using feet for the male was 3.7 minutes (0.1%) and for the female 2.2 minutes (0.1%). The male feeding behavior using feet was higher than the female. The average duration of drinking behavior for the male was 176.2 minutes (4.9%) and for the female 101.5 minutes (2.8%). The male drinking behavior was higher than the female. The analysis result of the difference test on the average eating behavior of the male and female pecking was not different ( $p > 0.05$ ). Feeding behavior occurred in a short and repeated time throughout the day in the morning and evening according to the ambient temperature below  $31^{\circ}\text{C}$  when the Nuri Talaud was on the perch and at the feed source both on the wall and the roof made of iron frames. The bird ate more in the morning between 6:00 a.m. and 9:00 p.m., at 1:00 p.m. and at 3:00 p.m. from 15:00 to 17:00 when the humidity was 75% in the cage environment. The drinking behavior of Nuri Talaud is part of the eating behavior throughout the day with repeated times. The average duration of drinking behavior for the male was 176.2 minutes (4.9%) and for the female 101.5 minutes (2.8%). In Figure 4, it can be seen that in observation, the male and female birds had an average of similar ingestion behavior activities. But during the day, the male bird was more active in ingestion than the female bird. Daily feeding behavior was the same because the male and female birds both need food and drink. Drinking behavior is very close to eating behavior [5]. The drinking behavior on Talaud parrot occurred after eating behavior or in between breaks. They did it on the perch or the place where the drink was located and the tip of its tongue (papilla) took water, before it was drawn into the mouth. This process continued until the thirst was gone.

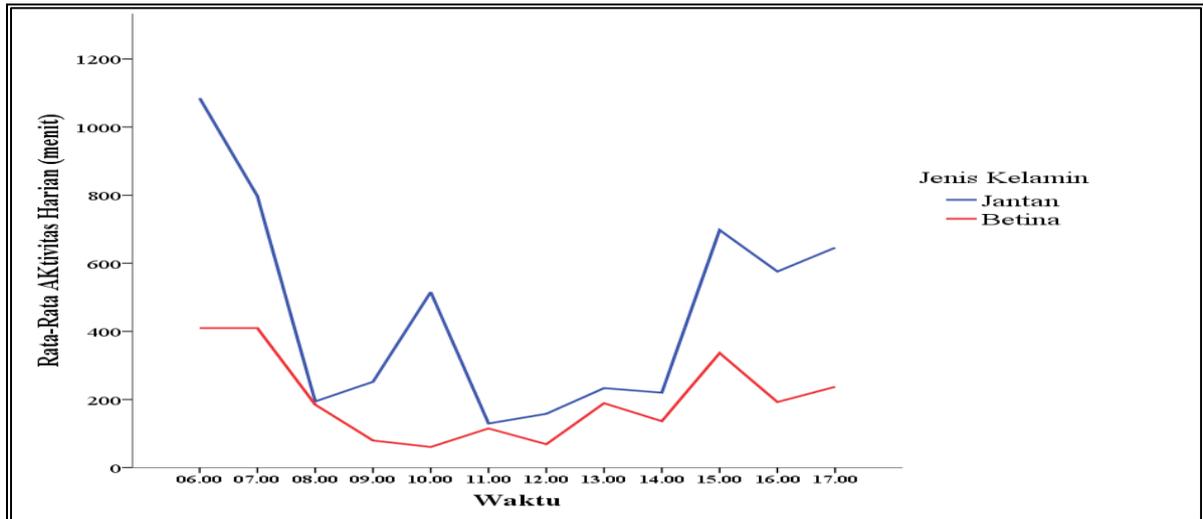


**Figure 4:** Ingestive Behavior of Nuri Talaud

In the male birds, feed is needed to get energy to do its behavior such as flying, foraging and voicing. In the female birds, it is associated with breeding season, such as the ability to produce good eggs. Bird food is found in the forest in the tree parts of their habitats. Nuri talaud feed on fruit, nectar, as a source of its food. The Nuri talaud behavior of eating and drinking is unique. Parrot talaud in its habitat and in captivity eat fresh fruit containing a high level of sucrose and fructose for the energy needed for flying. For feeding behavior, the body position is leaning down and the eyes are downward. Sometimes, the head is upheld when hearing something. The bird beak is opened and the tip of the brush-shaped tongue protrudes to take food and pull it into its mouth before crushing it with its beak. The thick tongue is used to prehensile the tip of the brush-shaped tongue and there is a line of papilla shaped like the letter U. The function of extending the tongue is to help erect papillae in taking nectar from flower pollen. Another way is to peck the feed in the feed container or the feed hanging on the perch and on the wall. Environmental temperature causes animals to reduce and increase the speed of metabolism in the body by reducing or increasing consumption. Feeding behavior mostly takes place in the morning at an average temperature of 25.4°C with humidity of 84.5% thought to be due to lower temperatures that trigger more food to increase body temperature [9,12]. Reference [2] noted states that the occurrence of eating behavior is caused by food availability.

#### 4.5. Moving Behavior

The observation results in Table 2 show that moving behavior includes walking, flying, jumping, and climbing. The average duration of walking behavior for the male was 280.3 minutes (7.8%) and for the female 47.1 minutes (1.3%). The male walking behavior was higher than the female, and the analysis result of the difference test was significantly different ( $p < 0.05$ ). The average duration of flying behavior was 10.8 minutes (0.3%) and for the female 13.1 minutes (0.4%). The male flying behavior was lower than the female, and the analysis result of the difference test was not different ( $p > 0.05$ ). The average duration of jumping behavior for the male was 6.9 minutes (0.2%) and for the female 2.5 minutes (0.1%). The male jumping behavior was higher than the female, and the analysis result of the difference test was not different ( $p > 0.05$ ). The average duration of climbing behavior for the male was 160.7 minutes (4.5%) and for the female 138.8 minutes (3.9%). The male climbing behavior was higher than the female, and the analysis result of the difference test was not different ( $p > 0.05$ ).



**Figure 5:** Locomotive Behavior of Nuri Talaud

Walking behavior occurred in a short and repeated time throughout the day according to the ambient temperature below 31 0 C when the Talaud parrot was on the perch and on the wall and roof made of the iron frames. More walking behavior was carried out from 6:00 a.m. to 7:00 p.m., 10:00 p.m. and in the afternoon from 3:00 p.m. to 5:00 p.m. when humidity was 80% in the cage environment. In the wild is not comparable because in the enclosure the flying behavior is limited by the size of the cage. In Figure 5 it can be seen that in the observation for 12 hours, the male bird had an average locomotive behavior activity longer than the female bird. The locomotive behavior of the male and female birds tended to fluctuate during the observations for 12 hours. In the morning and evening, the locomotive activities of the male and female birds tended to be more active than during the day. The bird jumping behavior took place on a perch or when fell on the floor. On the perch it is done to move places in close proximity. Meanwhile, the ability to fly in a cage is limited, so that it is not possible for a bird to conduct flying behavior for a long time [14].

## 5. Conclusion

Types of daily behavior of both male and female Nuri Talaud--locomotive, feeding (ingestive) and body care behavior as well as resting behavior in captivity--are different in duration. Behavioral differences can be used as an indicator for determining the sexes of Talaud parrot for reproductive purposes.

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