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Identification of food type and feeding behavior of sumatran orangutans (*Pongo abelii*) at the Ketambe Research Station in Gunung Leuser National Park

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Abstract.

As an endangered animal, sumatran orangutans (*Pongo abelii*) in Indonesia are declining rapidly. The extinction of food sources that formerly supported their diets is one of the factors that has contributed to this predicament. This paper aims to discover sumatran orangutans' food types and feeding behaviors at the Ketambe Research Station, Aceh Province, Indonesia. Two orangutans, Chris and Kelly, were the subjects of this study, and their behavior and environment were observed and recorded using the focal animal sampling approach. The study uncovered 29 distinct forms of food (27 plant species and 2 insect species). The type of fruit most consumed by sumatran orangutans (*Pongo abelii*) at the Ketambe Research Station is *Ficus racemosa*, followed by *Ficus obscura*, *Pandanus* sp., and *Ficus variegata*. The type of leaf most consumed by sumatran orangutans (*Pongo abelii*) is *Loides cirrosa*, followed by *Acacia pennata* and *Sindapsus hederaceus*. Then, their eating behavior patterns cover choosing, holding, taking, and eating the food. The orangutans like eating their meal high up in a tree. As they lead semi-solitary, arboreal lifestyles, preserving the forest ecosystems in which they thrive is crucial.

1. Introduction

Indonesia is an archipelagic country that has rich biodiversity. One type of endemic animal is the orangutan, the only type of great ape found in Asia. The orangutan population only remains on the islands of Sumatra and Kalimantan. Orangutans are divided into three types, namely sumatran orangutans (*Pongo abelii*), kalimantan orangutans (*Pongo pygmaeus*) and tapanuli orangutans (*Pongo tapanuliensis*). Orangutans are a crucial type of biodiversity and play an essential role in balancing the ecosystem in the environment. Orangutans are a species that spread seeds from fruit that they eat either through feces or by dropping and carrying seeds as they pass through trees in the forest [1].

According to Law Number 5 of 1990 concerning the Conservation of Natural Resources and Ecosystems, orangutans must be protected and cannot be traded or kept as pets. The orangutan



population in its habitat is experiencing a drastic decline. The population has shrunk 30-50% in the last ten years. This is caused by the loss of habitat as a place to live and as a food source for orangutans due to environmental damage [2]. Sumatran orangutans are categorized as critically *endangered animals* due to human forest destruction and illegal hunting (IUCN, 2014). Sumatran orangutans live semi-solitary and arboreal lives in forest ecosystems [3].

Sumatran orangutans (*Pongo abelii*) prefer a varied diet of plants and small insects [4]. According to research results, Taufiq [5] explained that the types of food trees for sumatran orangutans (*Pongo abelii*) carried out at the Ketambe Research Station based on the altitude where 35 families were found with a total of 83 types of food trees. The part of the food tree that orangutans eat most is fruit, with 68 types with a percentage of 81.9%. The remainder is the 7,2% seed portion (7 types); young leaves of 1 type with a percentage of 1.2%; 1 type of interest (1.2%); 2 types of young fruit and leaves with a share of 2.4%; 1 kind of fruit and tree bark with a percentage of 1.2%; 1 type of fruit, young shoots and young leaves with a percentage of 1.2%; 1 type of fruit, tree bark, and tree sap with a percentage of 1.2%; 1 kind of fruit, flowers and young shoots with a percentage of 1.2%; and two types of fruit and flowers with a percentage of 2.4%.

Currently, the plants that feed Sumatran orangutans are cut down yearly. Cutting down food trees for orangutans can cause the extinction of food sources and the original habitat of orangutans, so the current problem is that sumatran orangutans are losing their habitat and food [4]. The Ketambe Research Station area is one of the oldest research stations located in the Gunung Leuser National Park (TNGL), and many studies have been carried out regarding orangutans at this location. The diversity of animal and plant species scattered in this area has become a place for protecting animals such as the sumatran orangutan (*Pongo abelii*) [6]. From the research results conducted above, it is vital to carry out this research. The objectives of this research are: to determine the types and categories of food for sumatran orangutans (*Pongo abelii*) at the Ketambe Research Station and to study the feeding behavior of sumatran orangutans (*Pongo abelii*) at the Ketambe Research Station.

2. Materials and methods

2.1 Place and time of research

This research was conducted at the Ketambe Research Station in Gunung Leuser National Park. Ketambe Research Station is located in Desa Ketambe, Kecamatan Ketambe, Kabupaten Aceh Tenggara, Provinsi Aceh (03°02'50,5'' LU dan 097°25'02,0'' BT) and has 450 ha area. Ecosystem types include hilly and undulating highland and mountain types. The average of temperature in this area is 21,1°C – 27,5 °C, and the relative humidity is 80 – 100 %. The rainy season is evenly distributed throughout the year without a significant dry season, with an average rainfall of 2000 – 3200 mm per tahun. Soil types of this area are red-yellow podzolic, latosol, brown podzolic. Field research was carried out from January 18 to February 18, 2022.

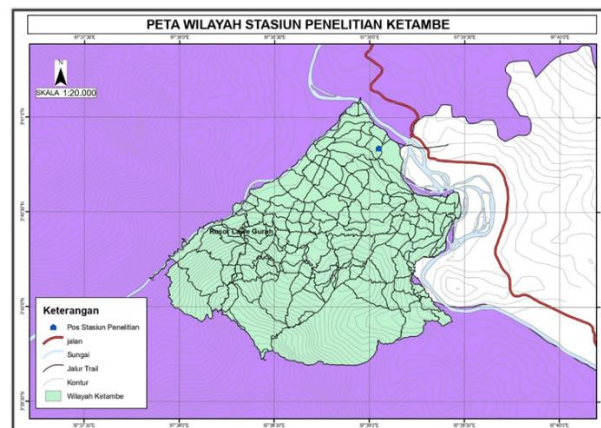


Figure 1. Map of the research location

2.2 Tools and materials

The tools and materials used for this research were a camera, binoculars, GPS, tally sheet, stationery, and a map of the research location.

2.3 Research design

The method used in this research was the *focal animal sampling method*, namely observing and recording an individual's behavior over a certain period. Observations were made by registering each target orangutan's eating pattern every two minutes. Observations were carried out from 5.30 AM to 6.30 PM, or the time could be increased as long as the orangutans have not finished eating, then the data is recorded in the observation table [8]. The observations focused on two female orangutans; individual 1 was the pregnant Kelly (26 years old), while individual 2 was a 35-year-old-Chris, which was not pregnant.

2.4 Research procedure

2.4.1 Search for sumatran orangutans. Orangutan search activities are carried out by looking for individuals on orangutans track in existing routes (exploratory survey). The search for orangutans is carried out in teams depending on the personnel at the Ketambe Research Station. The central track was explored by looking for target orangutan because orangutans often visit this area for food. If the target individual orangutan is not found in an area frequently seen, so the search is carried out by walking along the track in the research location or visiting several food sources in the home range. Information regarding the whereabouts of orangutans and their home ranges was obtained from the staff of the Ketambe Research Station, Gunung Leuser National Park. Next, the researchers conducted a survey.

2.4.2 Identify food plants. Each type of plant found as orangutan food was identified directly morphologically at the research location using species identification books and other literature studies and photographed as documentation. Several types that could not be identified directly were identified using the PlantNet application or the help of plant identification experts. Then, record information regarding the type of plant, family, local name, and scientific name on the observation sheet. Apart from that, the parts eaten per type of food plant were also recorded.

2.4.3 Observation of orangutan eating behavior. Eating patterns included selecting, holding, taking, and putting food into the mouth. Observation of sumatran orangutans (*Pongo abelii*) started from 5.30 AM – 6.30 PM. Observation time could increase if the nesting site were far or closer to the camp and feeding behavior was still ongoing, resulting in long nesting and weather conditions.

Observations of eating behavior were seen from the orangutan waking up from the nest in the morning and then carrying out eating behavior until the orangutan made the nest in the afternoon.

2.5 Data analysis

Data on food plant types are presented descriptively in tables and figures. Data on orangutan eating behavior is presented narratively in paragraph and table form.

$$\% \text{ ratio of food types} = \frac{\text{Ratio of food types}}{\text{total of all food types}} \times 100\% \dots \dots \dots (1)$$

3. Results and discussion

3.1 Types and categories of food

The research at the Ketambe Research Station involved two target adult female orangutans: Kelly (26 years and pregnant) and Chris (35 years and not pregnant). The observation length for Kelly was 44 hours 30 minutes, while for Chris, it was 57 hours 30 minutes. According to the Ketambe Research Station, these two targets were brothers and sisters. Only these two orangutans could be found due to limited food availability, and at the time of the research, it was challenging to see orangutans in the field. This condition is supported by research conducted [9], [10], [11], which states that the availability of food in specific habitats greatly influences the distribution and population of orangutans. The remaining orangutan population at the Ketambe Research Station is estimated to be around ten individuals, and only 2-4 have ever been seen.

Table 1 below lists types of food for sumatran orangutans found during research at the Ketambe Research Station.

Table 1 . Types of food for the sumatran orangutan (*Pongo abelii*).

No	Local name	Scientific name	Familia	Eating category
1	Akar Kusim Besar	<i>Loides cirrosa</i>	<i>Myrtaceae</i>	Leaf, Bark
2	Akar Palo	<i>Gnetum latifolium</i>	<i>Gnetaceae</i>	Bark
3	Akar Papan	<i>Liana</i> sp.	<i>Araceae</i>	Fruit
4	Akar Rangut Galang	<i>Acacia pennata</i>	<i>Fabaceae</i>	Leaf
5	Akar Tepus	<i>Poikilespermum suaveolens</i>	<i>Urticaceae</i>	Leaf
6	Akar Tombang	<i>Syndapsus hederaceus</i>	<i>Araceae</i>	Leaf, Fruit, Flowers, and Bark
7	Banitan Biasa	<i>Mastixia trichotoma</i>	<i>Cornaceae</i>	Fruit
8	Bintangur Mancang	<i>Mangifera laurina</i>	<i>Anacardiaceae</i>	Fruit
9	Dadap	<i>Erythrina variegata</i>	<i>Fabaceae</i>	Leaf
10	Dadap Berduri	<i>Erythrina subumbrans</i>	<i>Fabaceae</i>	Leaf
11	Entap	<i>Parashorea lucida</i>	<i>Dipterocarpaceae</i>	Flower, Leaf
12	Gala-Gala Biasa	<i>Ficus racemosa</i>	<i>Moraceae</i>	Fruit

13	Gala-Gala Sari Bulan	<i>Ficus</i> sp.	<i>Moraceae</i>	Fruit
14	Gala-Gala Rawu	<i>Ficus variegata</i>	<i>Moraceae</i>	Fruit
15	Jambu Hutan	<i>Eugenia grandis</i>	<i>Myrtaceae</i>	Leaf
16	Kapok Rimba	<i>Gratocylon arboreum</i>	<i>Guttaceae</i>	Flower
17	KerANJI	<i>Siphonodon celastrinus</i>	<i>Celastraceae</i>	Leaf
18	Kuel	<i>Trema orientalis</i>	<i>Ulmaceae</i>	Bark
19	Kukuran Betina	<i>Jurpinaspeaerocarpa hassk</i>	<i>Fabaceae</i>	Leaf, Fruit
20	Latong Rusa	<i>Dendrocinide stimulant</i>	<i>Urticaceae</i>	Leaf
21	Medang Rungku	<i>Litsea</i> sp.	<i>Lauraceae</i>	Leaf
22	Pandan Hutan	<i>Pandanus</i> sp.	<i>Pandanaceae</i>	Fruit
23	Rambung Konyel			
24	Tingkam	<i>Ficus</i> sp.	<i>Moraceae</i>	Fruit
25	Rambung Kuda	<i>Ficus drupacea</i>	<i>Moraceae</i>	Fruit
26	Rambung Uah-Uah	<i>Ficus obscura</i>	<i>Moraceae</i>	Fruit
27	Rerima	<i>Boehmeria glomerulifera</i>	<i>Urticaceae</i>	Leaf
28	Setur Gajah	<i>Aglaiia odoratissima</i>	<i>Meliaceae</i>	Leaf
29	Setur Padi	<i>Aglaiia korthalsii</i>	<i>Meliaceae</i>	Leaf
30	Surin	<i>Toona ciliata</i>	<i>Meliaceae</i>	Bark
31	Rayap	<i>Macrotermes</i> sp.	<i>Termitidae</i>	Insect
	Semut	<i>Xenomyrmex</i> sp.	<i>Formicidae</i>	Insect

From Table 1 above, it can be seen that there are 29 types of food plants for sumatran orangutans from 16 families, and there are two types of insects from 2 different families. Four categories are eaten: leaves, fruits, flowers and bark, and insects. The *Moraceae* family is the fruit food most eaten by sumatran orangutans, and the *Fabaceae* family is the type of leaf most eaten by sumatran orangutans (*Pongo abelii*). The insects that orangutans eat the least are from family *Termitidae*. The *Moraceae* family that is the food source for orangutans is *Ficus* spp.; the part consumed from this family is fruit. According to [11], *Ficus* spp. is a type of plant always available throughout the year. A significant natural food source for orangutans is *Ficus* spp.

This research was carried out when it was not fruit season, so it is thought that orangutans turned to eat young leaves, flowers, and insects, even leaf stalks and bark. Research [12] shows that orangutans eat tree bark to overcome hunger. While in the field, a sumatran orangutan (*Pongo abelii*) was also found tearing tree bark to eat the skin. Plant leaves contain many nutrients, especially protein, which is good for orangutans. Research [13] shows that orangutans need 6.1 to 26.0% protein. [14] stated that adult female orangutans can consume nutritious food such as fruit for high energy and leaves, which are used for protein needs during pregnancy, breastfeeding and caring for young. The considerable energy contained in fruit is quite suitable for the energy needs of female orangutans.

The type of fruit most consumed by sumatran orangutans (*Pongo abelii*) at the Ketambe Research Station is *Ficus racemosa*, followed by *Ficus obscura*, *Pandanus* sp., and *Ficus variegata*. *Ficus* spp. is the food most often eaten by orangutans because *Ficus* spp. bears fruit throughout the year. *Ficus* spp. is critical for maintaining stable food availability when the orangutan's food is not fruitful. The type of leaf most consumed by sumatran orangutans (*Pongo abelii*) at the Ketambe Research Station is *Loides cirrosa*, followed by *Acacia pennata* and *Sindapsus hederaceus*.

3.2 Percentage of sumatran orangutan (*Pongo abelii*) food categories

Table 2 shows that the leaf food category is the category most preferred by Kelly (adults and pregnant) with a feeding time of 358 minutes, followed by flowers with a feeding time of 298 minutes and fruit for 278 minutes. Kelly also ate insects with the longest feeding time compared to the other categories, namely 38 minutes. The type of food plant that the Kelly ate the longest was the flower of kapok rimba (*Gratocylon arboreum*), which took 222 minutes. But based on food categories, Kelly is preferred leaf food category than flower or fruit categories. In leaf food category, the type of food plant that the Kelly ate the longest was the root of the big kusim (*Loides cirrosa*), which took 152 minutes, followed by the root of the galang grass root (*Acacia pennata*) for 98 minutes. According to [15], young leaves and stems are food for orangutans to survive when the availability of fruit decreases in the forest. Apart from that, it is thought that Kelly's pregnancy condition is also one of the factors causing Kelly to prefer leaves to fruit. [14] stated that adult female orangutans can consume nourishing food such as high-energy fruit and leaves used for protein needs during pregnancy, breastfeeding and caring for young.

The primary food of sumatran orangutans is fruit. Fruit is a source of energy for orangutans, and to meet protein, orangutans eat young leaves and insects. When there is no fruit season or during lean times, the critical source of food for orangutans will decrease, and the middle path taken by orangutans is to eat alternative food sources (*all-back foods*) and move to another place to continue their survival but remain in their territory [12].

Flowers are a category of food eaten by Kelly (adult and pregnant) with a meal time of 298 minutes. Flowers are a variety of alternative food for orangutans at the Ketambe Research Station. *The Gratocylon arboreum* type is the flower most often eaten by orangutans. Flowers are usually an alternative food for adult female orangutans because they contain the nutrients their bodies need. Flowers are also not always available and only at certain times. According to [14], [16] stated that flowers contain NDF levels of more than 40% and are low in tannin but are only available at certain times. The second type most commonly eaten by orangutans is *Parashorea lucida*.

Table 2 . Kelly's feeding times (adult and pregnant).

No	Type	Scientific name	Time consuming (minutes)				
			Fruit	Leaf	Flower	Bark	Insect
1	Akar Kusim Besar	<i>Loides cirrosa</i>		152		28	
2	Akar Palo	<i>Gnetum latifolium</i>				8	
3	Akar Papan	<i>Liana</i> sp.	10				
4	Akar Rangut	<i>Acacia pennata</i>		98			
5	Akar Tombang	<i>Sindapsus hederaceus</i>	6	48		10	
6	Banita Biasa	<i>Mastixia trichotoma</i>		6			
7	Bintangur Mancang		12				
8	Entap	<i>Mangifera laurina</i>					
9	Gala-Gala Biasa	<i>Parashorea lucida</i>			76		
10	Gala-Gala Sari	<i>Ficus racemosa</i>	86				
11	Bulan	<i>Ficus</i> sp.	48				
12	Gala-Gala Rawu	<i>Ficus variegata</i>	34				
13	Kapok Rimba	<i>Gratocylon arboreum</i>			222		
14	KerANJI	<i>Siphonodon celastrinus</i>		4			
15	Kuel	<i>Trema orientalis</i>				30	
16	Rambung Konyel		18				
17	Tingkam	<i>Ficus</i> sp.					
18	Rambung Kuda	<i>Ficus drupacea</i>	8				
19	Rambung Uah-Uah	<i>Ficus obscura</i>	56	10			

18	Rerima	<i>Boehmeria glomerulifera</i>	22				6
19	Setur Gajah	<i>Aglaia odoratissima</i>	2				
20	Setur Padi	<i>Aglaia korthalsii</i>	16				
21	Rayap	<i>Macrotermes</i> sp.					6
22	Semut	<i>Xenomyrmex</i> sp.					32
Total = 1,048 minutes			278	358	298	76	38

Table 3 shows that Chris preferred fruit with an eating time of 644 minutes, followed by the category of eating leaves, namely 570 minutes, and insects, namely 48 minutes. According to [17], fruit is the primary food source that orangutans often eat. The main feed contains complete nutrition, namely water, high carbohydrates, fat, and energy, which the orangutan's body needs is more than 60% and is low in protein. *Ficus racemosa* and *Ficus obscura* are the most eaten fruit by Chris, with the eating time being 238 minutes and 202 minutes, respectively.

Table 3 . Chris's feeding time (adult and not pregnant).

No	Type	Scientific name	Time consuming (minutes)				
			Fruit	Leaf	Flower	Skin	Insect
1	Akar Kusim Besar	<i>Loides cirrosa</i>		90		2	
2	Akar Papan	<i>Liana</i> sp.	16				
3	Akar Rangut Galang	<i>Acacia pennata</i>		196			
4	Akar Tepus	<i>Poikilespermum suaveolens</i>		2			
5	Akar Tombang	<i>Sindapsus hederaceus</i>	10	76	4		
6	Dadap	<i>Erythrina variegata</i>		72			
7	Dadap Berduri	<i>Erythrina subumbrans</i>		18			
8	Gala-Gala Biasa	<i>Ficus racemosa</i>	238				
9	Gala-Gala Rawu	<i>Ficus variegata</i>	24				
10	Jambu Hutan	<i>Eugenia grandis</i>		26			
11	Kukuran Betina	<i>Jurpinaspeaerocarpa hassk</i>	48	44			
12	Latong Rusa	<i>Dendrocinide stimulans</i>		8			
13	Medang Rungku	<i>Litsea</i> sp.		32			
14	Pandan Hutan	<i>Pandanus</i> sp.	88				
15	Rambung Konyel Tingkam	<i>Ficus</i> sp.	18				
16	Rambung Uah-Uah	<i>Ficus obscura</i>	202	6			
17	Surin	<i>Toona ciliata</i>				18	
18	Rayap	<i>Macrotermes</i> sp.					24
19	Semut	<i>Xenomyrmex</i> sp.					24
Total = 1,286 minutes			644	570	4	20	48

The next orangutan food found at the Ketambe Research Station was insects. Insects are an alternative food source of protein after young leaves. Female orangutans eat more insects due to their need for protein. Insects that are high in protein are good for orangutans when they are pregnant or breastfeeding. The type of insect most eaten by orangutans is *Macrotermes* sp. and then *Xenomyrmex* sp. Most insect consumption is by adult female orangutans. According to [14], insects are food for

female breastfeeding orangutans, which need more protein. Animal food is rich in protein, which is necessary for raising children.

Based on Figure 2, the percentage of adult Kelly female sumatran orangutan (*Pongo abelii*) food eaten during the research was obtained.

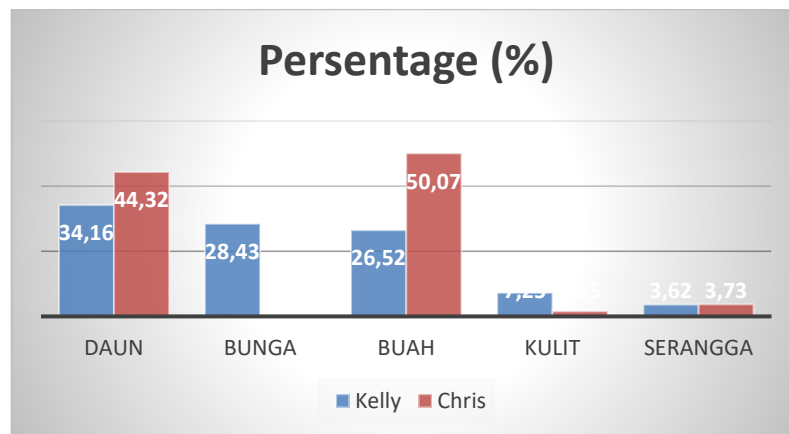


Figure 2 . Percentage of food types for Sumatran orangutans (*Pongo abelii*)

The leaf type of orangutan food consumed by adult Kelly females is 34.16% due to the limited availability of fruit and the adult female being pregnant, which requires much protein. The type of food eaten by adult female Kelly flowers was 28.43%, fruit 26.52%, skin 7.25%, and insects 3.62%. The high number of orangutans consuming alternative food affects the availability of primary food. According to [14], when fruit availability in nature decreases, consumption of alternative feed will be high.

Kelly's adult female orangutans tended to choose food when looking for food. When in the field, Kelly did not like unripe fruit. Sometimes, Kelly would only eat a little, then throw the fruit away and continue choosing ripe fruit. Kelly also consumed leaves more often when she woke up in the morning. Then, she continued looking for fruit trees and eating the fruit. After finishing those, she looked for insects and returned to eating leaves and tended to eat leaves until the afternoon. The orangutan had bark until she made a nest to rest at night. Orangutans, indeed, are into soft fruit, seeds, and berries such as *Ficus* sp. [18].

The adult female orangutan Kelly also drank from hollow logs during the research. The water consumed was rainwater collected in tree hollows. Kelly did not drink often; it was just that Kelly chewed tree bark and then threw away the dregs. [19] referred to in [20] states that most orangutans' water needs are met by the fruit they eat, but young orangutans will consume water at least once a day. Typically, the water consumed is water found in tree hollows.

The percentage of food types that adult female sumatran orangutans (*Pongo abelii*) ate during the research included more than the primary type of food, namely fruit. The percentage of fruit-type feed is 50.07%, which is very little different from the percentage of leaf type, namely 44.32%. The adult female Chris had different eating behavior from the adult female Kelly, where Chris ate more fruit than Kelly. Adult female orangutans had more fruit because it contained a lot of complete nutrition, namely water, carbohydrates, and the energy they need, which is 60% more than protein. Adult female orangutans need more energy to search for food in trees, especially those with a high canopy [21].

3.3 Eating behavior based on food categories of Sumatran orangutans (*Pongo abelii*) at the Ketambe Research Station

The discussion above shows that Kelly preferred leaves to fruit. This is presumably due to Kelly's pregnancy needs for protein. Kelly's general eating patterns were choosing, holding, and eating. For the leaf category, Kelly's eating patterns were holding the leaf, pulling it straight away, and putting it in the mouth (*leaf stripping with mouth*). Like the leaf-eating behavior of the *Litsea* sp., the orangutan took

a leaf twig with its right hand and immediately ate the leaf shoot or young leaf. Sometimes, they also took the leaves from the stem and had them straight away. Like the leaf-eating behavior of the *Acacia pennata* species, this species also holds and picks up the leaves with its hands from the base to the tip of the branch. Then, the orangutan will eat the leaves in their hands (*Leaf stripping with hand*). Orangutans also immediately pick up leaf tips using their mouths and sit on tree branches, sometimes sitting on the roots while eating the leaves they have picked. According to [8], orangutans, in this habit, will swing their bodies (*tree-swaying*) until their hands can reach food trees. Apart from that, sometimes orangutans are also found pulling young leaves and putting them in their mouths without moving the food tree.

For the flower category, Kelly's diet was picking flowers, then choosing the good ones to eat and throwing away flower petals that were not suitable for eating. From observations of the adult female orangutan Kelly, it was found that the average percentage of eating per day was 11 hours. Kelly spends 5 hours or 45% of her time eating activities, 2 hours or 18% resting or napping activities, 2 hours or 18% foraging activities, 1 hour of quiet activities or 9%, and other activities such as defecating and others 9%. Kelly's eating behavior and meal times can be seen in Table 4.

Kelly's eating behavior can also be seen when eating fruit from the *Ficus obscura* species. She would choose the hanging tree fruit, take it with their right hand, and immediately put it in their mouth. The eating behavior of orangutans when eating fruit is also more frequent, namely by picking the fruit one by one and then eating it straight away. This type of *Ficus obscura* is often visited by orangutans but not for long periods. Orangutan feeding behavior on *Ficus* sp. trees consists of hanging with one hand and one leg on a branch, where the other leg and hand are used to reach, hold, and collect branches full of figs [20].

Table 4. Kelly's behavior and eating times during the three days of observation.

No	Eating Category	Eating Behavior Patterns	Behavior Eating Time (minutes)	Percentage of Eating Behavior Patterns (%)	Information
1	Leaf	Choosing	13	3.63	Kelly held the leaf, pulled it straight away, and put it in her mouth. Sometimes, they also eat the leaves from the stem immediately.
		Holding	96	26.81	
		Taking	53	14.80	
		Eating	196	54.74	
2	Flower	Choosing	32	10.73	Kelly picked the flowers, selected the eatable ones, and threw away the appropriate petals.
		Holding	6	2.01	
		Taking	108	36.24	
		Eating	152	51	
3	Fruit	Choosing	6	2.16	
		Holding	6	2.16	
		Taking	118	42.44	
		Eating	148	53.23	
4	Skin	Holding	30	39.47	
		Taking	2	2.63	
		Eating	44	57.90	
5	Insect	Holding	8	21.05	
		Taking	6	15.78	
		Eating	24	63.15	

Based on Table 5 above, Chris's eating behavior is not much different from Kelly's. The average of specific eating behavior patterns per overall type of food category Chris obtained was a pattern of choosing 0.93%, holding 17.18%, taking 28.70%, and eating 53.18%. Chris's time for eating activities is 7 hours or 58%, foraging activities are 2 hours or 17%, resting or napping activities are 1 hour or 8%, activities for staying, defecating, making nests in the afternoon, and others are 2 hours or 17 %.

Table 5. During four days of observation, the behavior and eating time of non-pregnant adult female Sumatran orangutan Chris.

No	Eating Category	Eating Behavior Patterns	Behavior Eating Time (minutes)	Percentage of Eating Behavior Patterns (%)	Information
1	Fruit	Choose Hold Take Eat	4 122 180 338	0.62 18.94 27.95 52.48	Chris picked them one by one to eat. Apart from that, Chris also holds, meaning he takes a fruit branch straight to his mouth to eat.
2	Leaf	Hold Take Eat	89 167 314	15.61 29.30 55.08	
3	Insect	Choose Take Eat	8 20 20	16.66 41.66 41.66	
4	Skin	Hold Eat	10 10	50 50	
5	Flower	Take Eat	2 2	50 50	

In the category of fruit-eating behavior, picking was higher because Kelly and Chris often picked them one by one to eat, and then they would hold the fruit, which means the orangutan took the fruit twig straight to its mouth to eat.

At the Ketambe Research Station, foraging activity was also found by the two individuals observed. Kelly's foraging activity was 27.29% of all her eating behavior. Then, Chris's eating activity was 17.41% of his total eating behavior. The difference in eating activities between Kelly and Chris is caused by Kelly's orangutan being pickier due to pregnancy, especially with limited food availability. Chris was more active in eating behavior, given the available food.

When Chris ate the fruit of the *Ficus racemosa*, he sat and relaxed on a tree where many of the fruits were attached to the tree trunk and then picked and ate them. His eating behavior was also often standing to pick up the ripe fruit on top. Sometimes, he took one fruit stalk at a time and had it. This orangutan liked to eat *Ficus racemosa* species by sitting for a long time on the top of a comfortable tree. According to [22], the *Ficus* spp. type is a keystone species or mainstay species, specifically food that is consistently consumed. Part of *Ficus* spp. eaten is fruit. However, orangutans do not always choose *Ficus* fruit as food. During the fruit season, orangutans do not necessarily eat *Ficus* spp., but during the hungry season, orangutans choose *Ficus* spp. as feed ingredients.

The behavior of eating insects is that the orangutans went to look for termite nests in rotting trees or ant nests and then destroyed the termite nests or ant nests to eat. They picked up termites or ants one by one using their hands or ate them directly stuck to their hands. The animals also sometimes licked and then ate termite or ant eggs sticking to their hands. The type of termite eaten was *Macrotermes* sp. The type of ant eaten by the orangutans was *Xenomyrmex* sp. According to [15], around 6% of orangutan eating time is used to obtain insects. Small vertebrates that will be eaten assuming that they are readily available, as well as bird eggs in cages, are likely to be snatched.

4. Conclusions

Based on the research that has been carried out, the following conclusions are obtained:

1. There were 29 types of food plants for sumatran orangutans from 16 families and two types of insects from 2 families. The types and categories of food eaten by adult female Kelly were flowers 28.43%, fruit 26.52%, skin 7.25%, insects 3.62%, while Chris's type of food was fruit 50.07%, leaves 44.32%, skin 1.55% flowers 0.31% and insects 3.73%.
2. From the length of eating time for specific eating behavior patterns per all types of Kelly feed categories, the patterns were choosing (4.86%), holding (13.93%), taking (27.38%), and eating (53.81%). Meanwhile, from the length of eating time from specific eating behavior patterns per overall type of Chris's food category, the patterns obtained were choosing (0.93%), holding (17.18%), taking (28.70%), and eating (53.18%).

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