

Feeding Preference and Daily Activities of Deer (*Axis axis* Erxl. 1777) in the Captivity of Wari Park, South Sumatra Province

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ABSTRACT

Deer (*Axis axis*) are often cultivated in captivity of city park because they can be used to add population in natural habitats, beautifying city parks and as regional tourism objects. The success factors in deer breeding depend on the providing of the type of feed they like with a sufficient quantity of feed to produce a healthy deer generation. Status of a deer health is also determined by the understanding of the manager about the dynamics of their daily activities in captivity. This study aims to determine the preference of spotted deer on several types of feed given and their daily activities in captivity. The types of feed given were city vegetable wastes such as sweet potatoes (*Ipomoea batatas*), long beans (*Vigna sinensis*), bananas (*Musa paradisiaca*) and others in the form of grasses, rice bran. The study was conducted from May to July 2015 in Wari Park Captivity, Lahat City. The study of feed preferences used the Neu method. Nine individuals (3 adult males, 3 adult females and 3 juveniles) were given five kinds of food. The results showed that spotted deers more preferred bananas and sweet potatoes with preference index $w > 1$ than rice bran, long beans and grasses ($w < 1$). The higher daily activities of *Axis axis* in captivity were resting (42.92%), moving or locomotion (26.30%), and eating (22.89%), while the lower activities were social activity (1.04%), faecal disposal (1.09%), Agonistic (2.37%) and grooming (3.39%).

Keywords: *spotted deers, feed preference, daily activities, the captivity of Wari Park*

1. INTRODUCTION

Deer is wild animal that are vulnerable to extinction due to deforestation and poaching. The decline in their population has an impact on the balance of forest ecosystems. Deer breeding and release to native habitat are an effort to keep the ideal population level [1]. In Indonesia, deer breeding in many captivities is continuing to be carried out especially for *Cervus timorensis*, *Cervus unicolor* and *Axis axis* [2], [3]. Many factors that determine the success of deer breeding in captivity include the providing of the types of feed that they like and are nutritious and also understand the behavior of various deer daily activities [4], [5]. The feed preferred by

deers is known from their preference for the types of feed given and from the quantity of feed consumed [6-8]. *Cervus timorensis* more prefer to corn husk than grass and chicory [9]. While *Cervus unicolor* apparently do not like feed with high-fibers because they have an impact on decreasing in appetite and body weight [10], [3].

The dynamics of deer daily activities in captivity can indicate the health of the nurtured population. The daily activities of spotted deer (*Axis axis*) in captivity based on age classes where daily activities of adult deers are generally more productive than young individuals [11]. While [7] found that the highest daily activity proportion of *Cervus unicolor*

were feeding (45.8%), followed by sleeping (30.6%) and resting (23.7%) respectively. [12] stated that deer daily activities decreased when the number of individuals in the population exceeded the carrying capacity of the captive area which was indicated by a thin physical condition and some individuals were found sick or dead

Wari Park in Lahat City, South Sumatra Province, Indonesia is a city park that is deer breeding center, especially species *Axis axis*. Availability of various types for deer feed is main problem because the budget of local government is relatively limited. In addition, the cleanliness of traditional markets in the city is also a problem because of the accumulated vegetable wastes. This study tries to utilize several types of vegetable wastes as deer feed in captivity. The study aims to analyze deer preferences for several types of feed and observe their daily behavior in captivity. The results of the study are expected to reduce the problem of vegetable wastes in Lahat City.

2. MATERIALS AND METHODS

The study was conducted from May to July 2016 in the captivity of the Wari Park in Lahat City, South Sumatra Province. Some of the deer feed given were vegetable wastes such as long beans (*Vigna sinensis*), sweet potatoes (*Ipomoea batatas*) and bananas (*Musa paradisiaca*). Other types of feed are rice bran and grasses (*Axonophus*). The study of feed preferences was designed with a Completely Randomized Design in five different types of feed treatments with seven replications per treatment. *Axis axis* which was observed as research objects were nine individuals (3 adult males, 3 adult females and 3 juveniles). Deer was given five types of food with weight about 10% of the total body weight. The quantities of feed consumed by deer were calculated from the difference in weight of the initial feed given with the weight of the remaining feed. Deer preference for feed types was analyzed with values of Neu preference index [9].

Observation of daily activities of *Axis axis* was carried out in three adult males, three adult females and three juveniles. The methods of focal animal sampling and scan sampling were used to observe their daily activities [13]. Referring to [11] and [14], daily activities observed include eating, resting, moving, agonistic, removing faecal and urine and social activities. The percentage of each activity was analyzed by calculating the ratio of time duration of certain activity and the total of time duration from all types of activities multiplied by 100 percent [15].

3. RESULTS AND DISCUSSION

3.1. Food Preferences

Statistical results indicate that the preference of *Axis axis* from five types of feed relatively varied (Fcount = 151.07 **> F table 0.05 & 0.01 = 2.69 and 3.70 respectively). The Duncan test (Table 1) shows deer more preferred bananas (787.14 ± 17.99 gr) and sweet potatoes (761.43 ± 14.64 g) than long beans (591.43 ± 44.88 gr) gr), grasses (570 gr ± 23.80 gr) and rice bran (465.71 gr ± 34.09 gr). Rice bran was the least consumed type of feed. Bananas and sweet potatoes were relatively preferable, perhaps because they are sweeter and less fibrous than long beans, grasses and rice bran. Actually, ruminant animals generally prefer sweeter food rather than saltier or bitter food and lesser fiber [16], [10].

Bananas and sweet potatoes contain a lot of nutrients, fine fiber and proteins that are easily digested and absorbed by the deer's digestive tract so that they have a positive impact on the increase in body biomass [16]. Rice bran is less preferred because it contains relatively high crude fiber (11.5%) which will increase the pressure on the rumen wall so that the feed requires a longer retention time in the rumen which results in decreasing deer appetite [17], [18].

Table 1. Consumption of Spotted Deer on Five Types of Feed Given

No	Food Types	Weigh Averages of Food Consumed (gr)	Notation
1	Rice Bran	465,71 ± 34,09	a
2	Grasses	570,00 ± 23,80	b
3	Long Beans	591,43 ± 44,88	b
4	Sweet Potatoes	761,43 ± 14,64	c
5	Bananas	787,14 ± 17,99	c

Description: The average number followed by the same letters mean that it is not significantly different for p = 0.05 with the Duncan test

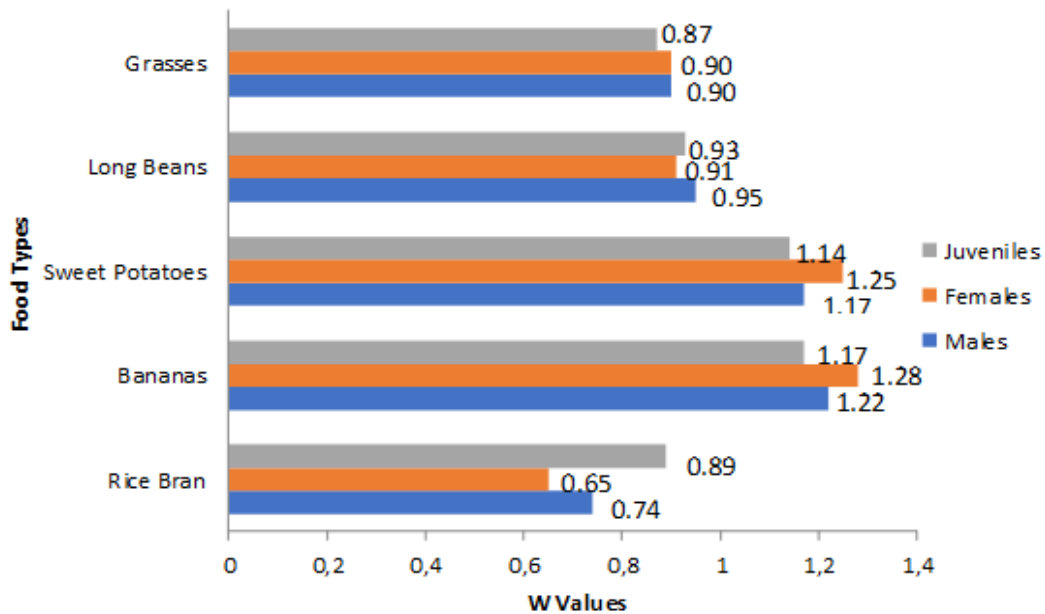


Figure 1. Histogram of Index of the *Axis axis* food preference

Based on sex and age structure, the preference of adult and young (juvenile) male and female deer was relatively the same, preferring bananas and sweet potatoes ($w > 1$) while long beans, grass and rice bran were less preferred, i.e. $w < 1$ (Figure 1). Sweetness and fiber content are the main reasons for the tendency of feed preferences. Banana fruit contains nutrients in the form of carbohydrates (13.92%), protein (4.88%), fat (0.97%) and fiber (5.52%). While sweet potatoes contain carbohydrates (23.89%), protein (4.88%), fat (0.97%) and fiber (4.93%). Three other types of feed were less preferred by deers because they have a higher fiber content. Long beans contain carbohydrates (8.60%), protein (33.61%), fat (2.78%) and fiber (18.70%). Grass plants contain carbohydrates (34.4%), ash (3.1%), protein (2.8%), fat (0.3%) crude fiber (11.7%), calcium (0.1%) and phosphorus (0.2%). Rice bran contains carbohydrate (12.4%), fat (13.6%) and 11.6% fiber [19], [20].

3.2 Daily Activities of *Axis axis* in Captivity of the Wari Lahat

Observations found that the general daily activities of *Axis axis* in captivity were resting

(42.92%), moving or locomotion (26.30%), and eating (22.89%), while the lower activities were social activity (1.04%), faecal disposal (1.09%), Agonistic (2.37%) and 3.39% to treat the body/grooming (Figure 2). These results are relatively similar to [11] study who observed the daily activities of *Axis axis* in the yard of Bogor Palace in West Java where the highest daily activity was rest (28.29%). Likewise, the findings of [21] on *Cervus unicolor* that spent their daily time for rest (44%), eating (43%) and moving places (6.12%). But this result is somewhat different from the findings of [22] at *Cervus timorensis* in Bitung, North Sulawesi where the most common daily activities were eating (31.17%), resting (28.17%), moving/locomotion (2.28%) and drinking (2.28%).

The results of this study are relatively different from the findings of [22] because the location of their research is in the deer conservation area covered by vegetation of forests and plantations in wide hilly areas. Deers move freely in conservation areas without human interference and get food sources from feed plants that are many found in that area without having to be provided by protected area managers.

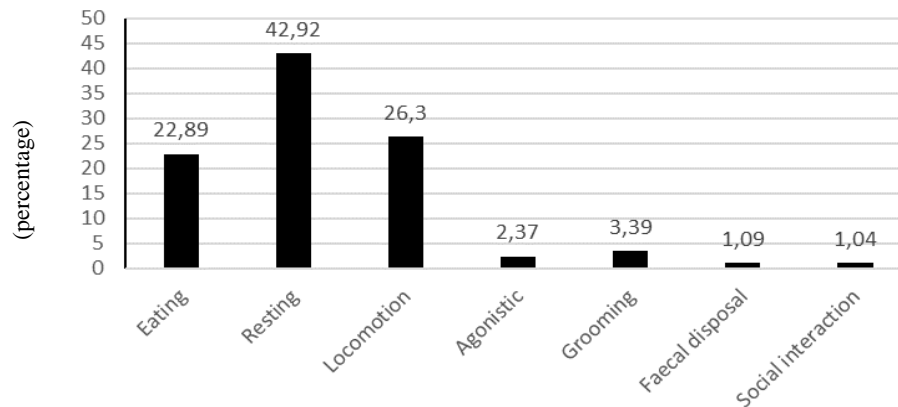


Figure 2. Histogram of daily activities of *Axis axis* in captivity of the Wari Lahat

4. CONCLUSION

Based on the analysis of the quantity of feed and the preference index of Neu, spotted deer (*Axis axis*) in captivity of the Wari Park in South Sumatra Province more preferred and consumed a lot of bananas and sweet potatoes than long beans, grass and rice bran given with (Neu's preference index = $w > 1$). The general daily activities of *Axis axis* in captivity are resting (42.92%), moving or locomotion (26.30%), and eating (22.89%), while the lower activities carried out were social interaction (1.04 %), faecal disposal (1.09%), Agonistic (2.37%) and grooming (3.39%).

ACKNOWLEDGMENT

The writing and publication of the results of this research is realized through the support of various parties. For this reason, the authors would like to thank Dean and Head of Biology Departments at Bengkulu University for motivating writers to contribute more in publishing research results that have been conducted on reputable international journals in order to improve the accreditation of departments and universities on national and international scale.

REFERENCES

- [1] I.S. Santoso, Deer Timorensis (*Cervus timorensis*). Graha Ilmu. Yogyakarta, 2011.
- [2] G. Semiadi, R.T.P. Nugraha, Guide to Tropical Deer Maintenance. LIPI Research Center for Biology. Bogor, 2004.
- [3] G. Semiadi, P.D. Muir, T.N. Barry, C.J. Veltman, J. Hodgson, Grazing patterns of sambar deer (*Cervus unicolor*) and red deer (*Cervus elaphus*) in captivity. New Zealand Journal of Agricultural Research 36 (2) 253-260, 2011. DOI: 10.1080/00288233.1993.10417761
- [4] M.A.K. Azad, M.M. Hossain, A.F.K.H. Bhuiyan, Feeding and Management of Spotted Deer at Dhaka Zoo, International Journal of Zoological Research 1 (1) (2005) 48-52.
- [5] D. Berteaux, M. Crete, J. Huot, J. Maltais, J.H. Ouellet, Food choice by white-tailed-deer in relation to protein and energy content of the diet: a field experiment. Oecologia 115 (1998) 84-92.
- [6] B. Kabeer, M. Anwar, M. Rais, et al., Study of Feed Preference of Endangered Hog Deer Under Captive Conditions in Pakistan. International Journal of Conservation Science 9 (2) (2018) 337-344
- [7] R. Garsetiasih, N.M. Heriyanto, J. Atmaja, Utilization of Rice Bran as Deer Feed Supplement. Forest Research and Development Center and Nature Conservation. Bogor. Germplasm Bulletin 9 (2) (2003) 23-27.
- [8] Gusmasari, Rustitanti, Daily Activity and Microhabitat Preference of Sambar Deer (*Cervus Unicolor* Kerr, 1792) In the University of Lampung Sanctuary. Biospecies 1 (2) (2016) 35-40.

- [9] R. Rihatni, Preference for Additional Feed for Vegetable Waste in Timor Deer (*Cervus timorensis*) and Its Effect on Eating Behavior. Thesis: Faculty of Agriculture, Institute of Agriculture in Bogor. Bogor, 2013.
- [10] Afzalani, R.A. Muthalib, E. Musnandar, Feed Preference, Eating Behavior and Nutrient Needs of Sambar Deer (*Cervus unicolor*) in Breeding Business in Jambi Province. *Livestock Media* 31 (2) (2008) 114-121.
- [11] S. Fajri, Daily Behaviour of Spotted Deer (*Axis axis*) breded in the Grassland coutyard of the Bogor State Palace. Thesis, Department of Animal Production, Fakulty of Animal Husbandry, Bogor Agricultural University, 2000.
- [12] R.Garsetiasih, N. Herlina, Study of Spotted Deer Population Structure (*Axis axis* Erxl) in Bogor Palace Park. *Journal of Forest Research and Natural Conservation* 2 (1) (2005) 61-70. Doi.org/10.20886/jphka.2005.2.1.61-70
- [13] J. Altman, Observational study of Behaviour, Sampling Method. *Behavior* 48 (1974) 227-265.
- [14] S. Marlina, Daily Activity Pattern of Spotted Deer (*Axis axis* Erxl) in Captivity of Jakarta Monas Park. Thesis, FMIPA-Diponegoro University, 2005.
- [15] P. Martin, P. Batesson, Measuring Behavior an Introduction Guide, 2nd Ed. Cambridge University Press, 1988.
- [16] M. Martawidjaja, Effect of Shaving and Concentrate on The Performance of Young Rams. *Science and Animal Husbandry*, 2 (4) (1986) 163-166.
- [17] M. Basri, Feed preferences and nutrient needs of mountain anoa (*Bubalus quarlesi* Ouwens, 1910) in pre-cultivation conditions. Dissertation. Post Graduate School. Bogor Agricultural Institute. Bogor, 2008.
- [18] D.C. Church, *Digestive Physiology and Nutrition of Ruminant*. 2nd Ed. O & B Book. Oregon. USA, 1988.
- [19] T. Sutardi, The Foundation of Nutritional Science. Department of Nutrition and Fodder Science. Faculty of Animal Husbandry. Bogor Agricultural Institute. Bogor, 1980.
- [20] R. Garsetiasih, Digestibility of Corn and Grass as Deer Feed. *Bulletin of Germplasm* 13 (2) (2007) 88-92.
- [21] B.S. Dewi, E. Wulandari, Daily Behavioral Study of Sambar Deer (*Cervus unicolor*) in the Natural Tourism Park of Bumi Kedaton, J. Sains MIPA 17 (2) (2011) 75-82.
- [22] Wirdateti, M. Mansur, A. Kundarmasno, Behavioral Study of Timor Deer (*Cervus timorensis*) in PT. Kuala Tembaga, Aertembaga Village, Bitung-North Sulawesi), *Animal Production* 7 (2) (2005) 121-126.