Botanical types and composition of grazing field in the captive breeding area for Timor deer (Cervus timorensis) at Wosu Village, Central Sulawesi

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Abstract. A research has been conducted to determine the botanical types and composition of the grazing field of a captive breeding area for Timor deer (Cervus timorensis) at Wosu village, Bungku Barat district, Morowali district, Central Sulawesi province from April 26 to May 16, 2018. Forage samples were taken with a destructive sampling method using a pair of 1 x 1m frame. The dry matter content of the forage samples was analyzed at the animal nutrition and feeding laboratory, Tadulako University. Data were analyzed, and results were presented descriptively. The results showed that the botanical composition of the was 83% kinds of grass and 17% weeds. The grasses were dominated by Imperata cylindrica, Cyperus rotundus, Cyperus kyllingia Endl., and Paspalum conjugatum.

1. Introduction
Timor deer (Cervus timorensis) is a wildlife animal that is endemic to Indonesia. The current population of the animal in its native habitat in Indonesia is probably declining due to many factors such as habitat loss, habitat degradation, and poaching. To prevent a further decline in population, Timor deer has been included as protected wildlife according to the Indonesian Government Regulation No. 7, 1999. Deer keeping and breeding in captivity as an effort made to preserve the animals are expected to contribute to preventing a further reduction in the deer population. The regulation allows the first deer offsprings (F1) resulted from the captive breeding to be transferred to other breeders as parents, while the second offsprings (F2) may be traded commercially.

In other countries such as Brazil, Malaysia, Thailand, New Caledonia, Australia, and Mauritius, Timor deer has been reared as a farm animal. According to [1], Timor deer has an excellent meat quality with low-fat venison (0.33%), high protein (24.5%), and has a particular taste. Other commercial products that have been obtained from Timor deer include blood deer powder, velvet powder, and some clothing materials from skin [2]. These indicate that Timor deer is a potential food source that can be developed further under a reasonable and sustainable cultivation program.

In a captive deer breeding area, the availability of feed and the quality of extractable nutrients from the feed are among the critical factors determining the life and performance of Timor deer. Since Timor deer is a ruminant species, the animal will depend primarily on the forage available in the grazing field of the captivity area where they are held. Measuring the availability of grasses and legumes in a captive breeding area will help us in obtaining information about the carrying capacity of the area and in
designing a better approach in feed management and provision for Timor deer. The objective of this study was to investigate the botanical types and composition of the grazing field in a captive breeding area and its carrying capacity for Timor deer at Wosu village, Central Sulawesi.

2. Materials and methods

2.1. Study site and procedures

This research was carried out for three weeks between April 26 and May 16, 2018, at the captive breeding area of Timor deer (Cervus timorensis) in Wosu Village, West Bungku Subdistrict, Morowali, Central Sulawesi. Plant samples for species identification were collected from the site using a 1 x 1 m plot for seedlings and a 2 x 2 m plot for saplings. Plant species identification was made based on its morphological appearance against a know plant database. The prestigious Value Index of the plant was determined according to [3]. For the determination of botanical composition, feed samples were collected with a destructive sampling method [4]. The samples were taken from a 1 x 1 m plots determined with the aid of a pair of 1 x 1 m square frame which was placed randomly along a parallel transect. The feed samples collected were categorized into either grasses, legumes, or weed. They were then stored in paper bags for dry matter determination in laboratory.

2.2. Calculations and assumptions

Using the dry matter contents of the collected feed samples, some calculations were made on the availability of feed for Timor deer in the captive breeding area, including the production of available forage, land requirement of each of the animals in the captive breeding area. Some assumptions were made when making the calculations. Production of available was calculated as the total amounts of forage produced by the grazing pasture (expressed in dry matter) minus the production of weed components, multiplied by proper use factor [5], and the proper use factor used in this case was 70%. The average body weight of a deer was assumed to be 50 kg with a feed dry matter requirement of 3%/body weight/day. The monthly requirement of land (ha/head) was calculated as the monthly requirements for dry feed matter (kg/head) divided by the production of available feed dry matter (kg/ha). The yearly land requirement for a deer per year (ha/head/year) was calculated using the Voisin formula, assuming a 30-days stay period and a 70-days rest period [6]. All the data were analyzed and presented descriptively.

3. Results and discussions

3.1. The captive breeding area

The captive breeding area of Timor deer (Cervus timorensis) is located in Wosu Village, West Bungku Subdistrict, Morowali District, Central Sulawesi Province. It is about 509 km from Palu, the capital city of Central Sulawesi Province. The captive breeding site has an area of about 20 ha, which is divided into three paddocks separated one another with wooden fences. The area itself is surrounded by both wooden and iron fences.

The vegetation that was found to grow within the captive breeding area consisted of trees, forages, and other plants that are potentially used as a source of feed by the Timor deer. The trees function as shelters for the animals in which the area under the tree canopy are used by the animals for day napping and resting while regurgitating the swallowed feeds.

The total population of the Timor deer contained in the captivity was 150 heads, consisting of 30 bucks, 56 does, and 64 fawns and young deers. The bodyweight of bucks ranged from 65 to 75 kg, does from 45 to 60 kg, while those of fawns and young deers ranged from about 5 to 35 kg.
3.2. Important value index of plants

The plant species found in the study site and its essential value index (%) are presented in Table 1.

Table 1. Plant species and its essential value index of the captive breeding area for Timor deer (*Cervus timorensis*) at Wosu Village, West Bungku Subdistrict, Morowali District, Central Sulawesi Province

| Species (Seedlings)   | Index (%) | Species (Saplings)   | Index (%) |
|-----------------------|-----------|----------------------|-----------|
| Cyperus cyperoides    | 45.63     | Dilenia sp.          | 8.64      |
| Taraxacum officinale  | 62.32     | Alastonia scholaris  | 17.30     |
| Cyperus rotundus L.   | 80.76     | Maesa ramantacea     | 51.90     |
| Mimosa pudica         | 56.27     | Arthocarpus altillis | 17.30     |
| Asplenium nidus       | 26.58     | Neonauclea purpurea  | 34.60     |
| Melastoma candidum    | 38.84     | Senna siamea         | 43.26     |
| Phyllanthus niruri    | 22.90     | Melastoma sp.        | 34.60     |
| Nerium oleander       | 14.47     | Zygium               | 17.30     |
| Alocasia lowii        | 18.32     |                      |           |
| Ficus septica         | 9.89      |                      |           |

As indicated by Table 1, the most important plant species found in the location was *Cyperus rotundus* L. for the seedling category and *Maesa ramantacea* for the saplings category, with a respective an important value index of 80.76 and 51.90%. The least essential species for the seedlings was found to be *Ficus septica* with an Important Value Index of 9.89%, and for the saplings was *Dilenia sp.* with an Important Value Index of 8.64%.

3.3. Botanical compositions

Results showed that the botanical composition of the captive breeding area is 83% kinds of grass and 17% weeds without legumes. The following species dominated the grasses: *Imperata cylindrica, Cyperus rotundus, Cyperus kyllingia* Endl., and *Paspalum conjugatum*, with an average dry matter content of 20.4%. These results indicate that the nutritional quality of feed resources available for the deers in the restricted area may be below, as there were no legumes found. The high diversity of plant species, especially species that are classified as palatable to animals (grass or legume), can be used as an indicator of the nutritional quality of a feed source of a breeding area. This is based on the assumption that the more diverse forage was available and consumed by animals, the less likely it is that the animals will suffer from a deficiency of certain nutrients due to the supplementary effects of various feed components. [7] suggests that a grazing field is of good nutritional quality if the proportion between grass and legume is 3:2.

One factor that might contribute to the domination of grasses and otherwise the lack of legumes in the restricted breeding area is probably due to the genetic difference between grass and legumes. Grasses generally grow to form clumps, have a robust root system that is resistant to livestock grasp and steps, have a rapid regrowth, creeping rhizomes, and form new crops that quickly spread if eaten by animals or cut off when defoliated [7]. Legumes, on the other hand, have taproots that make them difficult to compete with the fiber rooted plants such as grasses.

4. Conclusion and recommendations

The most important plant species found at the captive breeding are for Timor deer (*Cervus timorensis*) in Wosu village, West Bungku Subdistrict, Morowali District, Central Sulawesi province, was *Cyperus rotundus* L. For the seedling and *Maesa ramantacea* for the saplings. The botanical composition was found to consist of 83% kinds of grass and 17% weeds. The dominant grass species are *Imperata*
*cylindrica*, *Cyperus rotundus*, *Cyperus kyllingia* Endl., and *Paspalum conjugatum*. Increasing the availability and nutritional quality of feed resources within the captive breeding area can be done through the improvement of the grazing field by planting grasses and legumes of good nutritional quality.

**References**

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