**444Research proposal on browse preference and compatibility for Giraffes in Singapore Zoo**

# **Background**

Giraffes, especially the ones found in Kalahari region of South Africa preferred to feed on *Acacia erioloba* (camel thorn), *Ziziphus mucronata* (buffalo thorn), *Boscia albitrunca* (shepherds tree) and *Acacia mellifera* (thorn tree)(Deacon, ,2015). The preference was influence by the seasonal cycle of tree phenology. The giraffes also favour plants with high shoot where more than 2.0mm in diameter.

In Singapore Zoo there are a collection of four giraffes, where three are Rothschild’s giraffe, the subspecies of northern giraffe and another which is a hybrid of Rothschild and South African giraffe.

Based on the current browse preference record of the two young Rothschild’s giraffe, miracle (0-10%), ficus (0-20%), acacia (10-30%) and nangka (10-20%) were preferred compared to the others assorted browse given. The data of browse preference was taken from the average balance of the browse left after feeding the giraffe.

Giraffes were affected by different factors which stimulates the contrafreeloading but it was all based on their individual preference in Bronx Zoo (Sasson‐Yenor, & Powell, 2019). In the study by Deacon (2015), the activity budgets shows that 39% of the time the giraffes were spending their time related to non-feeding activities. Giraffe behaviour might also be influenced by the habitat and surrounding disturbance. One major finding was individual social preferences was exhibited during foraging (Muller et al., 2018).

# **Objective**

The research project emphasises on the nutritional content of the browse fed to the giraffes and their preferences. The other objective is to find out if the type of browse affects the activity budget of the giraffes where any correlation is observed between the preference of browse and the activity of the giraffes. The spatial space used by the giraffes during the feeding and how they behave are also taken into account for this study.

# **Methodology**

Nine different species of browse will be examined in this study. The browses are listed below:-

1. *Ficus maclellandii* (Ficus with long leaves)

2. *Ficus benjamina* (Ficus with small leaves)

3. *Acacia dealbata* (Acacia, small leave with yellow flowers)

4. *Averrhoa carambola* (Starfruit)

5. *Artocarpus heterophyllus* (Nangka)

6. *Cinnamomum verum* (Young cinnamon)

7. *Adenanthera pavonina* (Saga)

8. *Moringa oleifera* (Miracle)

9. *Caryota mitis* (Fishtail palm)

The study will last from May to August 2022. Each species of browse will be offered to the collection of four giraffes housed in the \*Exhibit\*, Singapore Zoo.

We will receive eight bundles of browse weighing 20kg each per day, of which five bundles will consist of *Ficus maclellandii* and the remaining three bundles to be assorted browse at random, one type per day. In the event of the giraffe does not want to eat the assorted browse offered, *Ficus maclellandii,* which happens to be their favourite, will still be available to them so that animal welfare is not compromised. Their other dietary requirements such as Johnsons pellets, hay and carrots will also be offered to them as per daily routine.

## ***Data collection***

Ethogram will be taken five times a week, four times a day on weekdays. Ten minutes when browse is offered is where they tend to be more active. However, the collection of data depends on the manpower and on-field tasks. Collection of ethograms would be made in ZooMonitor, where behaviours and outline of the exhibit are first recorded in the ZooMonitor before data collection. The behaviours commonly observed in the giraffes are standing, walking (movement), browsing, lying down, galloping (running), necking, drinking, grooming/scratching/rubbing, flehmen response, urinating/defecating, and lastly predator vigilance.

The frequency of the giraffes exhibiting the behaviours listed and the movement of the giraffes once they are released into the exhibit will be recorded in the ZooMonitor.

The preference of the browse would be measured using estimation method by bundle. For example, one delivered 20 kg bundle will be split into two 10 kg bundles and hung in the designated areas (i.e., Area A – D) within the exhibit (Figure 1). If the animal consumed at least half of the split bundle, it would mean that it is considered consumed.

* Good idea to also record the weather (climate, temperature) for each observation / day.
* Also a good idea to take note of the presence of visitors (e.g., counts) for each observation.

Table 1: Proposed combination between browse species (A— E)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Starfruit (A)** | **Nangka (B)** | **Fishtail (C)** | **Acacia (D)** | **Saga (E)** |
| **Starfruit (A)** |  | Starfuit + Nangka | Starfruit + Fishtail | Starfruit + Acacia | Starfruit + Saga |
| **Nangka (B)** |  |  | Nangka + Fishtail | Nangka + Acacia | Nangka + Saga |
| **Fishtail (C)** |  |  |  | Fishtail + Acacia | Fishtail + Saga |
| **Acacia (D)** |  |  |  |  | Acacia + Saga |

Table 2: Proposed weekly schedule of offered browse combinations, in addition to *Ficus* *spp*.

|  |  |  |
| --- | --- | --- |
| **Week** | **Mon – Sun** | |
| 1 | *Ficus spp* | BC: Nangka + Fishtail |
| 2 | AD: Starfruit + Acacia |
| 3 | BE: Nangka + Saga |
| 4 | CD: Fishtail + Acacia |
| 5 | AC: Starfruit + Fishtail |
| 6 | BD: Nangka + Acacia |
| 7 | AE: Starfruit + Saga |
| 8 | CE: Fishtail + Saga |
| 9 | AB: Starfruit + Nangka |
| 10 | DE: Acacia + Saga |

## ***Statistical analysis***

Linear regression used to analyse the correlation of the \_\_\_ and preference of the browse. Using percentage to determine the amount of browse being eaten to estimate the preference of the giraffe. The analysis would be performed in the R environment.

## ***Dry run***

20 kg of the received eight browse bundles will be split into sixteen 10kg bundles, totalling up to ten bundles of *Ficus maclellandii* and six bundles of assorted browse will be offered to the giraffes. Two bundles of *Ficus maclellandii* and two bundles of assorted in the morning during releasing; six bundles of *Ficus maclellandii* and four bundles of assortedwill be offered throughout the day in the exhibit after 11.00am; and two bundles of *Ficus maclellandii* in the yard/den overnight when confined.

The placement of browse is shown in Figure 1.

Graphical user interface

Description automatically generated with medium confidenceFigure 1. Assorted browse would be placed in Area B and Area D, while the rest of the areas would be for the preferred browse of the giraffes collected from previous data, *Ficus maclellandii*.

The timing to hang the browse will start at 8.30am and a total of five observations will be conducted for a period of 10 minutes each, recorded in ZooMonitor. The four observations should be recorded at 8.30am, 11.00am, 2.00pm and 4.00pm. The timings are subject to modification and data would only be taken from Monday to Friday.

***Faecal scoring system***

Graphical user interface

Description automatically generated

Reference from https://nagonline.net/wp-content/uploads/2018/04/Giraffe-Feacal-chart-2018.pdf

# **Considerations**

Token feeding might be affected due to the new browse introduced. For example, if the giraffes love that particular browse, they might feed on the browse instead of joining the token feeding. With the current workflow, the assorted browses that are offered to the giraffes would be overnight and hence, not be fresh as new browse received at around 11.00am. Try-outs could be done to see if it is feasible.

Based on the previous giraffe browse preference data obtained for the two young giraffe, they only like four types of browse species. With the advice from the experienced keepers, assorted browse should be offered together with the preferred browse, *Ficus maclellandii,* to not compromise giraffe welfare. If the assorted browse were not given together with the giraffe preferred browse, the giraffes will not consume the assorted browse but instead feed on the plants surrounding the exhibit.

Faecal scoring is not particularly encouraged and preferred in this study as the diet for the giraffes are not fixed so there are variables which would need to be taken into account.

**References**

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