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Behavioral Observations Surrounding a Diet Change of Zoo-Housed Matschie's Tree Kangaroos (*Dendrolagus matschiei*)

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Behavioral observations surrounding a diet change of zoo-housed Matschie's tree kangaroos (*Dendrolagus matschiei*)

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Matschie's tree kangaroos (*Dendrolagus matschiei*)

- Endangered arboreal marsupial native to Papua New Guinea [1]
- Currently housed at 21 zoos in North America [2]
- Diet
 - Free ranging: "browse-based" fiber-rich from leaves, ferns, orchids, etc. [2]
 - Zoo-housed: calorically dense and starch/sugar rich mixture of biscuits, leafy greens, and fruits
- Dietary discrepancy suspected to contribute to poor body conditions and unsuccessful breeding bouts in zoo-housed tree kangaroos [3]



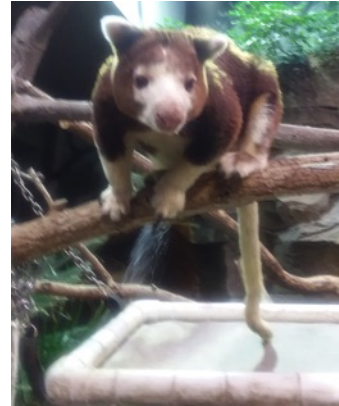
Cleveland Metroparks Zoo (CMZ)

- The Cleveland Metroparks Zoo (CMZ) houses two Matschie's tree kangaroos
- Female (Sausi)
 - 2017: Obese and no successful breeding attempts
 - 2019: Significant diet shift to mainly "browse"-heavy
- Male (Kiari)
 - 2017: Near ideal weight and body condition
 - 2019: Slight diet shift of biscuit to "browse"-heavy



Goals of this study

- Revamp the tree kangaroo diet program at the CMZ to better reflect that of a free-ranging tree kangaroos
- Investigate if and how the diet shift affects tree kangaroo behavior
 - Observe **more time spent feeding** after the diet shift
 - Ensure the diet shift is beneficial for the overall health and well-being of the tree kangaroos



Methods

- Baseline behavioral data was collected on the female tree kangaroo before any diet change from August 2018 - November 2018
- Current behavioral data collection on the male and female tree kangaroos from September 2020 - November 2020
- All behavioral data was recorded from captured video footage
 - ZooMonitor
 - Annke camera system
 - Sample time of 20 minutes
 - Instantaneous observations at 30 second intervals



Preliminary Results

- Sausi 2018 vs. Sausi 2020 activity budget
- G-test
 - Significant changes in overall activity budget after diet change
 - **G = 134.725 ; p < 0.0001**
- Post-hoc Z-tests
 - Significance in overall activity budgets come from inactive, consume, self-directed, and other behavior categories
 - Significant increase in overall activity and time spend feeding

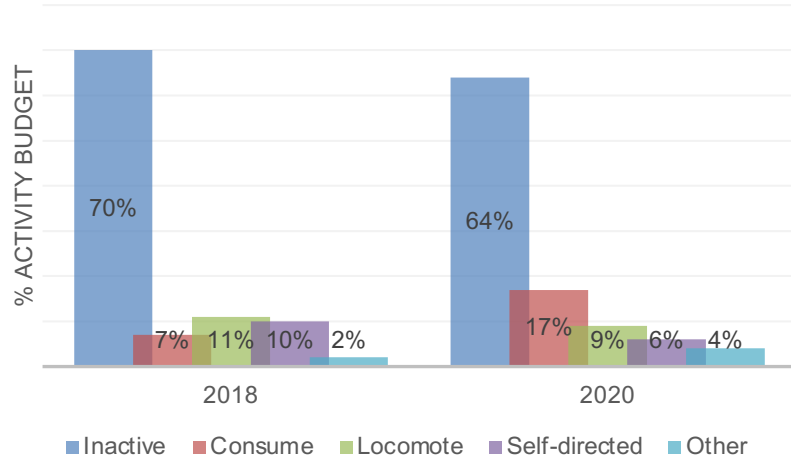


Figure 1. Comparison of the overall activity budget of the female tree kangaroo in 2018 (left) versus 2020 (right).

Preliminary Results

- Sausi 2020 vs. Kiari 2020 activity budget
- G-test
 - Significant differences in overall activity budget between the female and male tree kangaroos
 - **G = 90.283 ; p < 0.0001**
- Post-hoc Z-tests
 - Significance in overall activity budgets come from self-directed and other behavior categories (these behaviors are not the focus in this study)
 - Overall activity and time spent feeding did not change significantly

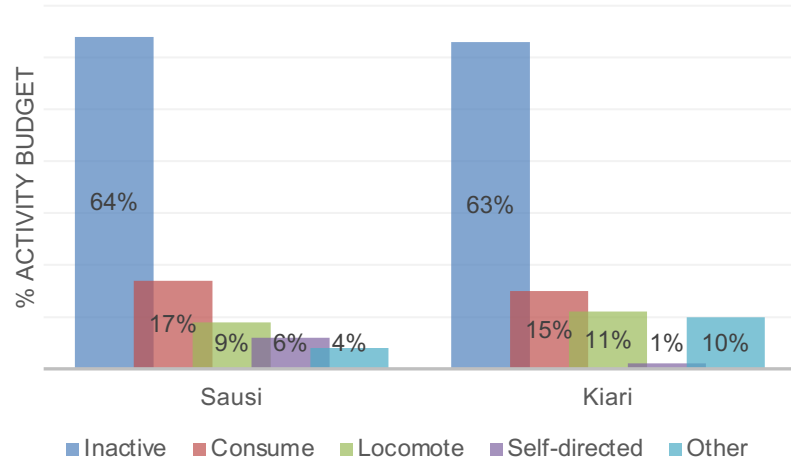


Figure 2. Comparison of the overall activity budget of the female tree kangaroo (left) versus the male tree kangaroo (right) in 2020.

Discussion and Future Directions

- The diet shift of the female tree kangaroo led to an **overall increase in active behavior and time spent feeding** (Figure 1)
- A severe diet shift as opposed to a less severe diet shift did not significantly impact time spent active or feeding between the male and female tree kangaroos (Figure 2)
- Future parts of this study will examine how the diet shift contributes to tree kangaroo
 - Energy expenditure
 - Nutrient intake patterns
 - Reproductive endocrinology
- Help other zoos with Matschie's tree kangaroos transition to a diet to improve their overall health and well-being

Acknowledgments

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Sources

[1] IUCN. (2019). The IUCN Red List of Threatened Species. Version 2019-3. Retrieved from www.iucnredlist.org

[2] Dierenfeld ES, Okena DS, Paul O, Dabek L. Composition of browses consumed by Matschie's tree kangaroo (*Dendrolagus matschiei*) sampled from home ranges in Papua New Guinea. *Zoo Biology*. 2020;1–5.

[3] Blessington, J., Steenberg, & J. (2007). *Tree kangaroo (Dendrolagus spp.) husbandry manual* (3rd Eds.). MD: Association of American Zoos and Aquariums, Silver Spring.