

# Secrets of the night: Investigation of behaviour patterns of *Madoqua kirkii*

H. Malwine Lenz<sup>1,\*</sup>, Kathrin M. Röper<sup>2</sup> & Paul W. Dierkes<sup>1</sup>

<sup>1</sup>Department of Didactics – Bioscience Education and Zoo Biology, Goethe-University Frankfurt, Germany

<sup>2</sup> Hannover Adventure Zoo, Germany

\*h.lenz@em.uni-frankfurt.de



Figure 1: Night-time image of three female Kirk's dik-diks showing the behaviours standing, standing eating and lying head up.

The nocturnal behaviour of Kirk's dik-dik has hardly been studied to date. Initial studies describe nocturnal activity<sup>[1,2]</sup>, but further details of the behaviour are unknown. To get a more detailed picture, we analysed the nocturnal behaviour of 13 adult individuals in different group constellations at Hannover Adventure Zoo between 5 p.m. and 7 a.m. The first comparative results are presented below.



Figure 2: A female Kirk's dik-dik in REM sleep position, which is characterised by head resting and relaxed neck<sup>[3]</sup>.

## Methods

The Kirk's dik-diks were filmed using infrared cameras from December 2023 to March 2024 (see example in Fig. 1 and 2). The video footage was analysed using the open-source program BORIS. The behaviour 'lying head down' is evaluated as the characteristic position of REM-sleep (shown in Figure 2), which has already been proven<sup>[3]</sup> and used in other ungulates studies<sup>[4,5]</sup>. This study compared 13 adult individuals in five separate groups, group composition is shown in Fig. 3.

## Activity budget group comparison

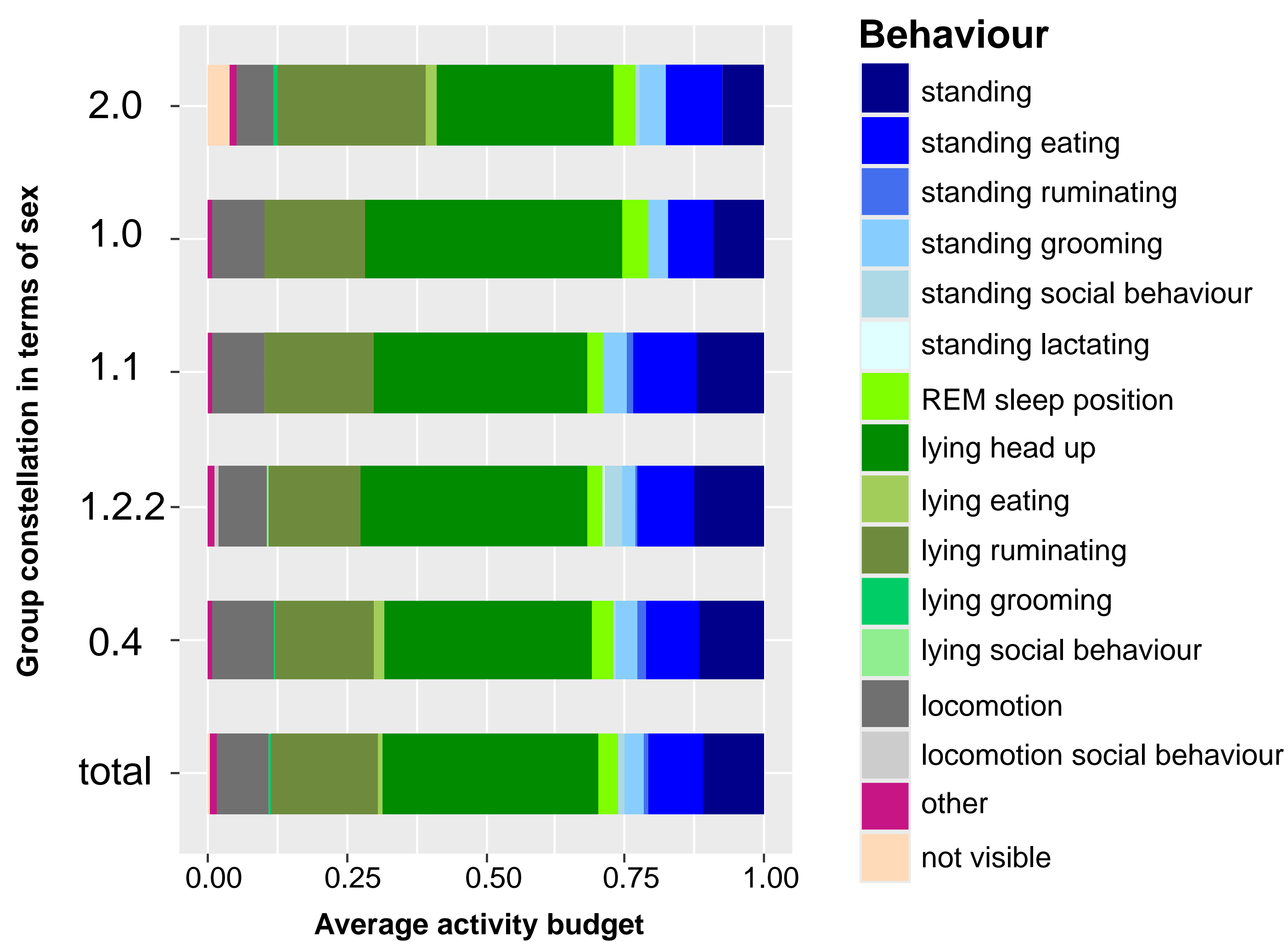


Figure 3: Overview of the nocturnal activity budget of the different groups for two nights. The gender ratio is shown on the left. Total includes the activity budget of all individuals.

## Activity budget

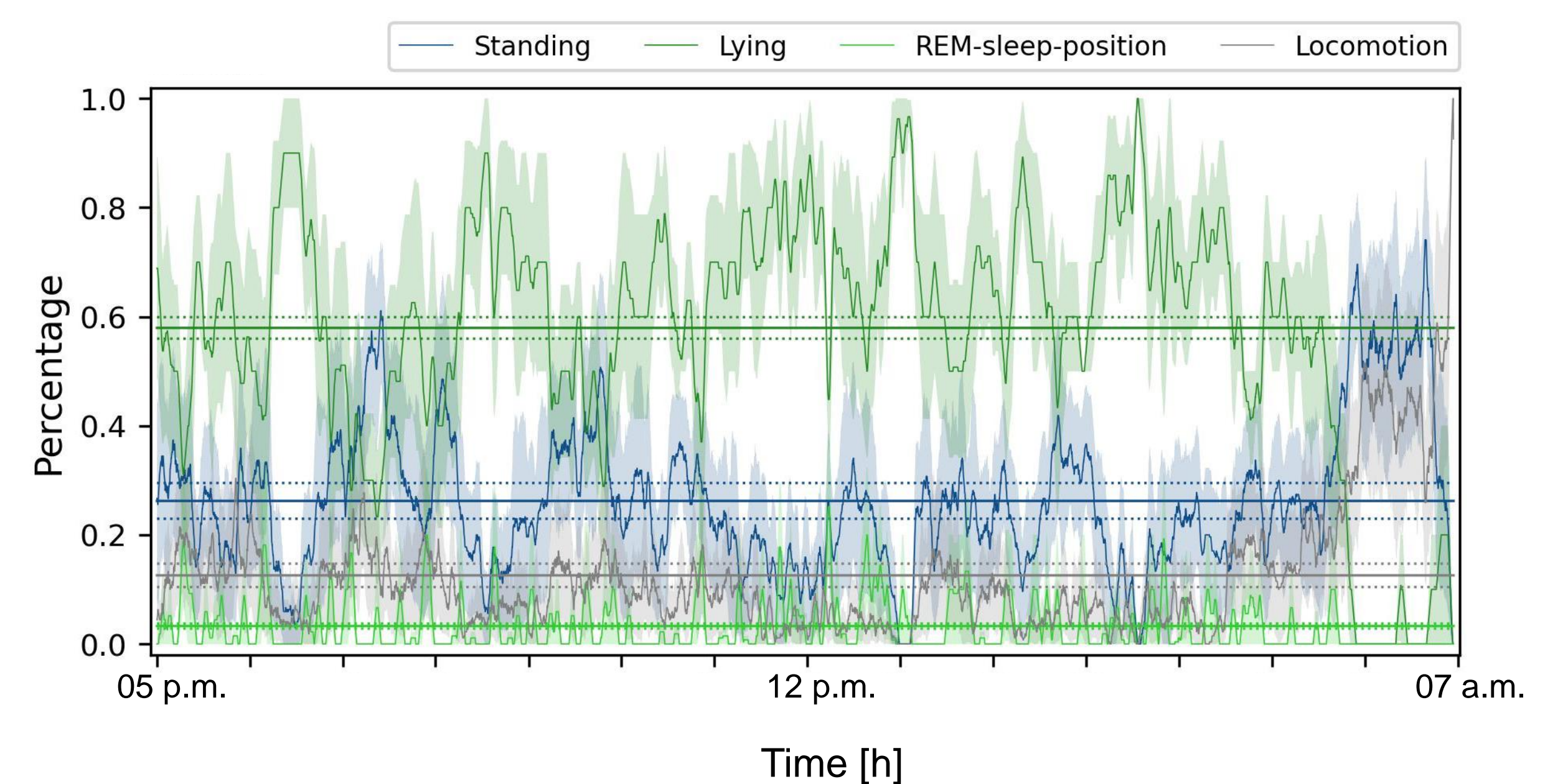


Figure 4: Activity patterns of all 13 individuals for two nights. Blue: standing activities; Dark green: lying activities; Light green: REM sleep position; Grey: locomotion

## Summary

Lying: 56.15 % ± 3.01 %  
 REM sleep position: 3.7 % ± 0.3 %  
 Standing: 27.27 % ± 2.12 %  
 Locomotion: 9.51 % ± 0.89 %

## Conclusion and Prospects

- ✓ The lying behaviour predominates during nocturnal behaviour (Figs. 3, 4).
- ✓ Kirk's dik-diks spend around 3.7 % of their time in the REM sleep position (Fig. 3).
- ✓ The night of a Kirk's dik-dik is structured in active and inactive phases (Fig. 4).

The results presented are still preliminary due to the small number of nights evaluated. In order to be able to make more valid statements, further nights must be analysed to provide an adequate data basis. In particular, the observed differences between the groups (Fig. 3) and the rhythmicity (Fig. 4) require additional data to be tested for significance.