

Diurnal activity patterns of oribi (*Ourebia ourebi*) in Maze National Park, Ethiopia

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ABSTRACT

Diurnal activity patterns of oribi (*Ourebia ourebi*) reveals how animals cope with changing environmental conditions in securing food and escaping enemies. It was studied during the wet and dry seasons for three years in Ethiopia. Data collection was carried out by using focal sampling technique of the free-ranging animals between 06:00 and 18:00 hours of the day using alternate periods during morning (06:00 to 10:00 hrs), mid-day (10:00 to 14:00 hrs) and late afternoon (14:00 to 18:00 hrs). Based on the result of the present study, feeding constituted the highest (57.58%) activity pattern compared to other diurnal activities. There was a morning and evening peak activities of feeding and mid-day peak of lying during wet and dry seasons, for both males and females. The result of the study confirms that there must be environmental factors that override physiological and morphological factors in determining how oribi activity budgets relate with its body mass. Diurnal activity patterns of oribi were mainly influenced by forage quality and availability in the study area. The oribi small body size and digestive physiology are potentially affecting their activity patterns. So, the habitat of the area should be properly managed in sustainable way by designing various conservation strategies to alleviate the activity problems.

Keywords: Activity patterns, feeding, focal watch, Maze National Park, oribi, *Ourebia ourebi*, time budget.

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INTRODUCTION

Oribi (*Ourebia ourebi* Zimmermann, 1783) is the largest and member of the dwarf antelope, tribe Neotragini, family Bovidae (Plowman, 2003). They are found throughout sub-Saharan Africa on fire-climax grasslands and mixed savannas, ranging from Senegal to Eritrea, west and central Ethiopia and southern Somalia, southward into eastern Kenya, across into north Botswana, Uganda and Angola, with patchy and discontinuous distribution through Mozambique, Zimbabwe, and into central and eastern South Africa (Stuart and Stuart, 1997; Coverdale et al., 2006). Historical distribution is likely to have been continuous across much of this range, whereas current distribution is highly fragmented (Coverdale et al., 2006). In Ethiopia, oribi occurs mainly within and to the west of the Rift

Valley. It survives quite widely in open habitats within its historical range, including some settled areas. East (1999) described the Ethiopian occurrence of oribi in low to moderate numbers in areas such as Senkele Wildlife Sanctuary, and Mago, Gambella, Omo and Maze national parks.

Due to its grassland dependence, the oribi are considered as a flagship species for the conservation of important grassland areas like Maze National Park (Marchant et al., 2007). They require short grass for grazing and long grass for shelter (Estes, 1992). Except for the Senkele Swayne's Hartebeest Sanctuary oribi population (Tekalign and Bekele, 2011), there is inadequate or no information about the diurnal activities of oribi and it acts as a flagship species of the park. So,

the aim of the study is to assess the major diurnal activities of oribi in the area in order to give more conservation and managerial attention of the park. Consequently, this study will provide information on diurnal activity patterns of oribi in Maze National Park.

MATERIALS AND METHODS

The study area

Maze National Park (MNP) covers 220 km² and is located in Southern Nations Nationalities and Peoples Regional State, Ethiopia. The park was established in 2005. It is located 485 km southwest of the capital Addis Ababa, and situated between 06.03° and 06.30° N latitude and 37.07° and 37.20° E longitude. Altitude ranges from 998 to 1200 m above sea level.

The annual rainfall is between 843.8 mm and 1375.3 mm. The area experiences a long rainy season that extends from April to October. The dry season is from November to February. The minimum monthly temperature ranged between 17.6 and 19.0°C, and that of the maximum between 29.2 to 33.9°C. The vegetation of the area is predominantly of savanna grassland with diverse and scattered trees and shrubs, including a narrow band of riverine forest associated with the main water courses in the grassland habitat. The Park is surrounded by high rugged mountain ranges, escarpments and evergreen hills. The grassland of the Park supports a wide range of wildlife species and domestic animals. There are 39 mammalian species were recorded in the park and adjacent area by Yimer (2008). Maze National Park harbours highest population of oribi, and it was repeatedly reported by park scouts and other investigators as common and unusually abundant inside the park (Timer, 2003).

Methods

The study was carried out from October 2009 to February 2012 and included two annual cycles of wet and dry seasons. Oribi observations were made using unaided eye and/or binoculars following the method used by Wilson et al. (1996) and Sutherland (1996). Animals were observed from distances varying between 50 and 300 m depending on the habitat of the area. Direct observation method described by Mitchell (1977), Irby (1982), Ono et al. (1988) and Brashares and Arcese (2002) was used to record the activity patterns of oribi. The activity of each male or female oribi individual in each group under observation was recorded at five-minute intervals.

Observations were carried out between 06:00 and 18:00 h. This was carried out for a total of six consecutive days for both males and females during October 2009 to February 2012. The major activities were recorded as feeding, walking, lying, standing and other activities (which included: grooming, courting, defecating, and sniffing of genitalia and other social interactions). Times allocated to different diurnal behaviours were calculated by percentage of animals engaged in different activities for twelve one-hour periods, that is, from 06:00-07:00 to 17:00-18:00 hours.

Diurnal time budget for male and female oribi was calculated by summing all observations per day. For each hour, the number of observations of each activity was expressed as the percentage of all observations during the particular hour; mean was calculated from these percentages. The average time spent in each behaviours by male and female oribi, during the wet and dry seasons, were tested using Chi-square tests and one-sample t-test. Differences among behaviours of oribi at different times of the day were compared using a one way ANOVA and *post hoc* multiple pairwise comparisons (Tukey's HSD test).

RESULTS

A total of 9136 (4271 and 4865 for males and females, respectively) observations, during 576 1-hour observation sessions, were carried out. Most of the observations of diurnal activity of oribi were of feeding ($n = 5260$; 57.58%), followed by walking ($n = 742$; 8.12%), sitting ($n = 2289$; 25.05%), standing ($n = 518$; 5.67%); and other activities ($n = 327$; 3.58%). There was a significant difference among the various activities carried out during the study period ($\chi^2 = 938.275$, $df = 4$, $p < 0.05$). Among the observed activities, observation for 'other activities' was with the least, that is, for males 3.17 and 5.17%, and for females, 2.42 and 3.58%, during dry and wet seasons, respectively.

The result for both male and female oribi shows that, there was a significant difference in the mean percentage of diurnal activity of oribi. The analysis using multiple comparisons with Tukey-test denotes that there was a significant difference feeding with walking, standing and other activities in the adults of male and female oribi during different hours of the day ($p < 0.05$) (Tables 1 and 2). However there was no significant difference between feeding with lying ($p > 0.05$). Applying paired samples correlations test, there was no correlation between the activity patterns of male ($r = 0.035$, $p > 0.05$) and female ($r = 0.033$, $p > 0.05$) oribi with the seasons of the year.

There was a morning and evening peak of the activities of feeding and mid-day peak of lying or sitting during wet and dry seasons for both males and females. The morning peaks for males in foraging were 59 and 68% ($\chi^2 = 0.638$, $df = 1$, $p > 0.05$) and afternoon peaks were 75 and 83% ($\chi^2 = 0.228$, $df = 1$, $p > 0.05$) during wet and dry seasons, respectively (Figure 1). For females, the morning peaks for feeding was 57 and 68% ($\chi^2 = 0.968$, $df = 1$, $p > 0.05$) and afternoon peaks was 78 and 79% ($\chi^2 = 0.006$, $df = 1$, $p > 0.05$) during wet and dry seasons, respectively (Figure 2). In both males and females, there was no significant difference between foraging activities of wet and dry seasons. The afternoon peaks were greater than the morning peaks, during wet and dry seasons for both sexes. There was no significant difference in the afternoon foraging activities between males and females during both wet ($\chi^2 = 0.059$, $df = 1$, $p > 0.05$) and dry ($\chi^2 = 0.099$, $df = 1$, $p > 0.05$) seasons.

The mean percentage of the day engaging in various activities by male was 69.00 ± 8.52 during the dry season and 69.00 ± 5.71 during the wet season. For the females was 69.50 ± 5.17 and 69.67 ± 7.50 during the wet and dry seasons, respectively (Figure 3).

DISCUSSION

During the study of activity pattern, oribi were observed feeding throughout the daylight hours. However, they were observed chiefly grazing during of early morning and late afternoon to early evening, when temperatures

Table 1. The mean percentage of time budget of male oribi during the wet and dry seasons.

Season/activity	Mean \pm SE	Test Statistic (t)	P value
Wet season			
Feeding	55.75 \pm 5.92	9.421	0.000
Laying/sitting	25.75 \pm 5.45	4.726	0.001
Walking	8.08 \pm 1.33	6.059	0.000
Standing	5.25 \pm 0.77	6.819	0.000
Other	5.17 \pm 0.94	5.472	0.000
Dry season			
Feeding	58.08 \pm 8.02	7.240	0.000
Laying/sitting	26.58 \pm 7.92	3.356	0.006
Walking	7.75 \pm 1.05	7.363	0.000
Standing	4.42 \pm 0.92	4.818	0.001
Other	3.17 \pm 1.05	3.014	0.012

Table 2. The mean percentage of time budget of female oribi during the wet and dry seasons.

Season/activity	Mean \pm SE	Test statistic (t)	P value
Wet season			
Feeding	58.00 \pm 5.40	10.748	0.000
Laying/Sitting	22.43 \pm 4.55	4.925	0.000
Walking	8.25 \pm 0.96	8.573	0.000
Standing	7.83 \pm 1.59	4.942	0.000
Other	3.50 \pm 0.65	5.422	0.000
Dry season			
Feeding	58.75 \pm 6.92	7.240	0.000
Lying/Sitting	25.33 \pm 6.97	3.636	0.004
Walking	8.50 \pm 1.44	5.911	0.000
Standing	5.00 \pm 1.18	4.235	0.001
Other	2.42 \pm 0.74	3.252	0.008

were generally cooler. Different authors described that foraging was the dominant diurnal activity of various species of ungulates. For example, Taylor et al. (2006) discussed that foraging was the dominant activity of; sympatric grey rhebok (*Pelea capreolus*) and mountain reedbuck (*Redunca fulvorufula*), taking up 56% of day time, which was similar to the results of the present study. They also found that animals generally rested more during the mid-day and involve freely more in the early morning and late afternoon hours.

The time spent in feeding by both males and females during this study period was in greater proportion during the dry season than during the wet season. There were differences in mean percentage of active hours for both males and females, during the dry and wet seasons. The dissimilarity in the allocation of time budgets during the wet and dry seasons of the year in oribi may imply that the availability of forage and temperature to be the decisive factors overriding the activities of the oribi

population in MNP. Roberts and Dunbar (1991) stated that seasonal variations in reedbuck (*Redunca fulvorufula*) behaviour might be associated with temperature, precipitation and vegetation biomass on the ground. du Toit and Yetman (2005) expressed that in addition to influencing feeding behaviour, body size also has implications for how animals respond to changing environmental conditions. They posted that among ungulates, the smallest members of a trophic guild would be expected to make the greatest relative adjustments to their diurnal activity budgets in response to hour-to-hour variations in ambient temperature through the day, and day-to-day variations in maximum ambient temperature through the seasonal cycle. Our results supports that there must be environmental factors that override physiological and morphological factors in determining how oribi activity budgets relate with its body mass.

An increase in forage quality and availability on the onset of the rains generally resulted in less time for

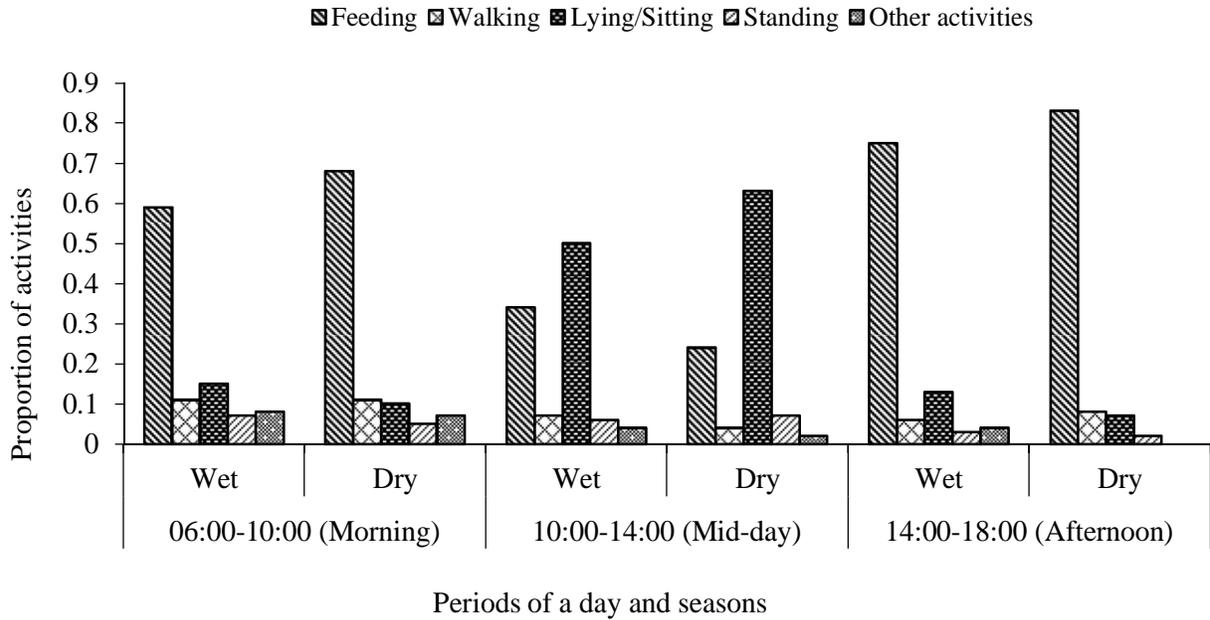


Figure 1. Proportion of diurnal activity patterns of males during the wet and dry seasons.

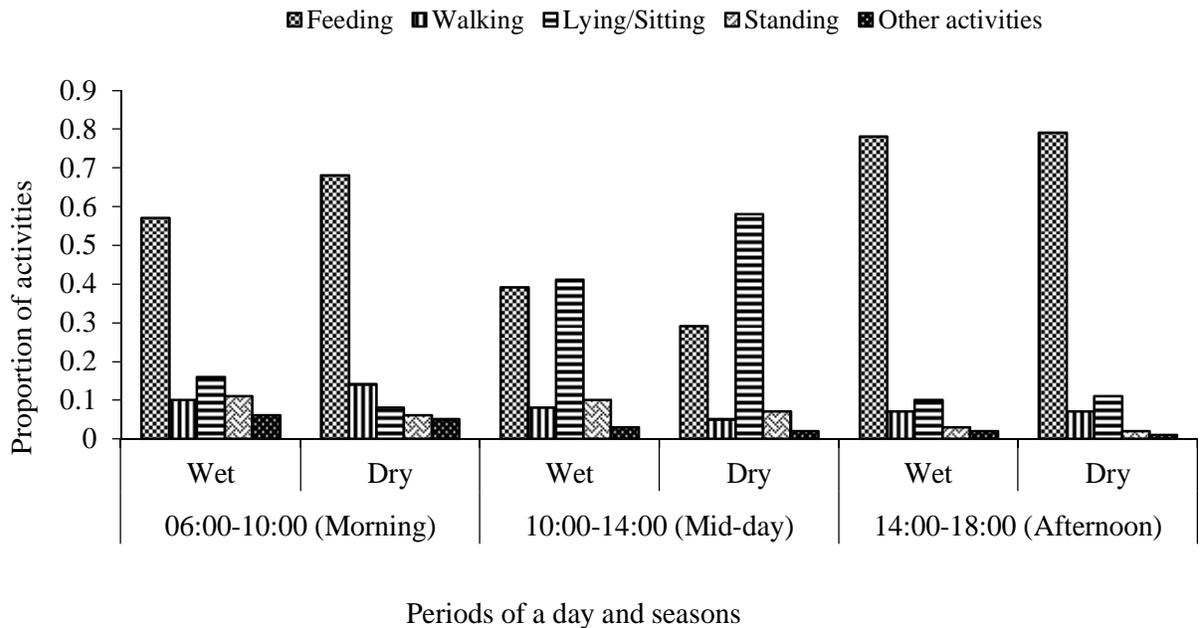


Figure 2. Proportion of diurnal activity patterns of females during the wet and dry seasons.

feeding as observed in male oribi during the study. During the dry season, diurnal activity was confined principally to a few hours after sunrise and before sunset. However, during the wet season, activity also peaked at these times even though low level activity continued throughout the day. Roberts and Dunbar (1991) revealed that activity and feeding levels of mountain reedbeek were lower during the wet season when forage quality

and availability were higher. This implies that, the diurnal activity patterns seem to be influenced by factors other than food availability and temperature. During the present investigation, male oribi performed territorial marking by frequently defecating small amount of faeces within their home ranges while females appeared to defecate randomly. Many of the oribi individuals were observed grazing grasses very close to large number of ungulates

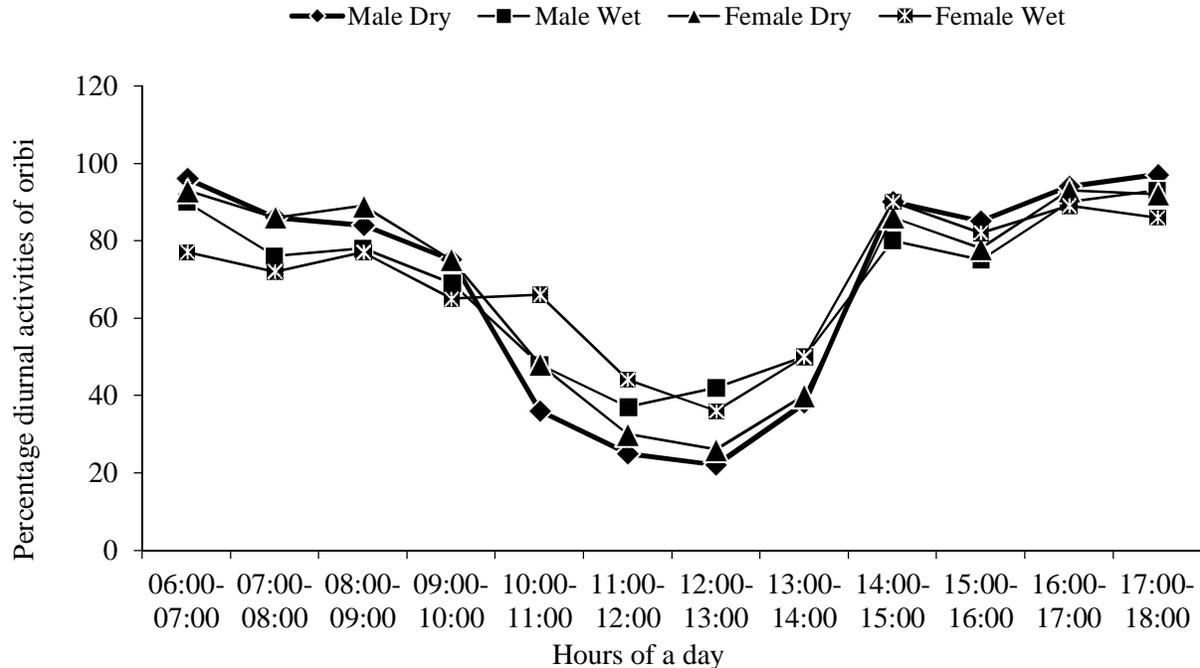


Figure 3. Percentage of active hours of the day engaging for male and female oribi during the wet and dry seasons.

inside the Park.

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