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RANDOM TIME-ACTIVITY BUDGETS IN CAPTIVE SOUTHERN GROUND HORNBILL *BUCORVUS LEADBEATERI* (VIGORS, 1825)

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Introduction

The conservation status of the Southern Ground Hornbill *Bucorvus leadbeateri* is vulnerable on the IUCN Red List (Birdlife International, 2012). The Mabula Ground Hornbill Conservation Project (2011) attempts to increase the number of hornbills by five main techniques: supplement feeding, double clutching, alternation of chicks, group augmentation and chick fosters (Kemp, 2000). Numbers are threatened directly by habitat loss, hunting and international trade (Trail, 2007), and indirectly by reporting rates (Vernon and Herremans, 1997), group size (Hulley and Craig, 2007) and communal breeding (del Hoyo et al. 2001; Tyler in litt. 2010). Furthermore, it has a highly K-selected life-history pattern (Kemp and Kemp, 1980). Captive breeding of this species can potentially increase the population size two-fold because both eggs laid are guaranteed survival. But when does mating occur?

Time-activity budgets in birds can be used to illustrate reproductive effort (Brunton 1988). Time-activity budgets for Southern Ground Hornbills are only known from wild birds in the Kruger National Park (Kemp and Begg, 2001). Here we determine the time-activity budgets of captive Southern Ground Hornbills in the Johannesburg Zoo and compare these with randomly expected behaviour in captivity.

Fig 1 – Male Southern Ground Hornbill in Kruger National Park
Courtesy: Trevor Hardaker

Materials/Methods

Both focal-animal sampling and scan-sampling was used to study three hand-raised Southern Ground Hornbills; an adult male (6 years old), adult female (*ca* 18 years old), and a juvenile (1 year old), between 08:00-16:00 from 30 January to 15 February 2013 at the Johannesburg Zoo. Pre-study observations were conducted prior to study and behaviour(s) were classified based on focal-animal sampling in the aviary (55 m x 25 m x 8 m). The Southern Ground Hornbills were fed twice daily at approximately 10:00 and 14:00. One of 12 behaviours of individuals was recorded at 1 minute intervals using a stopwatch for scan-sampling. These behaviours included: (i) walking, (ii) sitting, (iii) perching, (iv) preening, (v) foraging,

(vi) social interaction, (vii) running, (viii) standing, (ix) flying, (x) vocalizing, (xi) bill clapping, and (xii) other. The observed data were recorded and entered into Microsoft (MS) Excel and converted into percentiles. Random expected frequencies were generated by dividing the observed frequencies by the number of (behavioural) categories to get the expected frequencies (Zar 1989). The observed and expected frequencies were compared using the CHITEST statistical function in MS Excel (2007); which generated probability-values.

Results

Times for the scan observations totalled 26 hours. There was no significant difference between the observed behaviours and those expected by chance (N=12, p=0.91) in Southern Ground Hornbills. There were no significant differences between observed and expected male behaviours (N=12, p=0.98), observed versus expected female behaviours (N=12, p=0.87) and observed versus expected juvenile behaviours (N=12, p=1.00).

Of the twelve behaviours recorded walking was always the most common (51%), followed by standing (18%), foraging (8%), perching (7%) and sitting (5%). Less commonly observed behaviours included preening (2%), flying (1%), and running (1%). Communication in the form of bill interactions and territorial calling was recorded in 4.5% of the observations. The female called more frequently (4.1%) than the male (3.3%). The female spent more time perched than the male or the juvenile. The juvenile spent more time foraging and less time walking than either of the adults.

Discussion

The captive Southern Ground Hornbill time-activities observed were no different from randomness (Table 1). In other words, no significant differences between the 12 behaviours observed in the three birds and those expected by chance were found. The possible exception to randomness is the higher frequency of female vocalization. This is a species-specific behaviour and is known as territorial calling (Kemp and Kemp, 1980). The higher frequencies of territorial calling by the female may be female control (Eberhard, 1996).

Table 1: Time-activity budgets of Southern Ground Hornbill *Bucorvus leadbeateri* from scan behavioural samples.

Behaviour	Observed %	Random Expected %
Walking	51.05731	62.11111
Standing	18.4	22.0
Foraging	8.7	10.4
Perched	7.4	9.1
Sitting	5.3	6.4
Vocalizing	2.5	4.6
Preening	2.5	3.0
Bill clapping	2.0	3.7
Running	0.8	0.9
Flying	0.7	0.9
Interaction	0.5	0.6
Other	0.3	0.5
N (hours)	**26**	**26**

Preening, foraging, and sitting appeared less frequently than the same behaviour observed in wild birds (Kemp and Begg, 2001). Captive birds may be less prone to parasitism than wild birds? Foraging pressures may be released in captivity because food is provided in compact spatio-temporal instances and hence it occupies less time-activity. The juvenile may be spending more time foraging and less time walking because this is optimal for a helper-at-the nest in a captive environment analogous to the power struggles in cooperative breeders (Koenig 1981). The higher frequency of female

perching indicates defence of the nest site (Rendell and Robertson, 1994).

A future study could directly compare these data with Kemp and Begg (2001) using a contingency table.

Conclusions

The time-activity budgets of captive breeding Southern Ground Hornbills indicated random behaviour with the exception of vocalizations which were more frequent in the female compared to the male.

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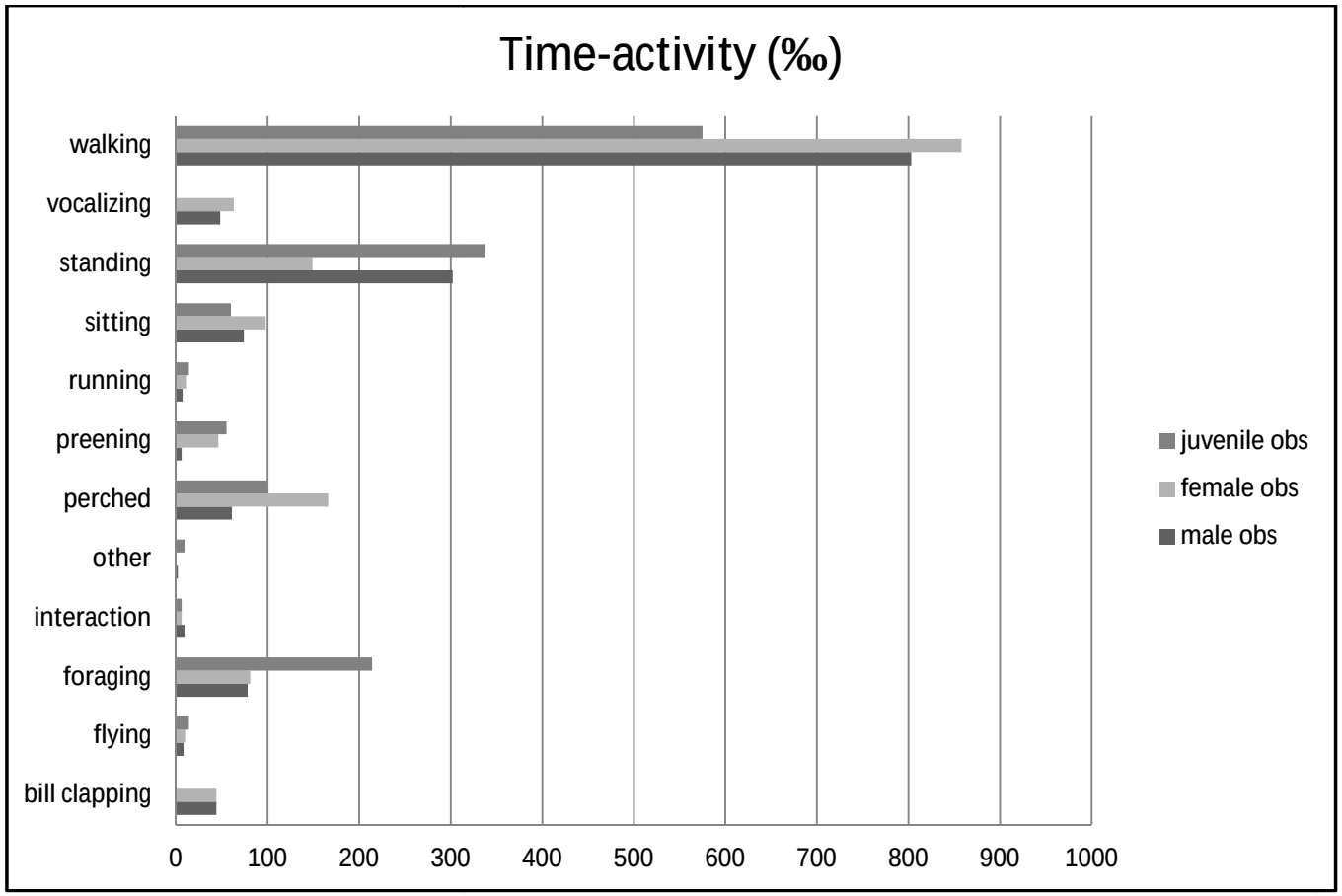

Fig 1 - Time-activity budgets estimated for the Southern Ground Hornbill *Bucorvus leadbeateri* from scan-sampling (*N*=4 361 observations).