Nesting and roosting behaviour of the white-nest swiftlet, *Aerodramus fuciphagus* (Aves: Apodidae) in Sarawak.

Mohamad Fizl Sidq Ramji[1], Lim Chan Koon[1] and Mustafa Abdul Rahman[1]

Department of Zoology[1]

Universiti Malaysia Sarawak

Kuching, Sarawak, 94300 Malaysia

Introduction

Edible-nest swiftlets had long been recognized as highly-prized commodity of economic and pharmaceutical values. In Borneo, the conventional management of swiftlet farming activities particularly the house-farmed colonies is largely manipulated by local entrepreneurs or farm managers with most practice neglects scientific implementation of important biological and ecological data. These include nesting and roosting behaviours, reproductive biology, adaptive mating system, courtship behaviour, dietary and feeding behaviours. Present knowledge on the biology and ecology aspects of Bornean swiftlets (*Aerodramus* spp.) are well documented in relatively few published studies (e.g. Medway, 1962; Lim, 1999, 2000; Lim and Cranbrook, 2002; Thomassen, 2005). However, the natural causes and adaptive value of communal behaviour is not clearly understood. Adding to this, the behavioural patterns of white-nest swiftlets

in swiftlet houses were rather subject of theoretical observations made on their natural cave-living comrades. By expanding these studies, detailed observation on nesting and roosting behaviour of the white-nest swiftlet in house-farmed colonies are made possible through controlled accessibility and easy deployment of continuous video surveillance system. It would be proven significant to investigate the development of adaptive behaviours of these house-farmed colonies and how the population expand and colonize new nesting sites. Thus, it is anticipated that comprehensive understanding on nest-site preferences will ultimately benefit farm managers to further improve their swiftlet houses.

Methodology

A simple non-stop video surveillance system was installed inside an established swiflet house in Miri from early June 2010 to observe the nesting and roosting behaviour of the white-nest colony. The sampled colony from 16 nest boxes were continuously monitored using an Infrared (IR) camera wired via video cables to a single 4 channels digital video recorder (H.264 4CH DVR) connected to a 15” inch flat screen monitor. All recorded video files were automatically stored into the DVR temporary internal hard disk for later viewings.

Data analysis

Each roosting areas were monitored to calculate total number and periodic intervals of nest attendance/non-attendance (Chazarreta *et al*., 2010). Due to enormous amount of data, all video footages were viewed on fast-forward mode, however comprehensive screening was done occasionally at normal speed to characterize miscellaneous activities which might be potentially overlooked (Pechacek, 2005). Subsequently, all prescribed activities were transcribed onto activity log sheets according to the 2400 hours timeline with numbers of bird counted per observation hour. Following Martin and Bateson (1993) and Pechacek (2005), a simple method of instantaneous sampling (fix-interval time point) was chosen to organize and screen the data systematically. To ensure consistency and comparison, recording time was fragmented and analyzed from four quarter sampling intervals (Q1, Q2, Q3 and Q4) per observation hour. 'Sample points' were derived from each quarter to infer the behavioural activity addressed by the targeted individual.

Results and Discussion

Overall, 1020 hours had been analysed by tallying 4080 quarterly counts (qc) of the sampled colony. Three basic activity sessions can be described which includes the first emergence hours (0600-0700), visiting hours (0700-1100) and returning hours (1800-1900). On average, the white-

nest swiftlet spent about 12 to 17 hours roosting inside the swiftlet house. The earliest signal of active flight movements commenced within Q2>0615 hr (Dec 2010, Jan 2011). At this point, the number of individuals decreased abruptly (a bit early in June 2010, about a quarter interval) and returned shortly after Q1>0700 hr. A unimodal curve was observed within 0700-1100 hr peaking between 0800-0900 hr with approximately half of the estimated population returning to roost after first emergence (Q2>0615 hr) (Figure 1). This daily colonial movement indicated a corresponding monthly general pattern from June 2010 until January 2011.

Based on the numbers of returning individuals (Table 1), the percentage of returning colony differ greatly in June and December 2010 between 22.5-76.1% and 21.2-72.5% respectively. Comparatively, the ratio can be as little as 5.1% to 50.2% in January 2011. The outstanding peak activity probably suggests that nest building and nestling feeding activities were most likely to occur during these visiting hours. An ethogram outlining the roosting and nesting behaviour is presented. Our preliminary findings on roosting movements of the colony identified five major types of roosting behaviours which are proximity fluttering, pair switching, pinching, parallel shifting and random roosting flight. Given the dynamic behavioural pattern between nesting and roosting individuals, these predefined activities may

potentially describe and elucidate the overall extent of various behavioural interactions within the colonial white-nest swiftlet.

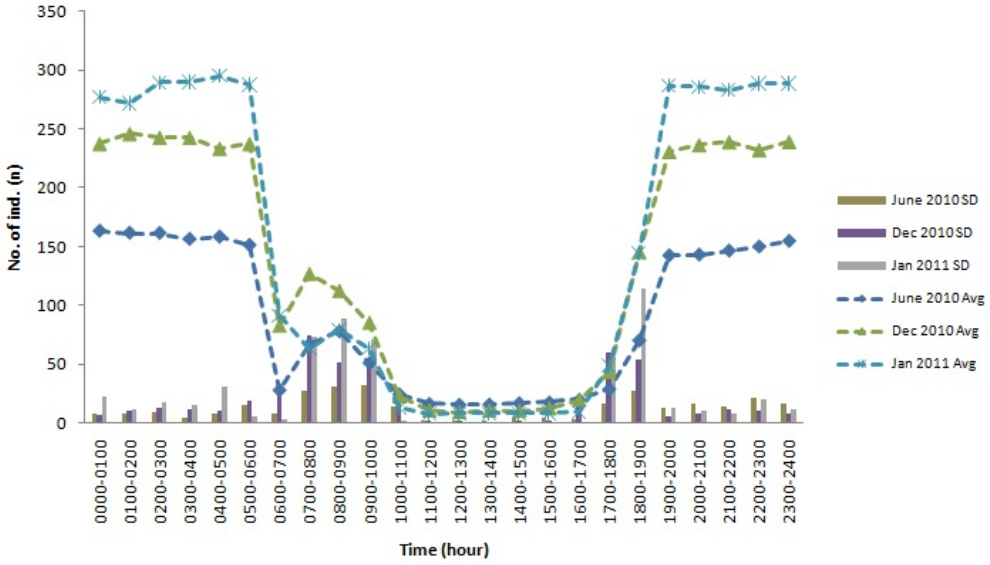

Figure 1: Cumulative graph of average colonial counts beginning in June 2010, December 2010 and January 2011.

Table 1: Percentage (%) of returning individuals during the visiting hours from 0700-1100 hrs.

Month	**Max. no. of returning ind.**	**Estimated population size**	**(%) of returning colony**
June 2010	143	177	22.5-76.1
December 2010	189	261	21.2-72.5
January 2011	143	317	5.1-50.2

References

Delaney, D. K.., Grubb, T. G. and Beier, P. 1999. Activity patterns of nesting Mexican spotted owls. *The Condor*, 101: 42-49.

Lim, C. K. 1999. Sustainable harvesting and conservation of the edible nest swiftlets (*Aerodramus* spp.) of Sarawak. Unpubl. PhD thesis. University of Kent at Canterbury, United Kingdom.

Lim, C. K. and Cranbrook, Earl of. 2002. *Swiftlets of Borneo*. Natural History Publications (Borneo), Kota Kinabalu.

Martin, P. and Bateson, P. 1993. *Measuring behaviour, Second edition*. Cambridge University Press, Cambridge.

Medway, L. 1962. Reproductive cycle, moult and changes in the sublingual salivary glands of the swiftlet *Collocalia maxima* Hume. *Proc. Zool. Soc. Lond.*, 138: 305-315.

Pechacek, P. 2005. Use of non-stop video surveillance to monitor breeding activity of primary cavity nesters in remote areas. *Acta Ethol*, 8: 1-4.

Thomassen, H. A. 2005. *Swift as sound. Design and evolution of the echolocation system in Swiflets (Apodidae: Collocaliini).* Print Partners lpskamp B. V., Enschede.