

ROOSTING ECOLOGY OF RED JUNGLE FOWL (*GALLUS GALLUS SPADICEUS*) IN OIL PALM PLANTATION

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Roosting ecology of Red Junglefowl (*Gallus gallus spadiceus*) was studied in oil palm plantation at Sungai Sedu Estate, Selangor, Malaysia. The data were collected by observing the Red Junglefowls directly and with the aid of radio telemetry. Student's t-test was used to examine the differences of roosting activities between males. Pearson correlation analysis was done to examine the relationship between environmental factors and roosting behaviour. The results showed that the Red Junglefowl preferred horizontal frond for roosting at night. In choosing a suitable roosting site, it climbed and walked on the branch step by step and frequently changed branches and trees from time to time. The roosting height varied between 4 to 12 m. However, hen with chicks roosted lower than other birds. The Red Junglefowl departed 7 min earlier than sunrise and roosted 2 min before sunset. The average time spent on roosting on tree was about 11 h 47 min. Generally, the female went to roost earlier than the male and the male departed earlier than the female.

Key words: Red Junglefowl, Oil palm plantation, Roosting time, Departure time.

Introduction

Roosting in this study refers to the resting of a Red Junglefowl (*Gallus gallus spadiceus*) on a tree at night. Red Junglefowl may form a close group along a limb or be scattered over different parts of the same tree at night (Bump and Bohl 1961). They normally roosted from 6 to 15 m above the ground on the trees. The same roosting site may be utilized for long periods of time unless the birds are disturbed. Johnson (1963) reported that the Red Junglefowl preferred to roost on large clumps of bamboo. Birds belonging to a harem flew to individual perches 5 to 6 m above the ground and selected a position well out on a bending cane and well screened above and below a location offering easy exit in case of night prowlers.

Red Junglefowl is a handsome game bird and is widely distributed in all states of Peninsular Malaysia (Siti Hawa 1992). However, no detailed study had been done on its ecology particularly on roosting in agriculture areas. Since the species is a very popular game bird, the information of its roosting ecology in agriculture areas is very crucial. This study was conducted to examine the roosting behaviour of Red Junglefowl in oil palm plantation. We recorded the temperature,

relative humidity and cloud cover at the time of roosting and departure and correlated the Red Junglefowl activities with environmental conditions.

Materials and Methods

This study was conducted from August 1996 to July 1997 in the oil palm plantation at Sungai Sedu Estate, Selangor, Malaysia. It is located about 60 km southwest of Kuala Lumpur (Longitude 101° 35' E and Latitude 2° 50' N). The oil palm species *Elaeis guineensis* was planted in the plantation. The dominant undergrowth was fern *Nephrolepis bisserata*. The age of the plantation varied between 4 to 25 years.

We used two methods for data collection. The first involved visits to the area early in the morning. When a male's crowing was heard before it departed from roost, a hiding place was established near the roosting place where the bird could easily be observed. Similarly in the late evening when a bird was detected, a hiding place was established to examine the birds roosting behaviour. The roosting trees were measured for their roosting height. The perch height was estimated directly with a measuring rod. A 20-nights survey (2100-2330 h) was also conducted with a torchlight to examine the roosting behaviour at night.

The second method used was by radio tracking. Four Red Junglefowls (three males and one female) were trapped and

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equipped with a single stage 16 g transmitter (with magnetic switch and less than 3% of the body weight) that emitted pulsed signals on channels 154 MHz. The signals were detected during radio tracking with a Mariner 57 portable receiver and a three-element Yagi antenna. Single stage transmitters (Biotrack, Wareham, and U.K.) were used because it was planned to observe Red Junglefowls over a number of months. We located radio-tagged Red Junglefowls during the early morning and evening. After detecting the bird, a hiding place was selected for recording the roosting and departing time. In plantation where visibility of Red Junglefowl was very low, the roosting and departing time was judged by the sound of signals.

The time, temperature, humidity and cloud cover was recorded when the Red Junglefowls departed and roosted. The temperature and humidity were measured by a whirling sycrometer. The cloud cover was estimated by visual observation. Data on sunrise and sunset time were obtained from the Islamic Calendar (Islamic Department, Shah Alam, Selangor) to examine the relationship between departing and roosting time.

Statistical data analysis. We managed to collect sufficient data for statistical analysis of departure time of only two Red Junglefowls (Male I and Male II). Student's t-test was employed to examine the significant difference of departure time between two males. Student's t-test was also done to examine the significant difference of departure time and sunrise time and roosting time and sunset time. Correlation (Pearson correlation) analysis was done to examine the relationship between each departure and sunrise time, and roosting and sunset time. Correlation (Pearson correlation) analysis was also done to examine the relationship between each roosting and departure time with environmental factors such as temperature, relative humidity and cloud cover. We used the Statistical Analysis System program (SAS 1994) for all statistical tests. The level of null hypothesis was taken as $\alpha = 0.05$. Data are reported as means + SE.

Results and Discussion

The departure time of two males (Male I and Male II) was not significantly different ($t = -1.96$, $P > 0.05$). The Male I departed at 0708 h while Male II at 0712 h. There was also no significant difference between departure time and sunrise time ($t = 1.42$, $P > 0.05$). However, there was a positive correlation of departure time with sunrise time ($r = 0.63$, $P < 0.05$). There was also a significant difference between roosting time and sunset time ($t = -5.558$, $P < 0.05$; Table 1) and significant positive correlation between roosting time and sunset time ($r = 0.36$, $P < 0.05$). The mean time spent on roosting tree was 11 h and 47 min.

There was a negative correlation of roosting time with temperature ($r = -0.45$, $P < 0.05$). It means that the higher the temperature the earlier the birds went to roosting. The relative humidity has a positive correlation with the roosting time ($r = 0.31$, $P < 0.05$). There was no correlation between roosting time and cloud cover ($r = -0.09$, $P > 0.5$). There was also no correlation between departure time with temperature ($r = -0.18$, $P > 0.05$), relative humidity ($r = -0.06$, $P > 0.05$) and cloud cover ($r = -0.03$, $P > 0.05$).

Generally the Red Junglefowls preferred a horizontal or bending frond for roosting. They frequently changed branches and trees before they decided to roost on it. Male Red Junglefowl always roosted solitary and departed 2 min earlier than the female, while the female roosted 1 min earlier than the male. Male and female often used the same tree but roosted on different branches or fronds. Young Red Junglefowls less than four months old roosted on the same branch and sat closely together with each other. During the study, one hen with chicks was observed. Hen first flew to the roosting tree and was followed by the chicks. She took her chicks under the feathers. Red Junglefowl roosted at a height between 4 to 12 m. The roosting height increased as bole height of oil palm trees increased. They roosted in the centre of the oil palm fronds. The roosting height of the hen with chicks was approximately 4.0 m above the ground.

Red Junglefowl departed from a tree as soon as light was adequate. This might be due to hunger after the nightlong sleep (about 11 h 47 min) and the increasing risk of predation as the day progresses. Another factor might be due to the fact that the Red Junglefowl preferred to start feeding at early in the morning especially in open areas (Bump and Bohl 1961). In the morning the arthropods were inactive and could easily be caught by Red Junglefowls (A.S. Sajap personal communication). Hoffman (1968) reported that Merriam's Turkey (*Meleagris gallopavo merriami*) departed the roosting tree before sunrise and went to roost before sunset. The time of departure the roosting tree was highly correlated with sunrise. Thus the Red Junglefowls probably respond generally to light, as many other birds do (Davis and Lussenhop 1970; Gill and Dow 1985). The cloud cover and the roosting time suggested that the bird might have cued their behaviour to sky condition as well as lights. The significant effect of relative humidity to roosting behaviour is difficult to explain. No doubt the birds can detect gross changes in relative humidity as humans can (Gill and Dow 1985). It could also be that other unseen environmental factors such as rainfall compelled Red Junglefowl to change their roosting behaviour.

The environmental factors such as humidity and cloud cover have no effect on departure time. These findings were

Table 1

Roosting and departure time of red junglefowl, sunset and sunrise time in oil palm plantation at Sungai Sedu estate

Variable	Time	Variable	Time
Sunset time	1923.36 ± 0.54 h	Sunrise Time	0711.47 ± 1.21 h
Roosting time	1916.34 ± 1.06 h	Departure Time	0709.23 ± 1.01 h

consistent with Gill and Dow (1985) who reported that cloud cover and relative humidity have no effect on the departure time on Babblers.

The male Red Junglefowl departed his roosting tree earlier than the female while the female went to her roosting tree earlier than the male. Chandola-Saklani *et al* (1989) reported that the male of Kalij pheasant (*Lophura leucomelanos*) left the roosting tree earlier than the female and the female went to the roosting tree earlier than the male (70% of total sightings). This might be due to its social behaviour. The main reason of a male to depart the roosting tree earlier and to go to the roosting tree later than the female was to show his dominance over the female. It might also be due to the fact that he prepares himself for mating in the morning. The normal habit of the male was to attract the female as soon as she left the roosting tree early in the morning.

The Red Junglefowls often changed their roosting sites from time to time. Collias *et al* (1966) stated that Red Junglefowl changed its roosting site after the site was damaged. In this study, it was observed that the Red Junglefowls changed their roosting sites due to habitat destruction, human disturbance, predators and for finding mates. Therefore, the cumulative effect of the above mentioned factors might force the Red Junglefowls to switch their roosting sites frequently.

It was also observed during this study that the female of the Red Junglefowl roosted earlier than her chicks. Noske (1985) concluded that the female of Varied Sittella (*Daphoenositta chrysoptera*) roosted before her chicks did. Gill and Dow (1985) reported that fledged got co-ordination to roosting from the oldest bird. This might be the learning process of the chicks to seek guidance from the mother for the selection of suitable roosting site to protect themselves against the predators.

In this study, it was noticed that the roosting height for both males and females varied from about 5 to 12 m. However, the female with chicks roosted slightly lower (4 m). Bump and Bohl (1961) reported that the Red Junglefowl preferred to roost at a height of 6 to 15 m in its natural habitat (Sal forest) in India. Similarly Johnson (1963) also reported a height of 5 to 6 m was preferred in his studies of Red Junglefowl conducted in Thailand. This might be the most suitable roosting height for the Red Junglefowl to avoid ground and aerial predators.

Chicks stayed with their mother while roosting. These findings are consistent with Yasmin (1993-94) who reported that a female and yearlings of Peafowl (*Pavo cristatus*) roosted together in groups. This might be associated with patterns of social organization. Red Junglefowl chicks are dependent on their parents up to two months. Sharma and Chandola-Saklani (1992) stated that the female of Kalij pheasant roosted with their chicks. This might be due to protection against the predators and environmental constraints such as rainfall.

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