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## Food and Feeding Habits of Red Junglefowl

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**Abstract:** The study on food and feeding habits of Red Junglefowl (*Gallus gallus spadiceus*) was conducted in three agriculture areas (orchard, rubber and oil palm plantation) by direct observation and crop contents analyses in Selangor, Malaysia. Red Junglefowl moved continuously in search of food and preferred by scratching the litter. It would feed in open areas early in the morning and evening. The rest of the day it would feed in shaded areas especially under trees. Red Junglefowl eats a variety of animals and plants. It prefers to eat the pericarp of oil palm (*Elaeis guineensis*) fruit, Iskandar palm (*Archontophoenix alexandrae*), Chiku (*Achras sapota*), Papaya (*Carica papaya*), Cempedak (*Artocarpus integer*), rubber (*Hevea brasiliensis*) nuts, and seeds of *Macaranga* sp. Analyses of crops content shows that among the animals, Dermaptera, Hymenoptera, Isoptera, Orthoptera, Coleoptera, Crustacea (Isopoda), leeches and snails were the predominant food. It also ate snails, eggshells, bones and snakes. The male Red Junglefowl consumed oil palm fruit more than did the female whereas the female consumed invertebrates and vertebrates more than did the male.

**Key words:** Red Junglefowl, food, feeding habits, oil palm fruit, invertebrates

### Introduction

The Red Junglefowl is a popular game bird in Peninsular Malaysia. Very little is known about its diet in Peninsular Malaysia. It has been observed to eat luban fruit (*Vitex pubescens*) and also tapioca roots (Collies and Saichuae, 1967). Medway and Wells (1976) reported that the diet of the Red Junglefowl contains a wide variety of insects, among them termites and ants were predominant. The Red Junglefowl was also recorded to consume bamboo flower and palm nut and insects such as grasshoppers (Nishida *et al.*, 1975) and rubber nuts (Abdullah and Babjee, 1982). There was a lack of published detail information on food and feeding habits of Red Junglefowl in agriculture areas such as orchard, oil palm and rubber plantation in Peninsular Malaysia. In this study the diet of Red Junglefowl was assessed from crop analysis and by direct observation. This paper provides detail informations on the food and feeding habits of Red Junglefowl in agricultural areas.

### Materials and Methods

This study was conducted in orchard, rubber and oil palm plantations in the state of Selangor, Malaysia. A total of 80 crops were collected from hunters in oil palm plantation including one from a naturally dead bird. The crops were stored in 70 percent ethanol until they were examined. The plants were also collected in oil palm plantation as a reference for identification. The contents were emptied into a petri dish and separated manually into different classes in accordance to animal or plant materials. The animal materials were identified up to order level. The plant contents were identified by comparing the physical morphology of the pieces recovered from the contents with that of plants collected from the field.

The contents of 26 crops (13 males and 13 females) were dried in oven at 60°C for 24 hours. The sample size chosen randomly having a degree of precision 33.3 percent. This sample size beyond doubt sufficiently representing overall sample size. According to Parel *et al.* (1978) we only required 5 percent or above degree of precision. The weight of each crop content was obtained with an analytical balance and converted into percentile of the total content weight of the respective crop. The data were

pooled to examine the overall percentage of each food item. Student's t-test analysis was done to examine the difference of food intake between male and female. The level of the null hypothesis was taken as 0.05. All analyses were performed by using Statistical Analysis System package (SAS Institute Inc.) (SAS., 1996). Observations on Red Junglefowl feeding behaviours were recorded in the field through a pair of binoculars (8 × 40) in a hidden position when the birds were detected. The feeding sites were also examined to identify what was eaten.

### Results

Red Junglefowl consumed a variety of animal and plant materials for its nourishment. They were seen feeding predominantly on pericarp of fallen oil palm fruits. They also fed on pericarp of Chiku, Iskandar palm, Papaya, Cempedak, rubber nut and seeds of *Macaranga* sp. Other materials were seeds of grasses such as *Paspalum conjugatum* and *Axonopus compressus*. A hen with chicks was also observed feeding on Rambutan fruit.

Analyses of crops of Red Junglefowls showed that the Red Junglefowl consumed 26 invertebrate orders and 12 plant species. All of the crops examined contained oil palm fruits (Table 1). Ants were found in 57 and termites in 53 of the 80 Red Junglefowl crops. An interesting finding was the presence of Red Junglefowl eggshells in two of the crops. Other items included a snake 26 cm long snake in a male crop and bones in a crop of another male.

Data analyses of the crop contents suggest that the food consisted largely of plant materials (80.88%) while animal materials amounted to 19.12% (Table 2). Of the plant materials, the oil palm fruit constituted the highest percentage whereas among animal materials, Dermaptera (earwig) was the highest. Plant leaves and flowers were least consumed. Generally immature seeds were also eaten.

Red Junglefowl males consumed significantly more oil palm fruit than did females ( $t_{15} = -2.505$ ,  $p < 0.05$ ) and females took significantly more invertebrates than did males ( $t_{13.5} = 2.321$ ,  $p < 0.05$ ) (Table 3).

Generally after leaving the roosting tree early in the morning, Red Junglefowls search continuously for food. It was often

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Table 1: Composition of food contents observed in the crops of Red Junglef owls out of 80 crops

	No. of crops
<b>Invertebrates</b>	
Hymenoptera (ants)	58
Hymenoptera (other)	4
Isoptera (termites)	53
Coleoptera (beetles)	31
Dermaptera (earwigs)	25
Orthoptera (hoppers)	17
Hemiptera (bugs)	10
Lepidoptera (moths)	7
Homoptera (cicadas)	3
Diptera (flies)	3
Unidentified Insects	2
Isopoda	19
Amphipoda	3
Pseudoscorpion	1
Chilopoda (Centipedes)	3
Diplopoda (millipedes)	3
Araneida (spiders)	25
Acarina (Ticks)	1
Gastropods (Snails)	25
Hirudinea (Leeches)	34
Nematode	4
<b>Vertebrates</b>	
Red Jung[fowl hen	2
eggs shell	
Birds Feathers	11
Snake	1
Unidentified vertebrate bones	1
<b>Plant food Contents</b>	
Oil Palm fruit	80
<i>Paspalum</i> sp. Seeds	9
<i>Aystasia coromadaliana</i> seeds	9
<i>Cyperus</i> sp. Seeds	6
<i>Paspalum</i> sp. Leaves	3
<i>Aystasia coramadaleana</i> flower	
<i>Cyperus</i> sp. Seed	1
<i>Vephrolepus biserrata</i> leaves	1
<i>Axonopus compressus</i> seeds	1
<i>Danicum nodosum</i> seeds	1
Jnidentified weed seeds	1
Jnidentified Weed shoot	1
Jnidentified grass leaves	11
Jnidentified grass seeds	15
DR palm dry frond	11

observed that they fed in open areas early in the morning and late in the evening. During the rest of the day they fed around the oil palm trees and within the *Nephrolepis biserrata* (fern) and in the stacked of the oil palm cut fronds. They were never observed feeding for a long period of time at a spot while foraging. The Red Junglefowl was also observed to consume water wherever it was available, especially in the morning hours.

**Discussion**

Food is the source of nutrients and energy. The energy in food serves as fuel for the metabolic processes of animals. The lutrients in food support growth and maintenance of body structure (Bolen and Robinson, 1989). For the said purpose Red lunglef owl consumed arthropods along with tender

leaves/shoots, seeds and fruits of a variety of plant species. The Red Junglefowl, thus, can be classified as an omnivore, confirming to the general previous remarks on this aspect of its biology (Beebe, 1922; Bump and Bohl, 1961; Collies and Saichuae, 1967).

Table 2: Food items of Red Junglefowl with their percentage of dry weight in crop analysis

Food items	Occurrence (%)
<b>Plant materials</b>	
Oil palm fruit	73.95
Miscellaneous plants material	6.93
<b>Animal materials</b>	
Coleoptera (Beetles)	0.20
Dermaptera (Earwigs)	3.55
Hymenoptera (Ants)	2.64
Isoptera (Termites)	1.89
Orthoptera (Cockroaches, Hoppers)	0.65
Arachnida (Spiders)	0.24
Crustacea (Isopoda)	0.37
Gastropoda (Snails)	1.28
Hirudinea (Leeches)	2.63
Miscellaneous animals groups	5.67

Table 3: Percent of intake of oil palm fruits and invertebrates by male and female of Red Junglefowl

Sex	(%) Oil palm fruit (x ± SE)	(%) Invertebrates (x ± SE)	P-value
Male	85.671 ± 3.712	10.859 ± 2.068	<0.05
Female	62.843 ± 8.321	29.556 ± 7.620	<0.05

The present analyses indicate that a larger part of its food was of plant material (81%) and that animal matter constituted only about 19%. In natural habitats in India the vegetative matter by volume consumed by the Red Junglefowl is about 90% and animal matter only about 2 to 3%. The higher value of per cent animal matter consumed by the bird in this study may be due to the presence of litter in the Red Junglefowl feeding area. The litter is rich in invertebrates because it provides breeding ground for them.

Amongst animal materials, ants, termites, beetles, earwigs, spiders, leeches and isopods were the main food consumed by Red Junglefowl. Most invertebrate species in the litter were flightless and hence became an easy prey for the Red Junglefowl. A high number of these animal species in the area may give Red Junglefowl an advantage between the amount of food intake and the time it takes for searching.

The study found that the Red Junglefowl consumed 14 plant species. This list of plant species is longer than those suggested previously for other geographical areas (Bump and Bohl, 1961). However, the species consumed mainly tender shoots, fleshy leaves and immature seeds. It is expected that mature and dry seeds were probably taken while picking the tender shoots and immature seeds. Contrary to the present findings Bump and Bahl (1961) suggested only the tender shoots were consumed by the Red Junglefowl.

The consumption of a food species/item by an animal (including birds) largely depends upon adjustment between the preference of the species and its availability (Mien *et al.*, 1988). The present results suggest that Red Junglefowl consumed different foods in different areas. In orchard area, it fed on chiku, papaya and rambutan, in rubber plantation, it fed on rubber nuts and in oil palm plantation, it fed on oil palm fruit. These variations were also noticed in previous studies (Nishida *et al.*, 1975; Beebe, 1922). This suggests that the species is an opportunist feeder. A higher representation of oil palm fruit in the crops reflects the species

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preference. The fleshy foliage of grasses and herbs provide energy and water to this shifting cultivation adapted bird.

Apart from invertebrates, a snake was also consumed by the Red Junglefowl. Collies and Saichuae (1967) advocated that the insects are a source of proteins to Junglefowl, which furthermore supplement this need by eating small lizards. Plant proteins are deficient or scanty in certain essential amino acids, which can only be supplemented by animal products, which help to maintain a balanced diet in chickens (Collies and Saichuae, 1967).

The large amount of intake of oil palm fruit by male is probably because the male requires more energy to establish and protect its territory, and for courtship. However, an in-depth study is required to confirm this point.

During the egg laying period, females require animal food to obtain protein necessary for egg production. Because the protein cannot be stored in appreciable amounts, protein for egg formation is obtained principally from the diet. Females feed on invertebrates, which become a source of lipid reserves providing energy during the egg laying period (Krapu, 1981). This study suggests that the female consumed more animal matter than the male. These results are consistent with the previous studies for other species of birds (Krapu, 1974a,b; Krapu and Swanson, 1975; Swanson *et al.*, 1979). These studies found that the pintail (*Arras acute*) and mallard (*Anas platyrhynchos*) take large amount of animal matter during the egg laying period. The Red Junglefowl breeds throughout the year, therefore, the hens need a lot of energy (protein, calcium) for egg production throughout the year.

Plant food contained calcium level far below than that considered adequate for breeding. Scott (1974) stated that calcium should range from 2.5 to 3.5 per cent of the diet of the species laying large numbers of eggs. The consumption of snails, eggshell and bones as food by the female of Red Junglefowl may fulfil the requirement of calcium for eggs production. Shells are a rich source of calcium and it can be as high as 38% in snail shells (Romanoff and Romanoff, 1949).

The Red Junglefowl is traveling and searching continuously for food. It preferred to forage in undisturbed tracts where there was little human disturbance. This behaviour can be explained on the basis of the Red Junglefowl being a shy bird (Bump and Bohl, 1961; Beebe 1922). This feeding habit protects the birds from human predation. The Red Junglefowl is generally regarded as a non-obligatory drinker. On very few occasions the birds were seen drinking water in the morning. It has been reported that the required water intake can be compensated by the ingestion of arthropods, leeches and tender leaves, which contain higher contents of water (Mien *et al.*, 1988).

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