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Journal Contact

Mailing Address

Editorial Office, ASAN National Secretariat, No. 14, Yunusa Adeniji Street, Off Muslim Avenue, Off Unity Road, Ikeja Lagos

Principal Contact

Professor G.S. Bawa

Editor-in-Chief

Editorial Office, ASAN National Secretariat, No. 14, Yunusa Adeniji Street, Off Muslim Avenue, Off Unity Road, Ikeja Lagos

Email: NJAS2011@gmail.com

Support Contact

Editor-in-Chief

Email: gidsbawa@yahoo.com

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Game Bird Domestication: A Preliminary Report on the Foraging Behaviour of the Double-spurred Francolin (*Francolinus bicalcaratus*, Linnaeus)

Meduna, A.J., *Amusa, T.O. and Likita, I.B.

Federal College of Wildlife management, PMB 268, New Bussa, Niger State

*teejayui@yahoo.com

Abstract

The domestication of game bird offers a great potential for putting into practical use the good qualities of several African Wildlife species as a possible means of increasing animal protein production in those areas where there are considerable wild stocks of animals. In this study, we investigate the foraging behaviour of *Francolinus bicalcaratus* (Double-spurred francolin or bush fowl) in the savanna areas of the Kainji Lake Basin, New Bussa. This is with a view to providing quantitative background information on the species as a basis for further systematic investigation by subsequent workers on various aspects of the biology and ecology of the bird. The focal animal sampling technique was adopted for field observation. The results revealed that the Doubled-spurred francolin feeds on both cultivated and uncultivated plant species. Their preferred food sources among the cultivated crops were seeds of *Sorghum guinensis*, while *Oryza sativa*, *Zea mays* and *Vigna unguiculata* were moderately utilized. Among uncultivated plant species, Double-spurred francolin favoured the utilization of roots, seeds and fruits of *Andropogon gayanus*, *Cyprus spp* and *Vitellaria paradoxum* respectively. The foraging activities during day light hours (6:00hr-18:00hr) consisted of scratching soil litter, pecking unidentified objects, and feeding on different food items. Results of Mann-Whitney test show that average time spent on feeding and non-feeding activities in the savanna woodland and cultivated farmland were significantly different ($n_1 = n_2 = 25$, $p < 0.05$, u , $u' = 277, 399$). The mean number of the species observed in the mornings was significantly higher than in the evenings ($P < 0.05$; $r_1, r_2 = 0.71, 0.83$) and more double-spurred francolin were sighted in cultivated farmland than the savanna woodland. Double-spurred francolin has a common tendency of going for water after successful forage both in the morning and in evening. The implication of the findings for possible domestication of the species is discussed.

Introduction

The production of animal protein in the developing countries has remained insufficient to meet nutritional requirements in this part of the world. Given the rising cost of production of conventional domestic livestock, Africa is now compelled more than ever before to domesticate some of its fast breeding, and socially acceptable wild animals. Wild animals undoubtedly constitute an

important source of animal protein for people in Africa, especially those in the lower income groups. It is surprising, however, that most of the many African wildlife species have not been put to use in any notable way. There are, of course, distinctive indigenous breeds of sheep, goats, cattle, etc., but they have been developed from exotic ancestors in not quite distant times (Ajayi, 1983). The Ostrich and the Guinea-fowl are the only

African contributions to man's stock of domestic birds and the first was only recently added into the fold.

It has always been argued that because wildlife evolved over a very long period of time they must be more adapted to the natural environment than exotic domestic animals brought from elsewhere. This argument is essentially important for considering some of the African wildlife as possible future domestic animals. Ajayi (1974) and Ayeni (1979) made important pioneering efforts in this regard. To improve the nutrient status of food and particularly protein level of African diets, therefore, wildlife domestication research is not only feasible but offers a practical approach to arresting the gloomy prospects for adequate protein supplies in the continent. In the light of the foregoing thus, this research was initiated to investigate the general ecology of the Double-spurred francolin with a view to understanding its requirements in captivity.

The Double-spurred francolin (*Francolinus bicalcaratus*, Linnaeus) or bush fowl is a game bird in the pheasant family (family-phasinadae) of the order Galliformes (Elgood, 1979). It is a medium-large bird with the plumage appearing brownish but close inspection reveals a beautiful patterning of the feathers, those of the under parts having markings that are distinctive for the species. Bush fowl are ground birds that spend most of their time moving in small parties through grass, farms and the savanna woodland in search of food. They lay five to six eggs in a natural hollow on the ground without real nest.

Breeding occurs at the beginning of the dry season. According to the International Union for Conservation of Nature and Natural Resources (IUCN, 2006), bush fowl are the most wide spread of all francolins found in West African sub region.

Francolinus bicalcaratus are of particular economic importance in the savanna region. Survey works revealed that the bird serves as a source of protein to rural dwellers that set traps in farms and bushes to hunt the animals (Onyeausi *et al.*, 1992). Their feathers are used for adornment to fill mattresses and pillows (Moreau, 1966). Traditionally, the bird is used in preparing 'disappearing' charm by certain people of Nasarawa and Niger State of Nigeria. Investigating the foraging behaviour of the species in the natural setting can help in determining its food preference and habit, and thus enhance research into its domestication for consumption as well as increasing protein in take of the populace. Studies on foraging behaviour will help in proper maintenance of the game bird under domestication. This is also important for habitat management and sustainable utilization of the species.

Materials and Methods

The Study Area

The study was conducted in the savanna areas of the Kainji Lake Basin, New Bussa (latitudes 7° 3' and 10° 23' N and longitudes 3° 30' and 5° 50' E). The climate of the area is tropical with high temperatures, high relative humidity and distinct wet and dry seasons. The average monthly temperature is 34°C

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Table 1:

Habitat

Savanna

with a mean annual relative humidity of 60%. The mean annual rainfall value is 104.45mm (DRB, 2004). The vegetation of the area has been described as Northern Guinea Savanna (Keay, 1989).

Data Collection and Analysis

The study was carried out between November, 2005-July, 2006. The study area was stratified into two major habitats. These are savanna woodland (SWL) and cultivated farmland (CFL). Two transect points of 1km lengths were laid in each of the habitats. Observations were made through focal sampling twice daily; the morning session was between 6:00hrs and 9:00hrs, while the evening session lasted between 17:00hrs and 19:15hrs for each day of data collection. Materials employed include: binoculars,

Results and Discussion

Table 1 gives the frequencies of plant species and parts utilized by Double-spurred francolin in each habitat. From among the plant species within the woodland, the roots, seeds and fruits of *Andropogon gayanus*, *Cyperus spp* and *Vitellaria paradoxum* were respectively highly favoured. *Andropogon tectorum* were moderately utilized, while

measuring tape, matchet, prismatic compass, ranging poles, stopwatch and field note book. The general activities of the species were recorded within the period of 10 minutes. Data on the various activities recorded throughout the study period were condensed into two major activity states namely; feeding and non-feeding (non feeding activity includes, running, resting, scratching the ground and scanning). Data collected were subjected to Mann-Whitney test, to determine significant difference in the average time spent on feeding and non-feeding activities in each habitat as well as Paired "t" tests, for determination of significance in the number of double-spurred francolin sighted in each habitat and for each period of the day. *Detarium microcarpum* and *Diospyros mespiliformis* were rarely utilized. Seeds of *Sorghum guineensis* were the most preferred plant species from cultivated farmland, while seeds of *Oryza sativa*, *Zea mays* and *Vigna unguiculata* were moderately utilized. Field observations revealed that Double-spurred francolin mainly used *D. mespiliformis*, *D. microcarpum*, *P. thoningii* and *L. acida* as shade.

Table 1: Plant species utilization by Double-spurred francolin in each habitat

Habitat	Plant species utilized	Part utilized	Frequency of utilization
Savanna Woodland	<i>Andropogon gayanus</i>	Roots	xxx
	<i>Andropogon tectorum</i>	Roots	xx
	<i>Cyperus spp</i>	Seeds	xxx
	<i>Detarium microcarpum</i>	Fruits	x
	<i>Diospyros</i>	Fruits	x
	<i>mespiliformis</i>	Fruits	xxx

<i>Vitellaria paradoxum</i>			
Cultivated Farmland	<i>Sorghum guinensis</i>	Seeds	xxx
	<i>Oryza sativa</i>	Seeds	xx
	<i>Zea mays</i>	Seeds	xx
	<i>Vigna unguiculata</i>	Seeds	xx

x = Rarely utilized; xx = Moderately utilized; xxx = Highly utilized

Table 2: Average Time spent on feeding and non-feeding activities per 10 minutes by Double-spurred francolin in each habitat

Habitat Activity/10mins	Feeding activity/10mins	Non-Feeding
SWL	5.056 ± 0.33 ^a	4.944 ± 0.44 ^b
CFL	6.630 ± 0.33 ^a	4.370 ± 0.44 ^b

^{a,b} Means with different superscripts within the same row are significantly different, (P<0.05).
SWL = Savanna Woodland; CFL = Cultivated Farmland

The result of Mann-Whitney test shows that average time spent on feeding and non-feeding activities in each habitat are significantly different. ($n_1 - n_2 = 25$, $P < 0.05$, u , $u^1 = 277, 399$). From Table 2, double-spurred francolin spent more time feeding in the cultivated farmland than the savanna woodland. This could be attributed to the ease with which the bird digs up newly sown seeds in farmlands.

Table 3 reveals that the mean number of Double-spurred francolin observed in the mornings is significantly higher than in the evenings. Total means of 29 species were sighted in the morning in each habitat while 24 were sighted in the

evening. More double-spurred francolin were sighted in cultivated farmland than the savanna woodland. Indeed, there was an abrupt shift in the number of bush fowl sighted from the woodland to the farmland as this study correspond with planting season on the farms, and double-spurred francolin favoured the consumption of seeds of farm crops. It also revealed that the species are a serious pest of farm crop. This is in tandem with the reports of the BirdLife International (2004). Essentially, Double-spurred francolin utilized the farmland for food while running for cover in the woodland.

Table 3: Average number of double-spurred francolin sighted for each period of the day

Habitat	Period of the day		r
	Morning	Evening	
SWL	25.80±2.51 ^a	20.30±1.49 ^b	0.71
CFL	32.00±2.41 ^a	26.50±1.75 ^b	0.83

^{a, b} Means with different superscripts in same row are significantly different, (P<0.05).

SWL = Savanna Woodland; CFL = Cultivated Farmland

Conclusion

The foregoing has revealed that the favourite food sources of Double-spurred francolin are seeds of agricultural crops. This agrees with the high number of the species encountered in cultivated farmland. Alternative food sources of the francolin are insects which are particularly feasted upon when seeds and / or fruits of crops are not available. Scratching the ground before feeding was commonly observed. One other common tendency of the francolin is that it always goes for water after successful forage both in the morning and evening. Generally, Double-spurred francolin prefer resting under the shades of wild plant in the woodland. These findings are essential for the study and management of the species under captivity for possible domestication. It must however, be emphasized that domestication of wildlife species is a multi-disciplinary project with varied aspects of investigations, each of which is of importance to the success of the project. In the West African region the Double-spurred francolin is already being threatened by over-hunting. If only the Double-spurred francolin can be conserved and/ or domesticated, the effort is bound to greatly increase the level of protein available in the rural areas throughout Africa.

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