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EFFECT OF DISTURBANCE ON LAYING PATTERN AND HATCHABILITY OF FERAL HELMET GUINEA FOWL (*NUMIDA MELEAGRIS GALLEATA* PALLAS) EGG.

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Abstract

The effect of breeding nest disturbance and hatchability potential of feral helmet guinea-fowl was studied. Ten (10) breeding nests were identified and monitored for number of eggs laid per week for eight weeks within the Kainji Lake Basin. Eggs were collected as a form of disturbance at different percentages i.e 0, 50, 60, 80 and 100. The eggs were later incubated and tested for their hatchability. The bird's egg laying pattern changed drastically in response to egg collection. The trend in nests where 100%, 80% and 60% of their eggs were collected presented sharp decrease in number of egg laid per week immediately after the collection. Incidentally, there was significant difference ($P<0.05$) in means of egg laid due to treatments in these group. Hatchability potential of the bird's egg was generally low. This was evident in the magnitude of unfertilised eggs (43.45%), undeveloped embryo (5.52%), hatches with deformities (23.52%) and still birth (11.72%). It can be concluded that when breeding nest of guinea-fowl is disturbed persistently, there is the tendency of the hen to abandon the nest thus allowing the egg to die and decay. Hence poor to moderately fair hatchability potential of feral helmet guinea fowl eggs can be said to be as a result of disturbance which made the fowls to abandon their nests even during the breeding season.

Keywords: Feral guinea-fowl, breeding nest, laying pattern, hatchability, *Numida meleagris galleata*.

Introduction

Habitat disturbance, egg collection, hunting, and predation by co-inhabitants of the same ecosystem and man have contributed immensely to population decimation of Guinea fowl (*Numida meleagris galleata* Pallas) within the Nigeria savanna area (Ayeni, 1980). This bird is distributed all over Nigeria Savanna landscape. The expectation had been that since the Savanna form about eighty percent of Nigeria landscape (Bada and Okojie, 2001) the bird population should be counted in millions if unperturbed. This is possible because the ecology of the area as illustrated in Ayeni (1980) is such that it will be able to provide food, cover, suitable wallowing, roosting and breeding sites for the bird. However, activities of hunters, Fulani herdsmen, farmers, firewood collectors, solid mineral prospectors and predators have put the bird under serious threat. Most of these activities affect the breeding nest and sites. Moreover the breeding season i.e wet season (Ayeni, 1980 and Saina et.al, 2005) is synchronised with the period of optimal activity of graziers and others. The effect is more pronounced since they are by natural instinct very sensitive, sentient and react swiftly to any form of changes noticed in the community.

Hatchability of egg generally depends on the available environmental factors, physiological disposition and

fertility of the egg and hen (Ayorinde, 1985). An optimum temperature and relative humidity that support the growth of embryo must be provided by the hen and the incubation substrate. The eggs need to be effectively covered with the hen wing while the experience of the hen in brooding will help the embryo to develop uniformly. More importantly, the egg must be fertilised during copulation before the development of the keets can be initiated in egg (Brah and Sandhu, 1989). It has been observed and demonstrated that guinea fowl hen are good layers. They are capable of producing up to one hundred and fifty (150) eggs during the breeding season which normally lasts for almost five months, coinciding with the raining season period (Ayeni, 1980). Usually average numbers of keets that are always found with the mother hen are far less than the expectation. It was suspected that the smaller number is as a result of various forms of human and natural disturbances of the breeding nest and the ecosystem. Thus the need for this type of study to actually find out the effects of disturbance on laying pattern, average number of egg laid and the hatchability potential of such eggs in the wild.

Materials and Methods

The study was conducted within the Kainji Lake Basin in Niger State of Nigeria. The basin form the corridors of Kainji Lake National Park, located between latitudes 9°40' and 10°30' N and longitudes 3°30' and 5°50' E (Jayeola and Meduna, 2003 and Onadeko and Meduna (2003).

Ten breeding nests of guinea fowl within the Kanji Lake Basin were identified at the inception of rains in May 2006 and marked serially. The nests were randomly assigned to four treatments with two nests each per treatment as replicates. The last two nests serves as control. The nests were left undisturbed but carefully monitored for eight weeks during which the number of eggs laid per week was recorded. The eggs were then collected in the following order: 100%, 80%, 60% and 50% while no egg was collected in the control. Monitoring of the nests continued for another four weeks after which the rest of the eggs were collected and joined with the previous ones for hatchability trial. Those eggs collected previously were kept in cool dry egg crates and stored in a well ventilated environment at room tempe-rature while the study lasted. Thirty six percent of the total eggs collected (145 eggs) were randomly selected and sent to the Hatchery Unit of University of Agriculture Abeokuta/Leventis Foundation Nigeria Agro Allied Company (UNAAB/ LFN), where they were incubated and hatched with the Western Hatching Incubator Machine (Chickmaster C 160) on the twenty eight (28th) day. Those eggs that showed signs of cracking but did not hatch completely were helped out of their shell manually while those that did not hatched at all were cracked on the 29th day to check whether they were fertilised initially or not. The data for egg laying pattern was subjected to t-test

Results

Egg-laying pattern of the guinea fowl in this study indicated that the birds are seasonal breeders. The number of eggs laid per nest kept increasing as the season advanced even though the increase was not significant ($P>0.05$) between breeding nests, but become significant ($P<0.05$) between weeks (Table 1). Laying pattern of the guinea fowl shows almost the same trend between week two and week seven (Fig. 1). The nests where 100%, 80% and 60% of their eggs were

collected presented sharp downward turn immediately after the collection. The difference in magnitude of the changes in number of egg can be observed in the lines of different treatments (Fig.1). Incidentally, there was a significant difference ($P<0.05$) in the means of eggs laid due to treatments in these group (Table 1). Birds in nest 7 and 8 are a bit tolerant to disturbance because it was observed that their withdrawal from the nests was gradual. Though the difference between the group where no egg (0%) was collected in control, and those in 50% and 60% were not significant ($P>0.05$), the trend of egg laying neither dropped below their means of 4.42, 3.13 and 3.84 eggs per week respectively. Rather they were on the verge of rising again when the experiment was terminated.

Hatchability trials of the eggs collected and set for incubation indicated low hatchability potentials. Cumulative figure of the eggs that were either unfertilised (43.45%) or those that did not hatch was 60.69% (Table 2). Many others (23.45%) hatched with various deformities most of which had to do with improper bone formation in the leg. Only 39.31% of the one hundred and forty five (145) eggs hatched properly.

Table1: Effect of egg collection on the laying pattern of the Guinea fowl, *Numida meleagris galleata*.

Treatments	Nest	Average number of egg laid per week ± S.D	95% Confidence Interval of the Difference	
			Lower	Upper
100%	Nest 1	3.25 ± 2.70[a]	1.53	4.97
	Nest 2	2.75 ± 2.22[a]	1.34	4.16
80%	Nest 3	1.67 ± 1.93[a]	0.45	2.89
	Nest 4	2.67 ± 2.23[a]	1.25	4.08
60%	Nest 5	3.75 ± 2.36[a]	2.26	5.24
	Nest 6	3.92 ± 2.68[a]	2.22	5.62
50%	Nest 7	3.50 ± 2.20[a]	2.11	4.90
	Nest 8	2.75 ± 1.42[a]	1.85	3.65
0%	Nest 9	3.67 ± 1.15[a]	2.30	5.03
	Nest 10	5.17 ± 1.27[a]	4.36	5.97

Means with different superscript on the same column are significantly different ($P < 0.05$).

Table 2: Hatchability Properties of the Guinea fowl eggs in Kainji Lake Basin.

HATCHABILITY PROPERTIES	QUANTITY	PERCENTAGE
Number of eggs set for Hatching.	145	
Total number of hatched eggs.	57	39.31
Total number of unhatched eggs.	88	60.69
Number of Keets that were helped out of shell.	8	5.52
Eggs that hatched with deformities.	34	23.45
Eggs that hatched normally	23	15.86
Mortality 24 hours after hatching.	11	7.59
Unfertilised eggs.	63	43.45
Fertilised eggs with undeveloped embryo.	8	5.52
Embryo that died in the shell before hatching.	17	11.72

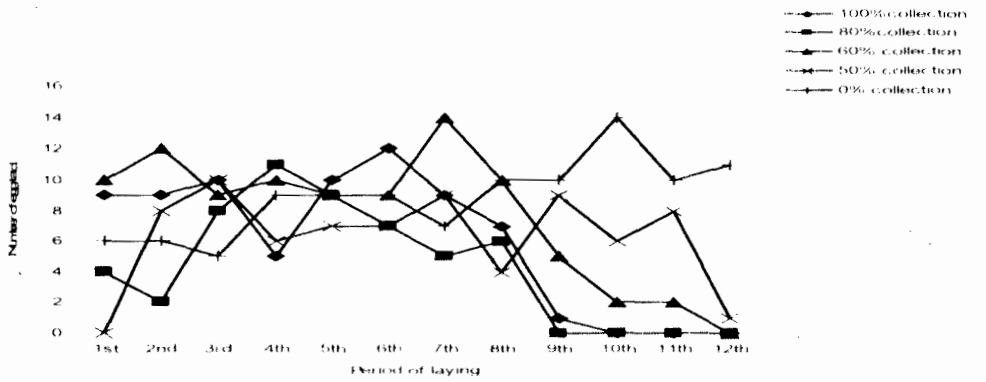

Fig. 1: Weekly egg-laying pattern of the Guinea fowl, *Numida meleagris galleata* in Kainji Lake Basin.

Discussion

This study agree with the opinion of Ayoinde et al. (1984) that guinea fowl are good layers and are capable of producing up to 50 - 150 eggs per breeding hens in a season. The significant differences in number of eggs laid per week between the breeding nests of the hens in this study were suspected to be probably because the birds breeding nests were disturbed by collection of eggs. Moreover, the number of eggs laid between different nests per week was not significant. This opinion will hold very strongly, when the communal laying habit of the birds as observed in this study is also considered. After week eight, the trend indicated that the bird's laying pattern was negatively affected by the egg collection (disturbance). The confirmation of the fact that egg collection as a form of disturbance may negatively affect production cycle and system of guinea fowl was expressed in nest 9 and 10 where no egg was collected.

The observation also resolved the envisaged confusion about the number of eggs laid per week per nest and the claim by Ayeni (1980), that the birds are monogamous. It was clearly demonstrated that the rate of increase in the number of eggs per nest on weekly basis was more than what a hen will deposit during the period. This assertion is supported by the estimates of Adedokun and Sonaiya (1999) about the average number of eggs that can be laid by indigenous chicken who share almost the same physiological and anatomical properties with guinea fowl.

The hindrances to the growth of population of feral guinea fowl within the Nigerian Savanna can be explained by the result of hatchability trial in this study. Number of unfertilised eggs laid during the breeding season is almost half of the total eggs laid. Hatchability potential of the bird's eggs is generally low. This is evidenced in the magnitude of unfertilised egg, undeveloped embryo, hatches with deformities and still birth. The number of unfertilised eggs within the collection may be as a result of the ability of the hen to lay eggs even without mating. It may also be an indication of sexual imbalance within the feral birds' population, since they have been described as monogamous (Ayeni, 1980).

Other contributors to the low population in the savanna are the various

environmental factors such as prolonged rain, fluctuations in sunshine hours, indiscriminate fire outbreak etc which mitigate incubation and hatching as noted in Ayorinde (1985), beside that the guinea fowl are poor brooders. The feral hen has a system of communal laying and incubation by the selected mother hen (Ayeni, 1980), but it does not follow that all the eggs are fertilised and will hatch. Another reason may not be unconnected with the fact that the process of incubation does not start until late in the season when most of the earlier eggs laid must have been exposed to adverse weather condition and thus become spoiled (Ayorinde,1985). The issue of natural predators and man that disturb their habitat by either removal or destruction of their eggs thereby causing the bird to abandon the breeding nest is also a contributing factor. When this happen it will definitely hinders the growth expected in population of the feral birds. The birds are sentient and can easily revert to feral situation at any stage of development even in captivity. It has been displayed in this study that the guinea fowl hens are capable of abandoning their breeding nests if the disturbance is persistent.

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