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HATCHABILITY OF GUINEA FOWLS EGGS AND PERFORMANCE OF KEETS UNDER THE TRADITIONAL EXTENSIVE SYSTEM IN TOLON-KUMBUNGU DISTRICT OF GHANA

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ABSTRACT: *A study was carried out to examine the hatchability of guinea fowls eggs and performance of keets under the traditional extensive system. A short questionnaire to ascertain production scope and management practices were administered to a total of ten farmers; five farmers from each of two communities, using purposive sampling. In order to establish some actual production indices, data was collected from the sampled farmers on mean number of eggs incubated, mean weight of eggs incubated, mean number of eggs hatched, percentage hatchability of eggs, mean weekly numbers of keets, mean weekly weight gain of keets, total weight gain of keets and mortality rate of keets. Data were analyzed using Genstats Discovery (3rd edition) and SPSS version 17. The main breeds of guinea fowls kept by farmers were the pearl and the lavender. The methods of identifying fertile eggs by farmers were by the use of size and texture of eggs. Majority of the farmers (80%) fed their guinea fowls with maize, while (20%) fed them with millet before egg laying, but during egg lay 80% of the farmers fed their guinea fowls with millet for the reason that it increased egg production. For the production indices, there were significant differences (P<0.001) in mean weekly numbers of keets and mean weekly weight gain of keets for the study period. A much lower significant difference (P<0.05) was observed for the total weight gain of keets, possibly because weight gain through growth over stripped the weight losses through mortality. Mortality rate of keets was high ranging between 61-69% within the two communities, though these did not significantly differ from each other. Mean number of eggs incubated was 18.4 for Nafaring community and 25.4 for Cheyohi community. Similarly the mean weight of eggs incubated, total weight of eggs incubated, number of eggs hatched and percentage hatchability (%) were 31.4g and 31.8g, 577.8g and 807.7g, 13.4 and 18.6, 72.8% and 73.6%, respectively. There were significant differences in performance indices across the weeks but not between the two communities.*

Key words: *Communities, Hatchability, Keet Performance Traditional Extensive System, Mortality*

ORIGINAL ARTICLE

INTRODUCTION

Guinea fowl production provides cash for investment in crop and livestock production (Karbo and Bruce, 2000). The meat and eggs from guinea fowl provide a good source of protein for rural folk, which can be used to balance the inadequate intake (Smith, 1990). Guinea fowl and its products are given to very important visitors like in-laws and part-payment of dowries in most parts of northern Ghana. Also the feathers of guinea fowl are used in making pillows and for aesthetic purposes in homes, restaurants and hotels. The local cracking call of guinea fowl especially when they see strange objects in the vicinity makes them potential guards. They are therefore kept as feathered "watchdog" which can protect poultry and alerting people (Managa and Haule, 1994).

There is some evidence to suggest that over 50% of the rural folks do not depend on industrially produced poultry and its products (Reddy and Qudratullah, 1996; Shitu, 2003). Hence attention is now being focused on poultry production at the village level in order to boost output. The local guinea fowl is one of the poultry species receiving more attention in northern Ghana because of its significant role in the lives of the people.

The production of guinea fowl in the rural and traditional system of management is faced with many problems including: diseases and internal parasites, inadequate feeding, unavailability of eggs for hatching in the dry season, low growth rate and lack of improved genetic materials (Okaeme, 1984; Ayorinde, 1989; Nwagu and Alawa, 1995; Idi., 1997; Karbo et al., 2002; Tanko, 2003), resulting in low production. Paucity of information on traditional guinea fowl production is hampering the development of this industry. As a result, the potential of the guinea fowl industry has remained rudimentary and undeveloped for long a time (Karbo et al., 2002). It is against

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this background that this study set out to assess egg lay, hatchability and fertility of guinea fowl eggs and also to determine performance of keets under the traditional extensive system.

MATERIAL AND METHODS

Study area

The study was conducted in two communities, Nafaring and Cheyohi, near the University for Development Studies, Nyankpala. These two communities are about 8 km apart. Nyankpala is approximately 16km West of Tamale. It has unimodal rainfall pattern. The area lies on latitude 09°25"N and longitude 00°58"W with an altitude of 183m above sea level. The mean annual rainfall and temperature are 1043mm and 28.3°C respectively. The rainy season is usually between April and October with the dry season from November to March. The mean annual day time humidity is 54% (Kasei, 1990).

Sampling procedure

The two communities were sampled because they were known to have good numbers of guinea fowl farmers and also because of convenience of accessibility for the researchers. Purposive sampling was used to locate guinea fowl farmers and within these farmers who were willing to take part in the monitoring of their flocks, simple random sampling was used to gather the required information.

Duration

The monitoring and collection of data on incubated eggs, hatchability and the performance of keets up to the fifth week was commenced in September 2010 to October 2010. The semi-structured questionnaire was administered alongside as and when farmers were visited.

Data collection

Data on breed type kept, feed type used, number of eggs laid/bird/year, feed type used and fertility detection method in eggs was collected using semi-structured questionnaire that was administered to ten respondents in two communities; five from each community. Additionally respondents were visited for about 6 times and data on the following production indices were monitored and collected for 4 consecutive weeks starting from the second week as it was not possible to be present at hatching or the day after, as follows:

Weight of eggs: The eggs were weighed before incubation using an electronic weighing scale. The eggs were put in badges and after which the weight was calculated. A perforated box was kept on the weighing scale and adjusted to zero before the eggs were kept into the box and the reading noted.

Weight of keets: The keets were weighed weekly early in the morning before feeding using an electronic weighing scale. The keets were weighed in badges after which the average weights were calculated. A perforated box was again kept on the weighing scale and adjusted to zero before keets were kept into the box and the weight recorded. The weekly weight gain was then calculated from the weekly weights recorded.

Data analysis

Data were analyzed using a descriptive statistical package in SPSS Windows professional (version 16) and Genstat (Discovery Edition).

RESULTS AND DISCUSSIONS

Type of breeds kept, feed used, fertility determination and number of eggs laid/ bird/ year

Fifty percent of the respondents preferred and reared lavender because they are hardy in addition to meeting end-user choice. The other 50% of respondents reared the pearl because it was readily available. No respondent reared the white breed. Payne (1990) reported that there are three main breeds of guinea fowls; which includes the white, the pearl and the lavender with the pearl being the most common in northern Ghana. Table 1 shows the results of the type of feed used to feed guinea fowls. 80% of the farmers fed their birds with maize while 20% fed millet before they laid. During laying however, the reverse was true.

Table 1 - Type of feed fed to guinea fowl before and during laying

Items / Type of feed	Before laying		During laying	
	Frequency	Farmers (%)	Frequency	Farmers (%)
Maize	8	80	2	20
Millet	2	20	8	80
Total	10	100	10	100

Overall $\chi^2 = 0.000$, df = 1for before laying and the same for during laying.

In both cases the differences in frequency or percentage of farmers using one type of feed as against the other were significant (χ^2=0.000, df=1). When respondents were quizzed further as to such practice, their response was that they perceived maize as promoting growth and maintenance while millet promoted egg production. The perceptions of these farmers suggest millet ought to have a higher nutritive value than maize since laying

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requirements are higher than growing requirements. Interestingly, this perception by these farmers appears to be on a sound scientific base because work by Adeola et al. (1996) found that Indiana pearl millet had marginally higher levels of energy compared to maize (4.52kcal/g as against 4.33kcal/g) and much higher crude protein than maize (12.5% as against 8.4%).

Fertile eggs were determined using the texture of the egg shell (80%) and size of the eggs (20%). Respondents indicated that with regard to texture, shells with rough surfaces hatch well when set while those with smooth surfaces do not hatch well when set. For size of eggs, though relative, they noted that small sized eggs were not good for incubation. These perceptions by these respondents may be backed by scientific findings of Nwagu and Alawa (1995) Biwas (1999) who noted that for hatching eggs, their weights should be between 40-45g so as to give a positive relationship between egg weight and number of keets that will hatch from them. Twenty of the farmers` birds laid 50eggs, 20 % laid 80eggs, 50% laid 100 eggs and 10% laid 120 eggs per bird per year. Since 90% of the farmers' responses fell within the range of 50 -100 eggs, the findings of this study are partly in agreement with work by Dei and Karbo (2004) who reported that guinea fowl lay about 40-80 eggs in a year in the traditional system of management.

Hatchability and keets performance

Number of eggs incubated, mean weight of eggs incubated, total weight of eggs incubated, number of eggs hatched, percentage hatchability and mortality did not differ significantly (P>0.05) between the two communities (Table 2). However the Cheyohi community figures tended to be higher for the parameters considered. The similar types of management practices may be implicated in the minor variations in the results obtained.

For the backyard guinea fowl keeper, the guinea hen or more commonly the chicken hen, is allowed to sit on 10 to 15 eggs depending on her size and ability to cover the eggs effectively with her wings (Ayorinde, 1988, 1990a), however in this study the mean number of eggs incubated ranged from 18-25 (Table 2) which was much higher than what was alluded to in Ayorinde's findings above.

Table 2 - Effect of location on egg indices, hatchability and mortality

Parameters	Community		S.e.d	Sig.
	Nafaring	Cheyohi		
Mean number of eggs incubated	18.4	25.4	4.5	ns
Mean weight of eggs incubated (g)	31.4	31.8	0.5	ns
Total weight of eggs incubated (g)	577.8	807.7	140.7	ns
Number of eggs hatched	13.4	18.6	3.3	ns
Percentage hatchability (%)	72.8	73.6	6.4	ns
Mortality rate (%)	61.2	68.8	6.0	ns

S.e.d- standard error of difference, Sig. = significance, ns= non-significant.

It has been noted elsewhere in this report that the mean egg weight was lower compared to other research findings. The lower weights possibly translated into smaller sizes which could thus have made it possible for these birds to incubate larger numbers of eggs or it may well be that these birds could also have been slightly larger in size than birds used by other research or even a combination of both factors that made the incubation of the above range of eggs possible.

The mean egg weight of around 31.4–32.8g in this study fall below the recommended standards by Nwagu and Alawa (1995) and Biswas (1999) who stated that eggs for hatching should be at least weigh between 40-45g in order to obtain relative high percentage of hatchability but was close to the lower weight limits of Ayorinde's (1987c) findings that local guinea fowl egg weighs between 34 and 45g. Again Ayorinde et al. (1989) noted that egg weight in the first year usually starts at about 28g, increases to an average of 39g by the end of the first breeding season and improves slightly further in the second and third breeding seasons, hence it is also plausible that these birds could have been in the early to mid-part of their first breeding season.

The mean hatchability for this study ranged between 72.8%-73.6% which was slightly above findings by Saina et al. (2005) who reported a mean hatchability of 71% for guinea fowl eggs incubated naturally. The guinea fowl farmers in these two communities, Nafaring and Cheyohi, may thus be said to possess some reasonable experience in incubating guinea fowl eggs.

Mortality ranged between 61-69% in the two communities. Though that of the Cheyohi community tended to be higher the difference was not significant (P>0.05). A number of researchers (Mbi and Djang-Fordjour, 1998; Karbo et al., 2002) have noted that mortality is at its peaks within the first one to eight (1-8) weeks of age and this is due to poor management and health care which in turn are caused by harmful microorganism such as virus, bacterial, mould, and protozoa (Dei and Karbo, 2004). The main diseases of guinea fowls include; paralysis, gumboro, coccidiosis, pullorum diseases, worm infestation (Dei and Karbo, 2004), so management at these rural communities require substantial improvement with such high mortality figures where more than half the flock is lost at 4 weeks of age.

Mean number of keets per the 2 locations, mean daily weight gain of keets per the 2 locations and mean weekly weight gain of keets per the 2 locations were significantly different between weeks (P<0.001) (Table 3). The significant differences observed in mean number of keets from one week to the other confirms the high mortality rate that was recorded at the end of the study. Mortality in weeks one and two were highest but decreased at a

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decreasing rate for weeks three and four (Table 3) as shown by the superscripts in reduced numbers. Teye and Gyawu (2001) reported a mean daily weight gain for keets to be 5.33g in their second week which is comparable to the value obtained in this study. The same authors reported weight gain values of 6.59g and 7.70g for the third and fourth weeks which are slightly lower than the values in this study (Table 3) possibly because farmers in these communities fed the keets with only termites which are very high in protein. The significant difference ($P<0.05$) for total weight gain of keets per the 2 locations was only observed between weeks one and two, possibly because the gain in weight due to growth was higher than the rate of lost in weight due to mortality from the higher numbers of mortality recorded with time. This may have compensated for the lack of significant differences in total weight of keets between weeks two and four (Table 3).

Table 3 - Keet performance from week two to week five

Parameters	Weeks				S.e.d	Sig.
	2	3	4	5		
Mean number of keets per the 2 locations	16^{a}	11.5^{b}	7.5^{c}	5.5^{c}	1.83	***
Mean daily weight gain of keets per the 2 locations	5.2^{d}	6.8^{c}	8.2^{b}	9.7^{a}	0.33	***
Mean weekly weight gain of keets per the 2 locations	36.4^{d}	47.6^{c}	57.4^{b}	67.9^{a}	2.30	***
Total weight gain of keets per the 2 locations	579^{a}	550^{b}	431^{b}	372^{b}	90.60	*

S.e.d- standard error of difference, Sig. = significance, different superscripts ^{abcd}= in a row imply significant differences between treatments, ***= significant at $P<0.001$, *= $P<0.05$.

CONCLUSION

The pearl guinea fowl was the variety that was readily available even though lavender was preferred for rearing because it was hardy in these communities. Majority of farmers in these communities either used maize or millet depending on whether the bird was growing or laying. Texture and size of the eggs were attributes employed in assessing fertility of eggs and majority of these fowls laid between 50-100 eggs/bird/year. Also, the average egg weight in these communities was below recommended standard for hatching, leading to unacceptably high mortality rate of keets after hatching. However fertility of these eggs was not in doubt for both communities.

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