

Full Length Research Paper

The effect of wetland on guinea fowl (*Numida meleagris*) egg productivity and fertility during the dry season in the guinea savannah ecological zone of Ghana

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A survey was conducted in two wet and two dry communities (communities with or without wetland/water resource) in Tolon-Kumbungu District to compare the productivity of guinea fowls on-farm reared in these two environments. In all 86 guinea fowl farmers in the four communities were interviewed on the eggs productivity of their guinea fowls and the hatching rate of eggs produced in the early part of dry season (from October to December, 2010) using a structured questionnaire. The results revealed that guinea fowls production enterprise is male dominated with 89.35% of the farmers being men and 10.65% women. The means of total guinea fowls in the farmers stock were not significantly different in both wet and dry communities. Communities' mean sex ratios of the guinea fowls were 4.68, 6.23, 6.02 and 3.05 for Cheyohi, Nyankpala, Nafram and Galinkpiegu respectively. These means were also not significantly different except Galinkpiegu which was significantly lower ($P < 0.05$) than Nyankpala and Nafram. The weekly eggs production means were 22.72, 41.80, 72.90 and 71.38 for Cheyohi, Nyankpala, Nafram and Galinkpiegu, respectively with Nafram and Galinkpiegu (wet communities) production being significantly higher ($P < 0.05$) per week than Cheyohi and Nyankpala (dry communities). The hatchability means of the eggs were 49.82, 52.93, 58.57 and 76.19% for Cheyohi, Nyankpala, Nafram and Galinkpiegu, respectively and were also significantly high in wet than dry communities under local hen incubation. It was concluded that given the same treatment, guinea fowls in wet communities produce more eggs with high fertility rate compared to those reared in dry communities during the dry season.

Key words: Guinea fowls, wet communities, eggs, dry communities, sex ratio, fertility.

INTRODUCTION

Water is an important resource for livestock productivity. Greg and Charles (1999) asserted that given free access to water, cows will produce more milk and butterfat than cows allowed to drink only twice per day. They also stated that limited water intake among livestock depresses animal performance drastically than any other nutrient. An acute situation of the water shortage could cause hearing and sight impairment in animals. According to Ward and McKague (2007), more than half

of free range poultry water intake comes from the feed. Inadequate provision of drinking water in dry environment culminates to water needs of bird not being met. Depending on the level of the deficiency, productivity is affected.

In Ghana most rural households keep chicken and in the savanna zone of northern Ghana, rural guinea fowl (*Numida meleagris*) production is common next to the local chicken (Anning, 2008). The contribution of guinea fowl in the livelihood of the rural farmer is enormous. For instance, the meat of the bird is a delicacy with demand being higher than supply (Koney, 2004; Avornyo et al., 2007). Hence, it is a source of ready cash for investment

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in crops production and purchase of grains to bridge gaps in food shortages. Guinea fowls are therefore very influential in food security of the farm family and plays vital role in socio – cultural practices of farmers such as sacrifices, funerals, payment of dowries and others (Dei and Karbo, 2004).

In Northern Ghana, free range is the most common system of rearing the guinea fowls among the small scale farmers. There is no systematic feeding regime followed by the farmers, the birds depend on free range in which guinea fowls glean grass seeds, vegetables and other available green leaves, insects, worms bones and eggshells (Dahouda et al., 2007) during the day and in the night, the birds are guided into a common hens coop but some farmers guinea fowls roost on trees at the backyard. It has been reported that egg production and fertility of the pearl Guinean fowls decreased significantly and in some case they stop laying in the dry season beginning from October up to March annually (Konlan et al., 2011). According to Larry (2011) guinea fowls are seasonal layers and will produce few months in the year. Naturally in the wild, guinea fowls are more resident at areas with persistent water where there are available green leaves, insects, arthropods and worms that they can feed on and are able to produce more fertile eggs (Prinsloo, 2003). An informal interaction with guinea fowl farmers in the area indicates that the birds reared in communities with wetland/water resources such dams, dug outs, naturally occurring water/wetland in valleys during the dry season lay more eggs with high fertility rate than those in communities without water resources.

The objective of this work was to collect data on farmers' knowledge and compare the eggs productivity and fertility of guinea fowls reared in community with or without wetland in the dry season.

MATERIALS AND METHODS

The study area

The survey was carried out in Tolon-Kumbungu District of the northern region, which is located on longitude $0^{\circ} 58' 42''$ W and latitude $9^{\circ} 25' 41''$ N and at a height of 183 m above sea level in the dry savanna ecological zone of Ghana. It has a unimodal rainfall pattern that begins in May and ends in October. The mean annual rainfall is 1043 mm. Temperature generally fluctuate between 15°C (minimum) and 42°C (maximum) with a mean annual temperature of 28°C and mean annual relative humidity of 54%. The area experiences dry cold harmattan winds from November to February and a period of warm dry conditions from March to May. The dry season therefore stretches from November to late April.

Two strata of purposive sampling techniques were used in selecting communities and farmers for this study.

Tolong – Kumbungu district was selected based on the proximity to the research station and availability of communities with or without water resources. In stage one, four communities (two each) with or without water resource were randomly chosen for the study out of six initial proposed communities. In the second stage, 25 guinea fowl farmers in each community were also chosen at random out of 40 identified guinea fowl farmers.

Data collection

The data was collected from both primary and secondary sources. The primary data was gathered through individual farmer interview using structured questionnaire while the secondary data obtained from review of previous related published scientific articles, books and informal discussions with guinea fowl farmers in the communities. The data was processed using the statistical package for the social science (SPSS).

RESULTS AND DISCUSSION

In all 86 guinea fowl farmers in the four communities (Cheyohi, Nyankpala, Nafram and Galinkpiegu) were interviewed on the eggs productivity of their guinea fowls and the hatching rate of eggs produced in the early part of dry season (October to December) in 2010 as reference point using a structured questionnaire.

Age of responding guinea fowl farmers

Age groups of farmers who rear guinea fowls in the four communities are illustrated in Figure 1. Majority (91%) of the farmers were youthful adults between ages of 19 and 54 years. Some few aged farmers above 55 years who have passion in guinea fowls production still keep them. Figure 1 illustrates the age distribution of the responding farmers. No guinea fowl farmer was found to be 18 years and below according to the responding farmers. Teye and Adams (2000) reported similar findings. The challenges involved in keeping the birds may be the obstacles preventing the very young and old from engaging in rearing the birds. The interest of the youthful working class of 19 – 54 years of age in guinea fowl production in the four communities indicates the viability of guinea fowl production enterprise and presents an opportunity for Job creation and poverty reduction among the resource poor farmers in the peri-urban and rural communities as this group have energy and right mind of making decisions to increase productivity.

Gender of the farmers

The study revealed that 89.35% of the farmers interviewed were men and 10.65% being women. This

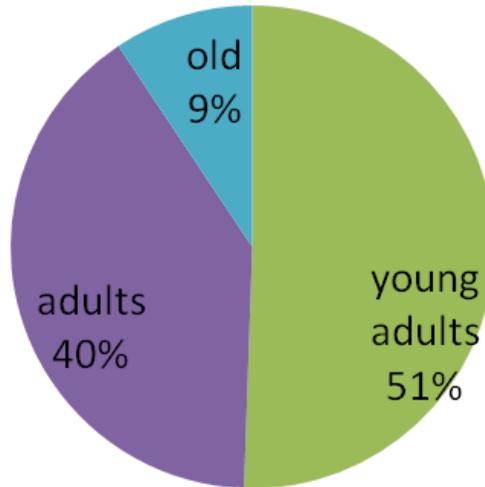


Figure 1. The age groups of farmers.

conspicuously indicates that guinea fowl production is male dominated in the study area. The current revelation is contrary to what has been reported in Zimbabwe in which 95% of the village household chicken belongs to women (Kusina and Kusina, 1999; Maphosa et al., 2004) in similar enterprise. Also, the findings does not agree with Adeniyi and Oguntunji (2011) who reported active involvement of women overwhelmingly (63.3%) taking the lead in village poultry production in all the villages considered in their study. Ayoade et al. (2009) investigated involvement of women in livestock production in Northern Nigeria and revealed that 41.3% of the respondents kept poultry as their major livestock enterprise. They concluded that the greater involvement of women in village poultry production might be connected with its easier management and relative low cost in the procurement of foundation and replacement stocks. The current findings could be attributed to the difficulty in keets brooding, housing and keeping breeding stock as many farmers could records 90 -100% mortalities during keets brooding (Avornyo et al., 2007) which scares women from taking the risk of investing their small capital into guinea fowls production. Connected to this is the rate at which guinea fowl antagonized farmers through same laying bits in communities making the more powerful claiming ownership of the eggs over the weaker ones. It is commonly said among farmers that 'if you do not like problems with your neighboring farmers, do not keep guinea fowls'. There is also an old traditional belief in the study area were women were not permitted to keep the birds (Avoryo et al., 2007) and this still lingers in the mind of some women though it is not being enforced by traditional leaders now. Efforts should be made by development workers to encourage women to go into guinea fowls production.

Guinea fowl housing

On housing of the precious birds, the study found out that 98% of the farmers interviewed housed their guinea fowls in the night and offer them few handfuls of grains and allow them to go for free range whole day. Some few farmers (2%) still practice extensive system and are not bothered where the fowls roost at night. Some of them leave the fowls in the farm and go there periodically to check them and collect eggs. It is important to add that those farmers complain of egg losses and difficulty in having access to life birds. They therefore have to hunt and kill the birds if the needs arise.

As to what time of the day guinea fowls are open for free range, all the farmers interviewed responded that they open the birds in the morning between 6.00 to 9.00 GMT and guide them in at 17.30 to 18.00 GMT.

Supplementary feeding

All the farmers contacted during the study offer supplementary feed to the guinea fowls in the form of cereal grains such as maize, millet and sorghum. This agrees to the report of Dahouda et al. (2007) on Benin traditional poultry production studies. A handful of grains are offered to both grower and adult birds in the morning after opening them and some times in the afternoon. On the measures of supplementary feed given, using a bowl of grains with an average weight of 2.5 kg as a standard measure, it was realized after computation and conversion of farmer's responses that the feed supplement offered per fowl per day were 0.04, 0.26, 0.6 and 0.5 g for Cheyohi, Nyakpala, Nafarim and Galinpiegu communities respectively with a mean of 0.35 g per fowl per day. The feed supplement appear very small but

Table 1. The stock structure, egg productivity and fertility of on–farm guinea fowls

Parameter	Communities' Mean values			
	Chayohi	Nyankpala	Nafarim	Galinkpiegu
Number of cocks	5.28 ^a	5.27 ^a	4.52 ^a	6.10 ^a
Number of hens	17.17 ^{ab}	22.60 ^{ab}	23.86 ^b	15.24 ^a
Sex ratio	4.68 ^{ab}	6.13 ^a	6.02 ^a	3.05 ^b
Total guinea fowls in stock	22.48 ^a	28.20 ^a	30.52 ^a	22.38 ^a
Number of eggs collected per week	22.72 ^a	41.80 ^b	72.90 ^c	71.38 ^c
Hatching rate of incubated eggs	49.82 ^a	52.93 ^{ab}	58.57 ^b	76.19 ^{bc}
Supplementary feed / fowl /day (g)	0.04 ^a	0.26 ^a	0.6 ^a	0.5 ^a

The means with difference superscripts are significantly different at $P > 0.05$ level

**Figure 2.** Guinea fowls scavenging for feed in dry environment.

could be argued that the last quarter of the year is just at the end of the harvesting season and birds can glean a lot of grains in the backyard.

The performance of guinea fowls in communities with or without wetland in the dry season

The results of the 86 farmers interviewed in the four studied communities on guinea fowls stock structure and performance from October to December, 2010 is shown in Table 1. On the number of males in stock, there was no significant difference among mean values of the four communities. Nyankpala mean value of guinea hens was significantly high ($P > 0.05$) than Galinpiegu but similar to chayohi and Nafarim. The sex ratio of the fowls was not significantly different in all the communities except that of Galinpiegu which was significantly lower ($P > 0.05$) than the mean values of Nyankpala and Nafarim both similar to that of Cheyohi.

From Table 1, The eggs production in communities with water resource (Nafarim and Galinpiegu) was significantly higher ($P > 0.05$) than that of the dry communities (Chayohi and Nyankpala). This is similar to the findings of Prinsloo (2003). It is attributable to the availability of water resources and its associated green leaves,

presence of arthropods and worms that increases the quality of feed the birds scavenge on in the range (Dahouda, 2007; Ward and McKague, 2007). The eggs were incubated using surrogate local hens. The hatchability of the eggs also showed the same trend as egg production indicating that the guinea hens reared in communities with water resources in the dry season are laying more fertile eggs relative to those in the dry communities. The mean hatching rates in the wetland communities in this current study is same as 72.9% obtained by Dahouda (2007) and the range of 50 to 76% is wider than the range of 64 to 72.9% reported by Saina (2005) in Zimbabwe. This could be due to environmental and seasonal differences in the study locations.

The effect of water on guinea fowls' egg laying and fertility

Poor water availability and quality may contribute to reduced Guinea fowls' productivity (Dahouda, 2007). This become more severe when the guinea fowls available scavenging feed contains less moisture as it pertains in communities without water resource or wet land as illustrated in Figure 2. The contribution of water in their productivity and fertility may be the reasons why guinea



Figure 3. Helmeted guinea fowl in a wetland area.

fowls eggs laying and hatchability peaks coincide with the rainy season (Ogwuegbu, 1988) in West Africa, the native origin of the birds.

It has been reported in Nigeria that guinea fowls eggs laying continuous all year around in scavenging systems (Ayorinde and Ayeni, 1986). This fall short of the environment or climatic conditions of the scavenging areas as this current finding suggest that laying year round occurs only in areas with water resource or wetland which modify the scavenging environment through increased in water availability and quality of feed accessible to them (Prinsloo, 2003) as shown in Figure 3.

According to Chrysostome (1993), the peak of guinea fowls eggs hatchability occurs in June and July and higher fertility was also observed in June in the rainy season. Nwagu (1997) asserted that, the main factors affecting eggs hatchability are eggs size, shell quality and variation in brooding temperature and humidity. These findings suggest that availability and accessibility of water to guinea fowls directly or indirectly through feed contribute to eggs productivity and fertility and confirms the responding farmers view that eggs laying and hatchability is higher in communities with water resource than those without water resource in the dry season.

Under the semi-intensive system, most farmers do not provide drinking water in the rainy season and the guinea fowls are left to drink water in ponds to support their productivity (Dahuoda, 2007). This is in line with this current survey as natural water bodies collection dries up during the dry season in communities without water resource indicated in this survey and consequently the decline in egg production and hatchability rate observed as compared to communities with water resource

available and accessible to guinea fowls in the form of dams and naturally occurring wetlands in the valley areas. Lukuyu et al. (2009) in similar studies reported that inadequate water accessibility causes reduction in feed intake and imposing limits on livestock productivity.

Goromela et al. (2007) reported that seasonal fluctuation in availability of water and feed resources coupled with little or no supplements are other possible factors responsible for poor eggs production most especially in dry season. Nutrient intake of rural poultry is below recommended levels and is insufficient for optimal growth and egg production. This support the current finding that availability of water in the dry season in communities with water resource stabilizes the presents of feed in the scavenging areas and reduces the negative effect of feed and water fluctuation on guinea fowls eggs production and fertility rate.

Conclusion

Communities with wetland/water resources have the potential of providing very good environment for guinea fowls production relative to communities without water in the dry season. This current study results shows that given the same treatment guinea fowls reared in communities with wetland will produce more eggs with high fertility exhibited in its high hatching rate than those reared in dry communities at the farmer level under semi-intensive or free range management system.

This finding implies that citing guinea fowls production enterprise in an area with water resource or near wetland

may give more returns than when cited in an area without water resource/wetland.

It will be necessary however, to conduct an experiment in these two different environment to confirm the findings of guinea fowls eggs productivity and fertility or otherwise.

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