EFFECT OF WILD GUINEA FOWL HATCHABLE EGG SOURCES ON EGG EXTERNAL CHARACTERISTICS, FERTILITY, EMBRYO CHARACTERISTICS, MORTALITY AND HATCHABILITY

O. P. A. IDOWU, O. M. SOGUNLE, O. A . ADEYEMI, A. M. BAMGBOSE, O. D. OGUNSOLA AND O. M. O. IDOWU

College of Animal Science and Livestock Production, Federal University of Agriculture, Abeokuta, Nigeria.

ABSTRACT

A total of 600 hatchable eggs (300 each)from Northern Nigeria (Birnin Kebbi) and Saki in Southern Nigeria were used to investigate effect of wild guinea fowl hatchable egg sources on egg external characteristics, fertility, embryo characteristics, mortality and hatchability.Results showed that incubated eggs sourced from Birnin Kebbi had higher dead in shell (17%), infertile eggs (7%) and keets hatched (68%) compared to ones from Saki, while hatchable eggs from Saki had higher dead in germ (28%) and weak in shell (4%) embryos compared to values obtained in Birnin Kebbi eggs. It was concluded that egg length and egg shape index (ESI) were significantly ($P<0.05$) influenced by the egg source while the meteorological elements and enviroment of the egg source constitute a complex system, which influenced fertility, embryo characteristics, mortality and hatchability of wild guinea fowl hatchable eggs.

Keywords: Guinea fowl, egg, wildlife.

INTRODUCTION

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. Hence, it is a source of ready cash for investment 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. Many species of wild guinea fowl are found in Nigeria. The commonly domesticated guinea fowls descended from one of the wild species (*Numidia meleagris)*. Egg morphometric parameters such as egg weight, egg width, albumen and yolk weights are very important in poultry beoause these factors influence egg quality and grading, reproductive fitness of the chickens and embryonic development (Onagbesan *et al*., 2007). The physical characteristics of the egg play an important role in the processes of embryo development and successful hatching. The most influential egg parameters are weight, shell thickness and porosity, shape index, described as maximum breadth to length ratio, and the consistency of the contents. The objective of this work was to collect and compare data on egg external characteristics, fertility, embryo characteristics, mortality and hatchability of the guinea fowls eggs sourced from wild in the Northern Nigeria- Birnin Kebbi and Southern Nigeria- Saki during wet season.

MATERIALS AND METHODS

Collection of eggs

A total of 600 hatchable eggs (300 hatchable eggs each from two different sources; Northern Nigeria (Birnin Kebbi) and Saki in Southern Nigeria were used for this study. It was ensured that the eggs were void of physical defects. The egg collection was in July and August. Eggs were stored for not more than 3 days at cold room temperature prior to setting in the incubator.

Egg physical characteristics

Physical characteristics such as egg weight (EWT), egg length (ELT), egg width (EW) and

egg shape Index (ESI) were measured before incubation. The weight of each egg sample was measured with a sensitive weighing scale (Mettler –Toledo ® PB 3002 electronic balance) to the nearest 0.01g prior to incubation.

Incubation

The eggs were incubated at Foresight Agro-Allied Industries Limited, Ibadan, Oyo State. The eggs were numbered according to sources for identification and were set in the same incubator. The eggs were positioned in the setting crates with broad end up to ensure ease of gas exchange between the eggs and the environment.

Candling protocol

Candling was carried out on the 25th day of incubation for the detection of dead embryo, and clear eggs. The candling process was carried out in a dark room using a candler fixed with neon fluorescent tubes. The eggs were placed on the candler for easy penetration of light through the egg mass and the eggs were viewed against the source of light. The fertile eggs were seen to be densely clouded and opaque with network of veins indicating development of embryo within the eggs while the unfertile eggs were translucent under the light. Number of infertile and embryonic mortality was recorded. After candling, the fertile eggs were transferred into the hatching tray and thereafter into the hatching unit for three days. After the keets were hatched at 28 days, the numbers of hatched keets including the normal, weak, abnormal and dead keets were counted and recorded.

Fertility and Hatchability percentage/rate

Each egg was evaluated to determine the fertility status of eggs from the setter to hatcher.

The followings parameters taken:% Fertility, %Hatchability of fertile egg, % Hatchability of eggs, %Dead in Shell, %Dead in Germ and % Weak in Shell.

Statistical Analysis

This experiment was laid out in studentized - t test at 95% confidence limit

RESULTS AND DISCUSSION

The effect of egg source on guinea fowl egg physical qualities are presented in Table 1. Egg length and egg shape index (ESI) were significantly ($p<0.05$) influenced by the egg source.

Eggs sourced from Saki in the South-Western Nigeriahad significantly ($p<0.05$) higher egg length (44.12 mm) and lower egg shape index (0.70) values compared to those got from Birnin Kebbiin the hot northern region of Nigeria. It has been reported by Dudusola (2012) that eggs that are unusual in shape, with long and narrow as found in eggs sourced from Saki, cannot be placed in grade AA (nearly perfect) or A (slightly worse than AA) since an egg is generallyoval in shape (0.72–0.76). Round eggs and unusually long eggs have poor appearances and do not fit well in egg cartons; therefore, they are much more likely to be broken during transportation to hatchery than the eggs of normal shape as found in Birnin Kebbi (0.80). Egg weight (37.47g) and egg breadth (34.74mm) of eggs from Birnin Kebbi were higher ($P>0.05$) than 37.26g and 34.65mm respectively obtained from Saki. However, Duman *et al.*(2016) reported astatistically significant positive correlation between egg shape index and egg weight ($P<0.05$). This could beas a result of the denser part of the egg (albumen) occupying the width area, which translates to heavierweight for the egg.Egg weight is an important parameter to be considered when determining incubation conditions. Literature reported average egg weight of guinea fowl as 38g (Ayorinde *et al.*, 1989) and 40-45 g (Fani *et al.*,2004) which were higher than values obtained in this study.

Figure 1 shows the graphical illustration of the effect of egg source on egg fertility, embryo characteristics, mortality and hatchability of guinea fowl eggs. There were differences in thenumbers of fertile eggs, embryo characteristics, embryo mortality and percentage hatchability ofguinea fowl eggs incubated across the two egg sources. The graph showed that incubated eggs sourced from Birnin Kebbi had higher dead in shell (17%), infertile eggs (7%)

and keets hatched (68%) compared to those from Saki, while hatchable eggs from Saki had higher dead in germ (28%) and weak in shell (4%) embryos compared to values obtained in Birnin Kebbi eggs. The lower early embryonic mortality (dead in germ), higher percentage of late embryonic mortality (dead in shell) and keets hatched (68%) obtained with eggs sourced from Kebbi could be attributed to low nutritional problem in the laying stock at early stage of incubation, high incidence of eggs set arising from fertile sperm and high sperm count while the late embryonic mortality be due to high shell thickness. The 7% clears (infertile eggs) associated with Kebbi in this study can be linked to a number of factors including lethal genes,insufficient nutrients in the egg and exposure to conditions that do not meet the needs of the developing embryo as reported by Nwagu (1997). The fertility (>90%) obtained in this study was higher than 16.2-61.9% fertility reported by Ayorinde *et al.* (1989), in the dry/hot season and in rainy season. The results of percent hatchability obtained from the two egg sources in this study is much lower than the near 100% reported for the Nigerian local chickens (Ayorinde *et al.,* 1989). Guinea fowl eggs exhibit low hatchability than chicken eggs mainly because of their thicker eggshells compared with chicken eggs (Ayorinde *et al.,* 1989). The hatchability rates of guinea fowl eggs is put at 67% under artificial incubation (Nwagu, 1997). Several factors have been identified (Ayorinde *et al.,* 1989) to affect hatchability of eggs in poultry and these include age of flock, species used, sample size, enviromental conditions and storage conditions, incubation relative humidity and egg turning angle. The low hatchability values recorded for Saki in the current study may, however, not be a true reflection of the genetic potential of the dominant guinea fowl breeds in the area. This was because in the tropical environment, meteorological factors exert significant influence on domestic birds. Direct meteorologic factors affecting birds include, especially, high ambient temperature and high relative humidity, resulting in severe heat stress. Temperature and photoperiod are two important factors that affect fertility and hatchability . The optimium temperature range for poultry is 12- 26°C and Birinni Kebbi hasa temperature ranged between 25 – 33 °C while Saki has 24- 29 °C between July – August. Nwagu (1997) documented the effects of enviromental factor , season, and heatstress in particular, on seminal characteristics in the guineafowl in the warm-wet, rainforest zone of Nigeria and demonstrated that heat stress deterred optimum fertility in the zonedue to a compromise in seminal characteristics.

CONCLUSION

Egg length and egg shape index (ESI) were significantly ($P<0.05$) influenced by the egg source while the meteorological elements and enviroment of the egg source constitute a complex system, which influenced fertility, embryo characteristics, mortality and hatchability of wild guinea fowl hatchable eggs.

REFERENCES

Ayorinde KL, Oluyemi JA, Ayeni JSO. Growth Performance of Four Indigenous Helmeted Guinea Fowl Varieties. Bulletin of Animal Health and Production Africa 1988; 36: 356–360.

Dudusola,I.O.,(2012). Comparative evaluation of internal and external qualities of eggs from quail and guinea fowl. Journal of Agriculture and Biological Sciences .3(3) :296 –299.

Duman, M., Şekeroğlu, A., Yıldırım, A., Eleroğlu, H. and Camc, Ö. (2016) Relation between egg shape index and egg quality characteristics. European Poultry Science, 80. 1612-9199,

Fani AR, Lotfollan H, Ayazi A. Evaluation in economical traits of iraniannative guinea fowl (*Numida meleagris*). Proceedings of the JointAgriculture and Natural Resources Symposium; 2004; Tabriz, Ganja.Iran; 2004. p.14-16.

Onagbesan, O., Bruggeman, V., Desmit, L., Debonne, M., Witters, A., Tona, K., Everaert,

N. and Decuypere, E., (2007). Gas exchange during storage and incubation of Avian eggs: Effects on embryogenesis, hatchability, chick quality and post-hatch growth. World's Poultry Science Journal. 63: 557-573.

Nwagu, B. I. (1997) "Factors affecting fertility and hatchability of guinea fowl eggs in Nigeria". World's Poultry Science Journal, Vol. 7(53, pp.279-286.

Yildirim, I. J. (2012) "Nutrition of guinea fowl breeders: A review". *Journal of Animal Science Advances,* Vol. 2(2), pp.188-193.

Table 1: Effect of source of egg on egg physical qualities

Parameter	Egg Source	
	Saki	Birnin Kebbi
Egg weight (g)	37.26±0.15	37.47±0.15
Egg length (mm)	44.12±0.1[a]	43.43±0.1[b]
Egg breadth (mm)	34.65±0.09	34.74±0.1
Egg Shape Index	0.70±0.002[b]	0.80±0.002[a]

[a, b]Means in the same row not sharing common superscripts are significantly different (P<0.05)

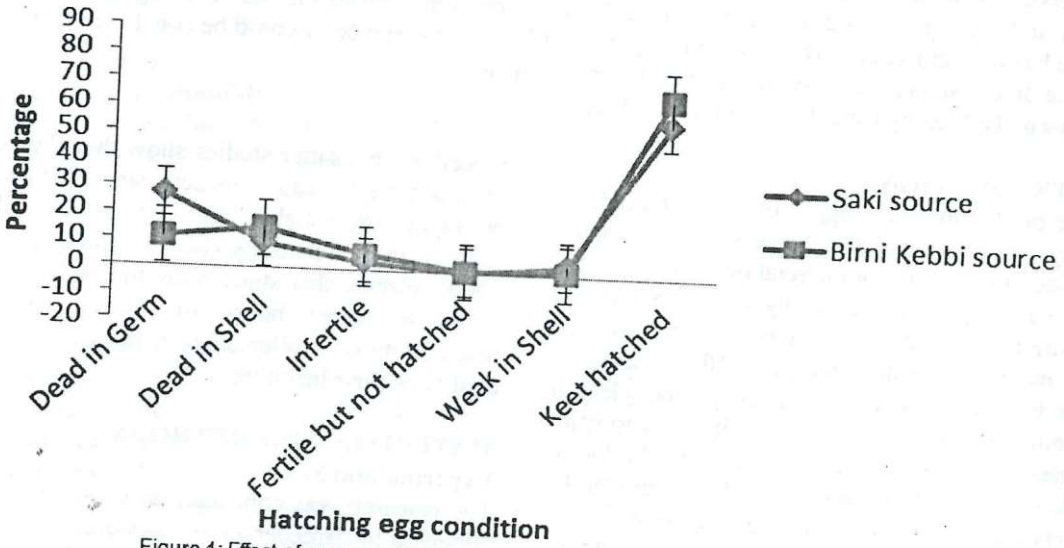

Figure 1: Effect of sources of hatching eggs on hatchability