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Original Research

New livestock production and evaluation of hatching performance in the Guinea fowls at the city of Korhogo

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ABSTRACT:

A study was conducted in the town of Korhogo to evaluate the production performance of eggs in the local guinea fowl (*Numida meleagris*). For this research, a total of 300 guinea including 250 females and 50 males were bred in an area of 75 m², with the density of 13 guinea/m². The experiment lasted for eight weeks, i.e. from 18 weeks to 25 weeks. The survival rate weight gain were analysed throught the study. It was studied by providing more illumination and selected feed for the livestocks. The results showed that the average weight increased from 1200 g to 1263 g. Average daily gain increased from 0.94 g/day for 18 weeks to 1.14 g/day for 25 weeks. The consumption index advanced from 10.46 to 10.47 and the mortality rate increased from 0.33% to 5%. With regard to the laying performance, the average weight of eggs ranged from 31 g to 33.5 g, the rate of ranged from 4.01% to 28.07%, size increased from 5.95 cm to 6.9 cm and the turn diameter increased from 10.59 mm to 11.65 mm. Ultimately, this study results showed the increased production performance in the local guinea fowl.

Keywords:

Production performance, Eggs, Local guinea fowl, Korhogo.

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INTRODUCTION

In most African countries south of the Sahara in general and particularly in Côte d'Ivoire, animal production is a real way to wealth, investment, savings and a source of income for farmers (Boko *et al.,* 2012). Furthermore, according to FAO (2012), 70% of poultry come from the indegenous sector and 30% from the modern sector. The modern sector mainly concerns the production of egg laying hens and broilers for meat. However, production of guinea fowl is little known in the Ivory Coast. Its domestic production is low and until now, the Ivory Coast is supplied by external markets (Kroman, 2018). Guinea fowl *Numida meleagris* is present in the African countryside, either in the wild or even as an animal backyard. It was raised in extensive systems by unproductive free-ranging (Saina *et al.,* 2005; Dahouda, 2009). Inspite of its intensive livestock development and very little usage, there is however, a good opportunity for valuing this animal with exceptional nutritional and dietary qualities of its meat and eggs (Oguntona 1989; Agwunubi and Ekpenyong, 1990). Farming and breeding techniques must guarantee sufficient production and profitability of the business. The méléagriculture is indeed handicapped by its weak productive performance (Amand *et al.,* 2008). Compared to those of the poultry industry, but opportunities for improvement exist if the results obtained in intensive systems in Europe were considered (Oke *et al.,* 2004; Agreste, 2008). It is this context that fits the present study of breeding and evaluation of production performance of local guinea fowl eggs in the city of Korhogo. The main objective of this study is to experiment with a new local guinea fowl breeding farm to improve the yield.

MATERIALS AND METHODS

Study zone

This study was conducted between 8 26° and 10° 18 latitude and 5° 17 to 6° 19 longitude, at the Laboratory of Animal Biology and Cytology, Université

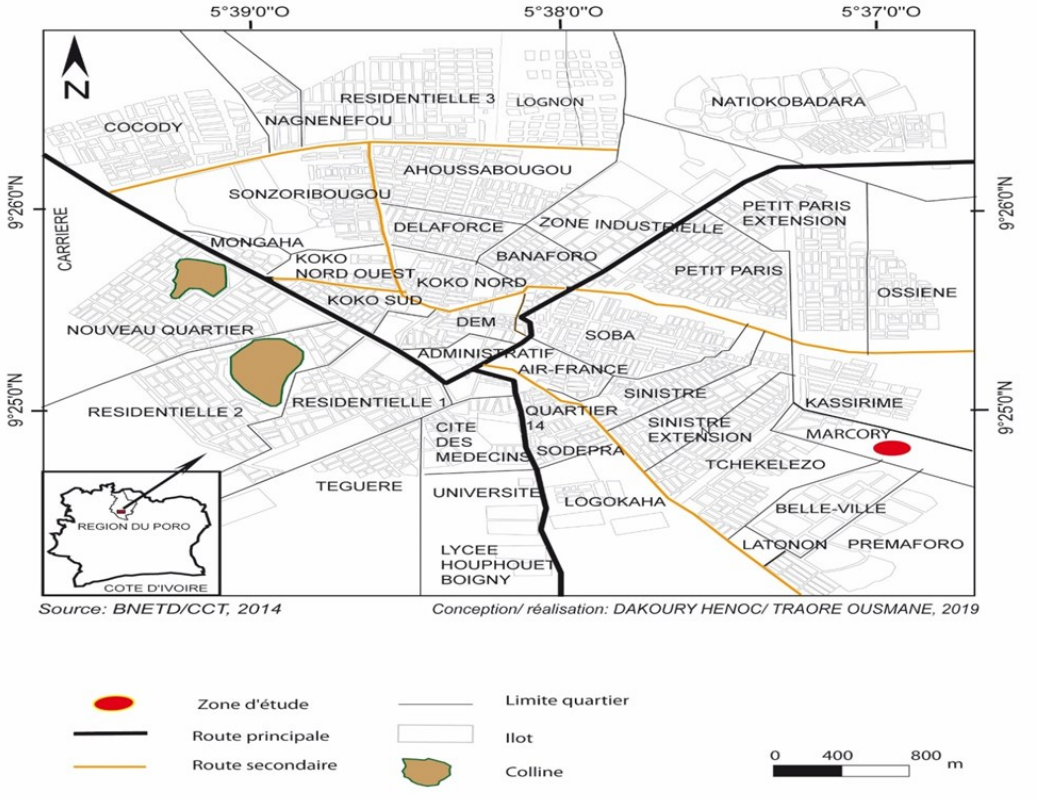

Figure 1. Korhogo city map (Anonymous, 2014)

Table 1. Bromatological composition of egg-laying food

S. No	Phase	Clutch
1	Protein (%)	15.6
2	Crude fat (%)	3.85
3	Crude fiber (%)	3.3
4	Energy (kcal)	2730
5	lysine	0.82
6	Methionine (%)	0.42
7	Methionine + Cysteine (%)	0.69
8	Calcium (%)	370
9	Phosphorus (%)	0.5
10	Sodium (%)	0.18

de Cocody, Korhogo is located north of the Ivory Coast. Capital of the Poro region and Savanna district is bounded to the north by the city of M'BENGUE, north-east by the city of Sinématiali, south-east by the city of Niakaramadougou, south by the city of Dikodougou and to the west by the city of Boundiali. The department of Korhogo covers an area of 12,500 km^2 (Figure 1) with the road and air accessibility (Anonymous, 2014).

Study material

The animals used were 300 guinea fowls (*Numida meleagris*) aged 18 weeks or 4.5 months (Figure 2). Plant based diet and farm poultry feed (Figure 3) were given to nurture the fowls with nutritive composition as given in Table 1.

Methodology

About 300 mature guinea fowls (*Numida meleagris*) were used for the reproduction performance analysis carried out in this study. Illumination for the stimulation of oviposition was done using light bulbs (NEON 06). The building used for rearing guinea had an area of 75 m² (width 5 m, length of 15 m and height 4 m). The building is oriented along the east-west axis to prevent the penetration of sunlight and for better ventilation. The density of the fowls was 13 guinea/m² with a sex ratio of one male for five females.

Spawing of guinea fowl

Spawning was stimulated by the increased duration of lighting and food. The fowls were kept in light for 24 h/ 24 h. The standard of the food intake of egg laying guinea fowl is 85 g/component/day and was increased by 30 g or 115 g/component/day and to avoid waste of the food, six feeders of 2nd stage are arranged equidistantly in the building for a ratio of 50 guinea fowl/feeder. Feeders received the same amounts of food at each service. The guinea received the food for two times a day viz., morning at 7'o clock and evening at 5'o clock to avoid wastage. The poultry feed used was a concentrated egg sac called KLC to be mixed with 5% of corn with 1000 kg but we mixed with yellow corn 150 kg, 80 to 100 kg of cashew and 5 kg of cotyledons shell. Drinking water was provided *ad libitum*. Guinea fowl were also provided with nest boxes for laying eggs in good condition and to prevent the eggs breakage. The animals were dewormed every month with albendazole. They regularly received amin'total as a vitamin and amino acid supplemnent, avemix as an anti-infectious agent, alphaceryl as an antibiotic and narcox plus as an anticoccidial drug. The bedding was not changed during the laying phase to avoid animal stress which could favor the decrease in spawning. To reduce the proliferation of parasites and bacteria, livestock and the farm site buildings were disinfected every two weeks with a disinfectant called Virunet using sprayers (Sanou, 2005; Miloud *et al*., 2010)

Calculation of production performance

The production parameters such as Average

Table *2.* Number of eggs laid and broken eggs

S. No	Age (week)	S_{18}	S_{19}	S_{20}	S_{21}	S_{22}	S_{23}	S_{24}	S_{25}	Total
1	Number of eggs	12	24	32	45	57	61	75	80	386
2	Number of broken eggs	0	2	1	0	3	1	3	4	14

Figure 2. ***Numida meleagris***

Figure 3. Industrial pellet feed

Weight (AW), Average Daily Gain (ADG), the consumption index of each batch and the mortality rate were calculated using different formulae.

Feed Conversion Ratio (FCR)

Feed conversion ratio was determined by the ratio of the quantity of feed utilized to the average daily gain according to the following formula (Halbouche *et al.*, 2010)

$$FCR\ (g/fowls/day) = \frac{Amount\ of\ feed\ intake}{Average\ daily\ gain}$$

Average weight (AW)

The average weight was determined by calculating the ratio of the sum of all the individual fowls to the total weight of individuals according to the following formula (Halbouche *et al.*, 2010)

$$AW\ (g) = \frac{Final\ weight\ of\ all\ the\ individuals}{Total\ number\ of\ individuals}$$

Average Daily Gain (ADG)

Average daily gain was calculated by taking the ratio of the weight change over the period (in days), according to the following formula (Halbouche *et al.*, 2010)

$$ADG(g)/day = \frac{Final\ weight\ (g) - Initial\ weight(g)}{Age}$$

Consumption Index (CI)

The consumption index reflects the effect of diet on growth issues. Thus the guinea fowl with feed efficiency lowest will be those who value the best food (Halbouche *et al.*, 2010)

$$CI = \frac{Quantity\ of\ food\ consumed\ during\ a\ period\ (g)}{Weight\ gain\ during\ the\ same\ period\ (g)}$$

Mortality rate

The mortality percentage was calculated from

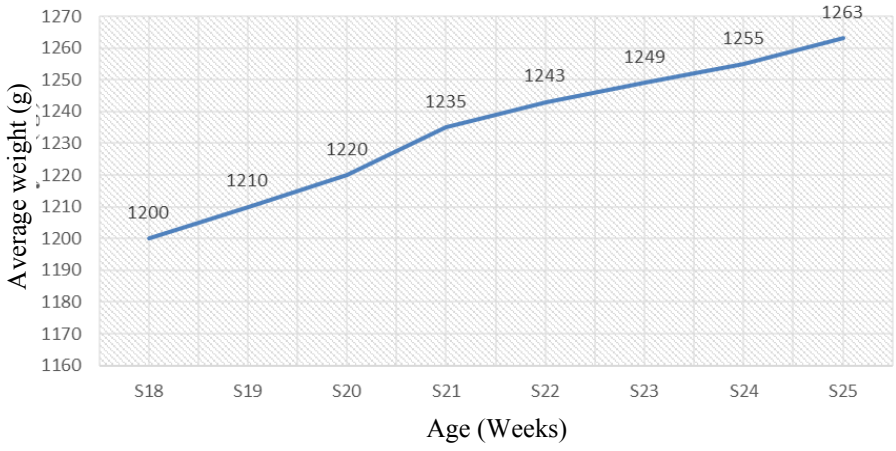

Figure 4. Average weight of guinea fowl

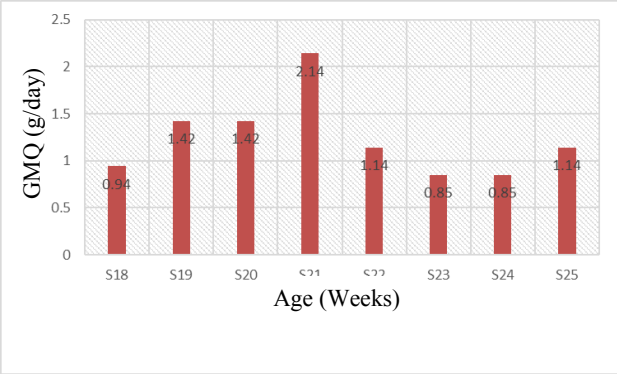

Figure 5. Average daily gain

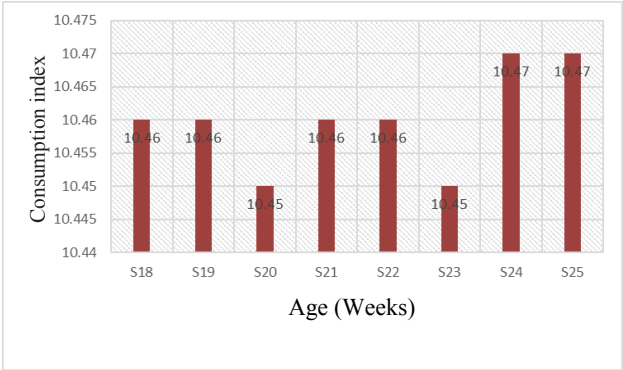

Figure 6. Consumption index

the following formula (Halbouche *et al*., 2010)

$$Mortality\ rate = \frac{Number\ of\ dead\ fowls\ x\ 100}{Total\ number\ of\ fowls\ present}$$

Egg parameters

Average weight of eggs

The mean egg weight expressed in grams was calculated from the following formula:

$$MW = \frac{\text{Total weight of the eggs weighed}}{\text{Number of eggs weighed}}$$

Number of eggs

The laid eggs were collected daily and counted.

Laying rate

The laying rate is the ratio of the total number of eggs laid during the period to the total number of hen-days during the period multiplied by 100. Weekly laying rate was calculated according to the following formula:

TP = ((I/PK)) * 100

where 'I' is the total number of eggs laid, 'P' is the number of layers and 'K' is the number of days of laying.

Egg size

The egg size is measured weekly using a measuring tapes.

Egg diameter

The diameter was also measured by the measuring tape every week.

Statistical analysis of data

Data on production performance of the animals were subjected to analysis of variance factor using STATISTICA 7.0 software. The means were calculated using Excel software.

RESULTS

Average weight of guinea fowl

The average (weekly) weight of guinea fowl is shown in Figure 4. The average weekly weight of guinea fowl increased from 1,200 g at 18 weeks to 1263 g

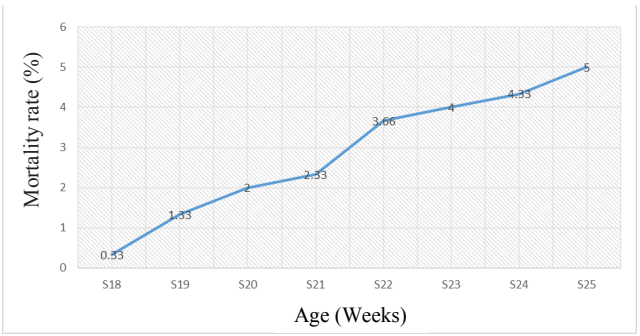

Figure 7. Mortality rate

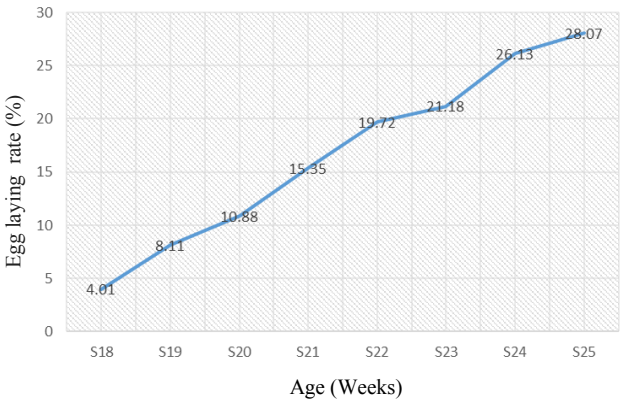

Figure 8. Egg laying rate

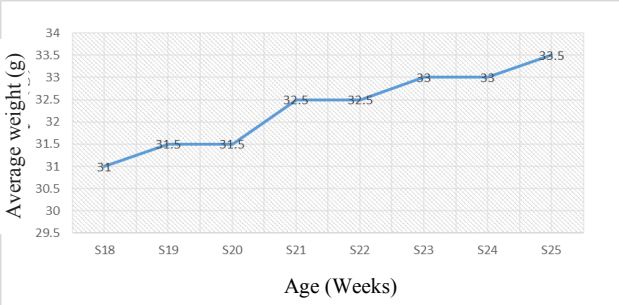

Figure 9. Average weight of eggs

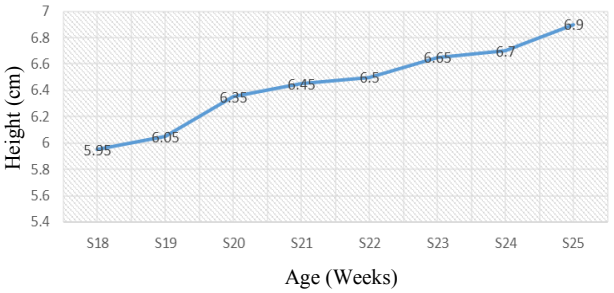

Figure 10. Average size of eggs

at 25 weeks.

Average daily gain

Average daily gain increased from 0.94 g/day to 2.14 g/day for 18 weeks to 21 weeks respectively and decreased from 2.14 g/day to 1.14 g/day at 21 week and 25 weeks respectively (Figure 5).

Consumption index

The results of the consumption index is shown in Figure 6. The weekly index of consumption was constant at 18 weeks and 19 weeks with a 10.46 value. It varied from 10.46 to 10.45 during the 19th week to the 20th week and remained at 10.45 at the 20th week to the 23rd week but it varied from 10.45 to 10 47 during the 23rd week to the 25th week.

Mortality rate

The weekly death rate has changed by 0.33% in the 18 weeks to 5% at 25 weeks or one died during the 18 weeks and 14 deaths during the 25th week (Figure 7).

Number of eggs and broken eggs

Table 2 shows the number of eggs laid and broken eggs during the laying cycle. The number of broken eggs was 14.

Laying rate

Figure 8 shows the variation of the weekly laying rate during the cycle. The weekly rate of lay evolved in a gradual manner and increased from 4.01% in the 18 weeks to 28.07 at the 25th week.

Average weight of eggs

Figure 9 shows the change in average weekly weight of the eggs during the laying cycle. The weekly average weight ranged from 31 g at 18 weeks to 33.5 g at the 25th week.

Egg size

Figure 10 shows the change in average weekly length of the eggs during the cycle. Average weekly size of 5.95 cm has evolved at 18 weeks to 6.9 cm at 25 weeks.

Tower diameter

Figure 11 shows the evolution of the turn of average weekly egg diameter. The weekly average diameter increased by 10.59 mm in 18 weeks to 11.65 mm at 25 weeks.

DISCUSSION

Live weight of local guinea fowl to the onset of laying is 1200 g. This result is higher than those of several other researchers. Indeed, Oke *et al.* (2003) and Sanfo *et al.* (2007) obtained respective average weight of 1121 g and 932 g at the onset of laying at 18 weeks of age. This weight has gradually increased until the 25th week demonstrating the good quality of the food. In our study, the average daily gain obtained at 25th weeks was 1.14 g/d. This is lower than Dahouda *et al.* (2008) and Houndonougbo *et al.* (2013) who obtained 1.93 g/day and 4g/day respectively in the 25th week. This difference could be explained by the guinea fowl breed used, the quality of the food and the environmental factors of the barn. Besides, the local guinea fowl is known for its low rate of weight gain (Hien *et al.,* 2005; Nahashon *et al*., 2007). The consumption index indicates the degree of conversion of the food consumed to the weight gain.

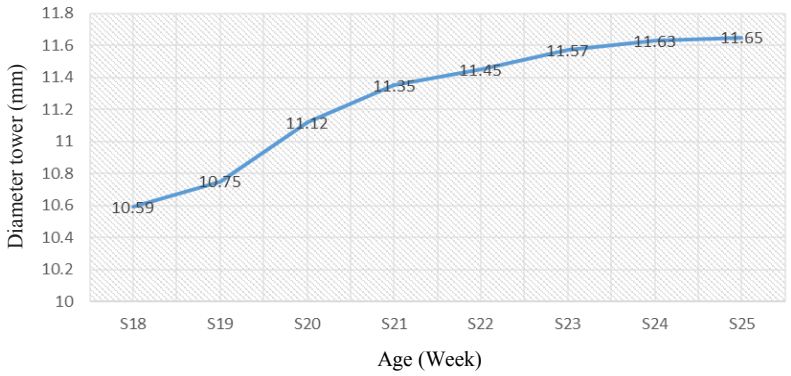

Figure 11. Average diameter of the eggs

The weight gain assessment of the consumption index in guinea fowl can be done on two levels its evolution with age of subjects and its variation with the protein level and the energy level of the food. The average consumption index weekly obtained in our study was 10.46. This is close to those of Adeyemo and Oyejola (2004) who showed that this parameter increases progressively with the ability to reach 12.6 at six months of age.

The mortality rate recorded in this study was 5%. This is lower than Miloud *et al.* (2010), who reported a rate of 8% throughout the laying cycle. These deaths could be explained by stress due to factors of the building environment such as temperature, dust, noise etc.,

The average weekly rate of eggs obtained in our study is 16.68%. It is below the average of 44.2% obtained in Burkina by Sanou (2005). This observed difference could be explained by the breed used, climatic conditions and diet. Indeed, genetic performance of laying of eggs, the breed used in the study are lower when compared to those of the high race in Burkina Faso. Eggs of guinea fowl in our study have an average weight of 32.25 g. This result is consistent with that of Laurenson (2002) who reported that the weight of guinea fowl eggs varies between 20 and 50 g with the proportion that weighs between 35 and 45 g.

In this study, the broken eggs were picked up. This could be explained by the lack of nesting boxes in the livestock building, poor provision of nest boxes and the non-entry of birds into nests and struggles in the reproductive spawning.

The eggs that we had obtained respectively have a mean size of 6.9 cm and an average diameter of 11.65 mm. These results are superior to those of Sanfo and Boly (2005) in Burkina Faso. They reported local guinea fowl egg measurements with respective averages of 4.7 cm height and 9 mm diameter round. The difference is attributable to several factors such as breeding conditions, genetic characteristics, climatic conditions and the composition of the food.

CONCLUSION

The present study was to test a new breeding conducted on guinea fowl to improve production performance. Increasing the duration of illumination and quantity of food distributed have improved the mean weight, height and diameter of the eggs in the local guinea fowl. This new breeding behaviour has to be promoted among farmers to increase their income. However, difficulties exist mainly for the access to rural lighting source and additional expenses related to the increase in food intake. This research could be replicated on other farms by improving the building environmental factors to further enhance the production performance.

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