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Influence of egg size on optimal growth of three varieties of local guinea fowl chicks in the Hambol region (Côte d'ivoire)

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Abstract

An experiment was carried out on guinea fowl at the Allasso meléagricole farm in the Hambol region of Côte d'Ivoire. The aim was to determine the influence of egg weight on reproduction and optimal growth in three local guinea fowl chick varieties. These were pearl grey, white and pearl grey with white breast varieties of guinea fowl. A total of 2012 guinea fowl eggs were collected, characterized and classified in 5g weight intervals from 30 to 50g. Four categories (C) of egg weight were selected (C1 to C4) and the incubation and growth parameters of the guinea fowl were measured according to these and the variety. Egg weight had no effect on fertility rate. Embryo and intra-shell mortality rates were higher in the lower weight categories (C1 and C2). Hatching rates were higher in the heavier weight categories (C3 and C4). The heaviest guinea fowls hatched from the heaviest eggs and showed the best growth performance, especially those of the pearl grey variety. This study therefore confirms the effect of egg weight on guinea fowl reproduction and the need to select a more resilient variety for optimum production.

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Introduction

In Côte d'Ivoire, very few in-depth studies have been devoted to guinea fowl farming (Meléagriculture). However, it is a very important tool in the fight against poverty and food insecurity among the rural population (Koné *et al.*, 2018). Indeed, in rural areas, the sale of guinea fowl and their eggs allows families to meet their basic needs during the period between two harvests (Koné *et al.*, 2018). In addition, some of the eggs are intended for consumption and reproduction. In Côte d'Ivoire, an estimated 49.7% of the population lives in rural areas (RGPH, 2014), so it is important to pay special attention to this promising sector.

According to FAO (2008), guinea fowl account for only 14% of effective poultry production in the north of the country. This low productivity is related to the difficulties faced by farmers. These are mainly supply and the high mortality rate of guinea fowl, estimated at 60% of the birds (Mishra *et al.*, 2002). King'ori (2011) reports that the supply of day-old chicks is strongly influenced by fertility and hatchability. While Nwagu (1995) states that the main factors affecting hatchability are egg size, shell quality and variation in incubation temperature. The relationship between egg size and guinea fowl production parameters has been studied in Bostwana by Moreki and Mothei (2013) and in Burkina Faso by Sanfo *et al.* (2017). However, other conditions should be taken into account, such as the case of Côte d'Ivoire. This study aims to determine the influence of egg size on reproductive parameters and optimal growth in three local guinea fowl breeds in the Hamdol region (Côte d'Ivoire).

Materials and methods

Study zone

The research was conducted at the Allasso Meleagricultural Farm (FMA), situated in the Niakaramandougou Department, 555 kilometres far from Abidjan. Niakamandougou is part of the Hambol region in north-central Côte d'Ivoire.

Collect, classify and measure eggs

A total of 2012 eggs were collected from three phenotypes (varieties) of local guinea fowl including white, pearl grey and white-breasted guinea fowl. Each phenotype of guinea fowl was assigned a unique identification number. The eggs were weighed using an electronic kitchen scale (with a capacity of 5kg and a sensitivity of 1g), then they were classified into four weight categories, with 5g intervals in the range of 30 to 50g. The length and the large diameter of each egg was measured using 15cm capacity caliper. The following formula was used to determine the surface area and Shape index of the eggs.

Egg surface area (cm^2) = 4.518 × L (0.289) × GD (0.3164) × W (0.4882) (Carter; 1975 cited by Houndonougbo, 2014)

Shape index= Gd/L (Carter; 1975 cited by Houndonougbo, 2014)

L(cm)= length, GD(cm)= large diameter, Wh(g)= egg weight

Incubation of the eggs

Only 90 eggs per weight category were incubated, for a total of 1080 incubated eggs.

Incubation took place in an incubator-hutch featuring an XM-18D type controller with automatic turning and ventilation. This hutch had a capacity of 4224 hen eggs with an incubation temperature of 37.8°C and 60% relative humidity. In the hatcher, the temperature lowered to 37.5°C and humidity increased to 80%. The study utilized nightlights to assess the rates of egg fertility, embryonic mortality, and intra-shell mortality respectively on days 9, 24, and 31 (for eggs not hatched) of the incubation process. The following formulae were used to determine the incubation parameters:

Fertile egg rate (%) = (number of fertile eggs / total number of incubated eggs) ×100;

Embryo mortality rate (%) = (number of dead embryos / number of fertile eggs) × 100;

Apparent hatching rate (%) = (number of hatched eggs / total number of incubated eggs);

Actual hatch rate (%) = (number of hatched eggs/total number of fertile eggs) × 100;

Intra-clutch mortality = (number of unhatched eggs/total number of fertile eggs) × 100.

Treatment of animals

After hatching, the breeding experiments were carried out on 192 guinea fowl chicks, with 64 birds per variety. Four batches of 16 guinea fowl check were formed based on egg weight category for each variety. Subsequently, each batch was divided into two replicates (8 subjects each). The trial was carried out for 5 weeks within a brooder where chicks were kept and the ambient temperature was maintained at 38°C. To segregate the chicks based on egg weight categories and varieties, labelled bumps were utilized. A starter-feed made of 70% cracked maize and 30% of foods supplement (CMVA) was distributed ad libitum to the guinea fowl chicks via siphonic feeders. Additionally, water containing an anti-stress agent was given to them ad libitum. The individual weight of each bird was assessed at 7-day intervals using an electronic scale capable of weighing up to 5kg and detecting a 1g difference in weight. Chicks' mortality rates, categorized by egg weight and guinea fowl variety, were recorded daily from hatching until the conclusion of the experiment. Growth rate (GMQ) and mortality were calculated as follows:

GMQ (g/d) = weight gain (g) during a period/duration of the period (d);

Mortality rate = (number of dead plants/number of starting plants) × 100.

Data analysis

Statistical analysis was conducted on the whole data. Excel software was employed to compute the various rates. Means were contrasted using the ANOVA test with IBM SPSS STATISTICS version 22 software. Significance was established at the 5% level.

Results

Categorization and egg weight of the three varieties of local guinea fowl

The percentage of occurrence of each egg weight category in the three varieties of guinea fowl is shown in Fig. 1. Among the varieties, category C2[35-40g] had the highest occurrence rate. It represented globally 50% of the eggs in each variety. C2 was followed by C3 [40-45g] which represented on average 29% of eggs in each variety while C1 [30-35g] represented 16%. The C4 weight category [45-50g] was the rarest, it represented on average only 4% of the eggs in each guinea fowl variety. For all guinea fowl varieties, the average egg weight showed a significant statistical difference (P<5%) between each weight category. On the contrary, there was no significant difference (P>5%) in average egg weights between the varieties of guinea fowl within the same weight range. The mean weight of all the hatched eggs was 39.75g.

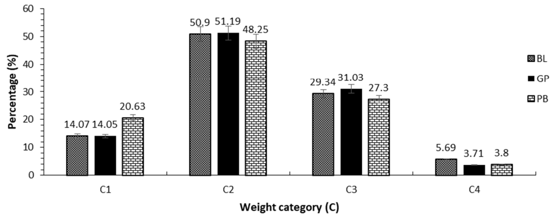


Fig. 1. Percentage of weight categories of different varieties of local guinea fowl (*Numida meleagris*)

Characterizations of the eggs of three varieties of the local guinea fowl according to the weight category

The mean values of 4.86 cm; 3.8 cm; 54.30 cm² and 0.78 were recorded respectively for length (Lg), great diameter (Gd) (width), surface area (Sf) and egg shape index (IF) for all guinea fowls. The mean values obtained for each of the egg weight categories for the above parameters were as follows C1 (4.58 cm; 3.58 cm; 48.23 cm² and 0.78), C2 (4.75 cm; 3.76 cm; 52.48 cm² and 0.79), C3; (49.6 cm; 38.6 cm; 56.29 cm² and 0.78) and C4 (51.6 cm; 4 cm; 60.20 cm² and 77.33). No significant differences (P>5%) were found between the means of the parameters (length, large diameter and surface area) in the same egg weight category. Except for the shape index parameter (If), which differed significantly within the same egg weight category. However, we found significant differences (P<5%) between the mean values of the parameters in the different egg weight categories (C1, C2, C3 and C4) for all guinea fowl varieties. The mean values of the parameters are presented in Table 1.

Table 1. Egg measurements by weight category for three local guinea fowl varieties

Parameters	C1 [30-35g]			C2 [35-40g]			C3 [40-45g]			C4 [45-50g]			Mean
	GP	BL	PB	GP	BL	PB	GP	BL	PB	GP	BL	PB	
W (g)	32.9± 1.4^{a}	33.03± 1.23^{a}	33.62± 1.6^{a}	37.71± 1.37^{b}	37.64± 1.28^{b}	37.69± 1.16^{b}	41.61± 1.16^{c}	41.63± 1.37^{c}	42.29± 1.23^{c}	46± 1.73^{d}	46± 1.05^{d}	46.92± 1.17^{d}	36.29
Lg (cm)	4.65± 0.21^{a}	4.52± 0.16^{a}	4.59± 0.12^{a}	4.73± 0.12^{b}	4.78± 0.14^{b}	4.74± 0.13^{b}	4.93± 0.14^{c}	4.97± 0.14^{c}	4.98± 0.15^{c}	5.16± 010^{d}	5.15± 0.13^{d}	5.18± 0.16^{d}	4.86
Gd (cm)	3.55± 0.07^{a}	3.59± 0.07^{a}	3.61± 0.08^{a}	3.78± 0.07^{b}	3.75± 0.07^{b}	3.74± 0.08^{b}	3.87± 0.07^{c}	3.86± 0.08^{c}	3.87± 0.08^{c}	3.99± 0.08^{d}	4.03± 0.21^{d}	3.98± 0.06^{d}	3.80
SI	0.77± 0.04^{a}	0.79± 0.03^{b}	0.79± 0.02^{b}	0.79± 0.02^{b}	0.79± 0.03^{b}	0.79± 0.03^{b}	0.79± 0.03^{b}	0.78± 0.03^{ab}	0.78± 0.03^{ab}	0.77± 0.02^{a}	0.78± 0.05^{ab}	0.77± 0.03^{a}	0.78
SA (cm²)	47.97± 1.42^{a}	48.10± 1021^{a}	48.64± 1.56^{a}	52.50± 1.27^{b}	52.42± 1.19^{b}	52.51± 1.08^{b}	56.12± 1.02^{c}	56.09± 1.23^{c}	56.68± 10^{c}	59.94± 1.49^{d}	59.95± 091^{d}	60.72± 1.03^{d}	54.30

a. b. c and d: Means followed by different letters within the same line are significantly different at the threshold of 5 %; GP: grey pearl guinea fowl; BL: white guinea fowl; PB: white breast guinea fowl; W: weight; Lg: length; Gd: great diameter; IS: shape index; Sf: surface area; C1 to C4: weight categories - Significant at the 5% level ($P < 0.05$)

Table 2. Monitoring egg incubation parameters for three local guinea fowl varieties

Parameters	White guinea fowl (BL)				Grey pearl guinea fowl (GP)				White breast guinea fowl (PB)				Mean
	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	
Number of eggs incubated	90	90	90	90	90	90	90	90	90	90	90	90	90
TF(%)	68.88	71.11	90	80	80	72.22	73.33	76.66	85.55	74.44	78.88	75.55	77.22
EMR(%)	12.9	9.37	3.7	5.55	13.88	7.69	6.06	2.9	16.88	8.95	8.45	5.88	8.52
IMR (%)	27.42	23.43	18.52	13.38	26.38	18.46	16.66	15.94	22.07	17.91	14.08	13.24	18.96
AHR(%)	41.11	47.77	70	64.44	47.78	53.33	56.66	62.22	52.22	54.44	61.11	61.11	56.02
RHR(%)	59.67	67.19	77.77	80.55	59.72	73.84	77.27	81.16	61.04	73.13	77.46	80.88	72.47
HWh (g)	19.25	24.8	27.2	28.75	21.75	25.5	28.18	29.75	20.83	26	28	30.33	25.86

C1 to C4: weight categories (C1 [30-35g]; C2 [35-40g]; C3 [40-45g]; C4 [45-50g]); TF: Fertility rate; EMR: Rate of mortality in embryos; IMR: Rate of mortality inside the eggshell; AHR: Apparent hatching rate; RHR: Real hatching rate; HWh: hatching weight

Relation between egg weight and incubation parameters in three varieties of local guinea fowl

Incubation parameters included fertility rate (FR), embryo mortality rate (EMR), intra shell mortality rate (IMR), actual hatch rate (AHR) and apparent hatch rate (AHR) (Table 2). The average fertility rate was 77.22% for all eggs studied. In white guinea fowl, the highest fertility rate was observed in weight category C3 (90%) and the lowest in category C1 (68.88%). For pearl grey, the highest rate was observed in category C1 (80%) and the lowest in category C2 (72.22%). For the white-breasted guinea fowl, the highest fertility rate was observed in weight category C1 (85.55%) and the lowest in category C2 (74.44%). The embryo mortality rate (EMR) was higher in the lowest egg weight category (C1) for all guinea fowl varieties as compared to the other categories. They were respectively: BL (C1: 12.9%); GP (C1: 13.88%); PB (C1: 16.88%). The lowest percentages of intra-shell mortality (IMR) were observed in the highest egg weight category (C4) for all varieties (from 13.24% to 15.94%). They increased progressively in the lower weight categories.

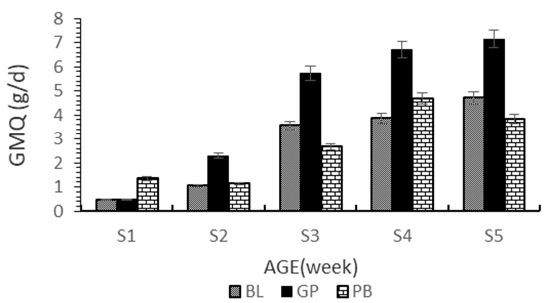
Relation between egg weight and the average hatching weight of guinea fowl chicks from different varieties

The mean hatch weights of guinea fowl chicks in the different egg weight categories for the different varieties studied are shown in Table 3. Mean hatch weights for the same egg weight categories did not differ significantly (P>5%) between the guinea fowl varieties. However, significant differences (P<5%) were observed in the hatch weights of guinea fowl chicks from different egg weight categories. However, the hatching weights of guinea fowl chicks from C3 and C4 egg weight categories of GP and BL guinea fowl varieties were not significantly different (P>5%).

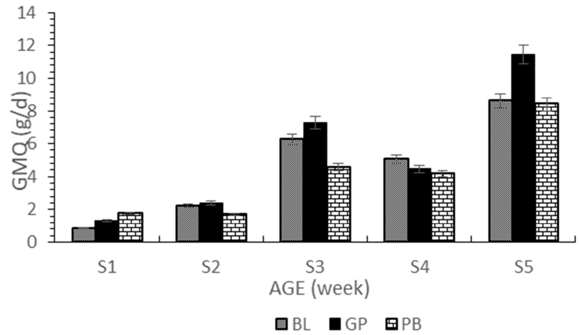
Table 3. Monitoring guinea fowl weight growth by egg weight category in three local guinea fowl varieties

AGE	White guinea fowl (BL)				Grey pearl guinea fowl (GP)				White breast guinea fowl (PB)			
	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
Wh0	19.2± 1.09^{a}	24.8± 1.81^{b}	27.2± 2.35^{c}	28.7± 3.50^{c}	21.75± 3.30^{a}	25.5± 1.35^{b}	28.4± 1.71^{c}	29.75± 0.96^{cd}	20.83± 2.13^{a}	26± 2.40^{b}	28± 0.82^{c}	30.33± 1.86^{c}
W1	22.66± 2.52^{a}	30.6± 1.78^{b}	30.9± 3.21^{b}	38± 3.85^{d}	25.25± 3.1^{a}	34.6± 2.27^{c}	31.3± 2.40^{b}	38.5± 1.91^{d}	30.29± 4.03^{b}	38.4± 2.91^{d}	42.6± 3.27^{d}	41.6± 5.59^{d}
W2	30± 02^{a}	46.2± 4.49^{c}	48.6± 7.42^{cd}	56± 4.41^{de}	41.33± 1 .25^{bc}	51.5± 5.08^{d}	52.4± 4.50^{d}	49.75± 7.54^{cd}	38.14± 5.11^{b}	50.4± 2.32^{d}	52.5± 2.59^{d}	60.5± 8.17^{e}
W3	55± 05^{a}	90.15± 15.63^{c}	92.1± 23.25^{c}	99.38± 13.78^{d}	81.5± 0.4^{b}	102.5± 12.01^{d}	83.3± 10.90^{c}	99.5± 11.44^{d}	56.86± 8.93^{a}	82.6± 9.33^{c}	96± 11.38^{cd}	104± 10.29^{d}
W4	82± 5.5^{a}	125.6± 25.65^{bc}	139.4± 30.66^{c}	145.75± 16.28^{d}	128.5± 2.85^{c}	133.7± 12.34^{c}	139.5± 12.03^{c}	162.75± 22.12^{d}	89.71± 17.31^{a}	110.40± 13.08^{b}	116.3± 7.43^{b}	129.5± 21.18^{e}
W5	115± 05^{a}	186± 14.30^{b}	206± 30.25^{c}	226.25± 27.22^{c}	178.5± 1.22^{b}	214± 24.58^{c}	194± 17.76^{bc}	240± 58.31^{c}	116.71± 29.38^{a}	170.6± 22.82^{b}	174.6± 19.42^{b}	212.5± 14.79^{c}
W5 (C1-C4)	183.31± 34.15				206.62± 20.37				168.6± 25.94			

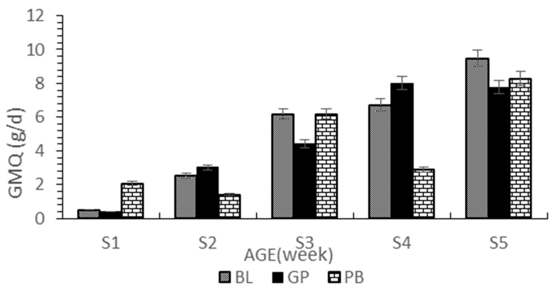
C1 to C4: weight categories (C1 [30-35g]; C2 [35-40g]; C3 [40-45g]; C4 [45-50g; Wh0: Average initial live weight; W: Week



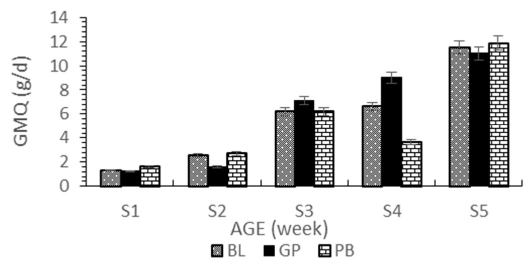
A: Weight category C1



B: Weight category C2



C: Weight category C3



D: Weight category C4

Fig. 2A-D. Growth rate of guinea fowl in weight category C1 to C4 in different guinea fowl varieties

Relation between egg weight and the weight growth of guinea fowl chicks from different varieties

The average weight of guinea fowl chicks is presented in Table 3. A progressive change in the weight of guinea fowl by age was observed, with significant dominance (P<5%) individuals from higher egg-weight categories. The experiment resulted in pearl gray guinea fowl from different egg weight categories having a higher average live weight (206.62±20.37g) than white guinea fowl (183.31±34.15g) and white breasted guinea fowl (168.6±25.94g).

Relation between egg weight and the growth rate (GMQ) of guinea fowl chicks from different varieties

Overall, growth rate significantly increased (P<5%) with both guinea fowl age and egg weight across all studied varieties. Fig. 2 displays the growth rates of guinea fowl in different varieties for each egg weight category. At the end of the study, the pearl grey variety of guinea fowl achieved almost a higher average GMQ in each of the egg weight categories.

(C1:4.47g/d; C2:5.38g/d; C3:4.72g/d; C4:6g/d) compared to the other two varieties, which exhibited comparable average GMQ. They obtained average egg weight category GMQ (C1 to C4) of 2.74 g/d, 4.6 g/d, 5.1 g/d, and 5.6 g/d for white variety and 2.74 g/d, 4.12 g/d, 4.18 g/d, and 5.20 g/d for white-breasted variety. However, there was no significant difference (P > 5%) reported between these GMQ values.

Relation between egg weight and the mortality rate (%) of guinea fowl chick from varieties

The mortality (22.38%) of the guinea fowl chicks was recorded only during the first two weeks of rearing when following the animals (from 0 to 5 weeks). For each variety, the lowest mortality rate of 12.06% was recorded for guinea fowl of pearl grey variety, followed by 22.07% and 30.66% for white breast and white varieties, respectively. The guinea fowls in the C1 egg weight category had the highest mortality rates for each variety. These rates were 25%, 66.66% and 50% for pearl grey, white breast and white varieties, respectively.

Discussion

Eggs in weight category C2[35-40g] were the most numerous in each guinea fowl variety. This could be related to a natural selection of eggs to obtain guinea fowls of medium performance. These results are in agreement with those of Sanfo *et al.* (2007) and Sanou (2005) in Burkina Faso, who obtained occurrence rates of 49.8% and 51.9% respectively for the 35-40g weight categories. The mean weight of all incubated eggs was 39.75g, which exceeds the mean weights of 37.3g and 37.7g documented by Sanfo *et al.* (2017) and Dahouda *et al.* (2008), respectively, for locally raised guinea fowl under an enhanced setup.

This variation in weight is associated with the diminutive size of eggs observed in their research. Additionally, this mean weight is similar to that of common guinea fowl (40.78 g) and Bonaparte guinea fowl (38.77 g) reported by Houndonougbo *et al.* (2014) in Benin.

The mean values for egg length, large diameter, and surface area for incubated eggs are 4.86 cm, 3.8 cm and 54.30 cm² respectively. These values are higher than those reported by Sanou (2005) in Burkina (4.76cm for egg length, 3.73cm for large diameter, and 52.6 cm² for surface area). However, they are lower than those reported by Ahaotu *et al.* (2019) in Nigeria (5cm for egg length, 4cm for large diameter, and 52.6 cm² for surface area). The averages of egg length and large diameter observed in pearl grey guinea fowl and white guinea fowl are similar to those reported by Houndonougbo *et al.* (2014). Length and large diameter values recorded for pearl grey and white guinea fowl were 4.91 cm/3.8 cm and 4.9 cm/3.86 cm, respectively. Furthermore, our mean values for both varieties were higher than those obtained by Onunkwo *et al.* (2015) in Nigeria (pearl grey guinea fowl: Lg 4.52 cm, Gd 3.59cm). Differences in environmental factors and rearing conditions could account for these variances.

The size of the eggs had no significant impact on their fertility rate. The egg fertility rates of the three guinea fowl varieties were similar: white (77.50%), white-breasted (79.02%) and pearl grey (75. 80%). However, our study found lower average fertility rates of 74.53% compared to rates reported by Sanou (2005), Sanfo *et al.* (2007), and Sanfo *et al.* (2012) in Burkina Faso, which were 92.8%, 84%, and 82.7%, respectively. Additionally, this rate is similar to rates reported by Saveur (1988) and Sanfo *et al.* (2017), who found average rates of 72.5% and 70.3% respectively. Differences between our findings and those of these authors may be due to variations in rearing conditions and sex ratios employed. The sex ratio of 1 male to 5 females in our study is consistent with an intensive guinea fowl rearing system. This reduces fighting between males and could reduce egg fertility compared to an extensive rearing system (1 male to 1 or 2 females). However, this egg fertility rate is acceptable for local guinea fowl in our region and could be improved by further research into appropriate rearing conditions for these animals.

For each variety, the embryo mortality rate followed the trend reported by Sanfo *et al.* (2007). Their findings showed a decrease in embryo mortality rate as egg weight increased, with a reduction of 27.5% and 11.9% observed in the egg weight categories ranging from 25-30g to 45-50g, respectively. This result could be related to the difficult conditions under which the eggs were transported to the hatchery. Our eggs were transported by motorcycle on an unsealed road. Movement during transport can have a negative effect on the internal structure of the eggs. However, in Togo, Kouame *et al.* (2019) have shown that prolonged egg storage increases embryo mortality and significantly reduces hatchability.

It was also found that the hatching rate influence egg weight in the three local guinea fowl varieties examined. According to Sanfo *et al.* (2017), there exists a positive correlation between egg weight and hatching rate. The increased hatch rate of larger eggs may be attributed to their higher surface area and larger yolk reserve (Moreki and Mothei, 2013). The hatching rate average (72.47%) was higher than that reported by Dahouda *et al.* (2008) in Benin (65.7%) and by Kuit *et al.* (1996) in central Mali (44%). However, it was similar to the 74.15% rate reported by Lombo *et al.* (2011) in Togo. The observed variations in hatching rates may be attributable to several factors such as season, storage conditions, and egg transport. Sodjedo *et al.* (2022) found that incubating eggs during the rainy season yielded better incubation parameters compared to those incubated during the dry season. Additionally, hatchability rates were negatively impacted by prolonged storage periods of eggs (Kouame *et al.*, 2019).

The hatch weights of guinea fowl were significantly higher for pearl grey (26.35g) and white breasted (26.34g) varieties compared to white guinea fowl (24.97g) across all egg weight categories. The average weight of all guinea fowl studied was 25.88g, which is consistent with the value of 25.6g reported by Sanfo *et al.* (2017). Guinea fowl weight increased significantly ($P<5\%$) with egg weight for each variety. This observation was confirmed by Sanfo *et al.* (2017) in Burkina Faso. They demonstrated a positive correlation ($r=0.96$) between the weight of guinea fowl and the weight of their eggs.

The average live weight of guinea fowl of the different guinea fowl varieties studied increased significantly ($P<0.05$) with egg size. According to Sanfo *et al.* (2007), the average live weight of guinea fowl at typical ages is influenced by the egg weight category. This weight remains higher in guinea fowl from heavy eggs. The average live weight of pearl grey guinea fowl (206.62g) for all categories is higher than the live weights of white guinea fowl (183.25g) and white breasted guinea fowl (168.60g). This difference in live weight could be linked to the genetic variability between these varieties. In general, for all the varieties studied, growth rate increased significantly ($P<0.05$) with egg weight and guinea fowl age.

However, growth rates in the C2 and C3 egg weight categories were almost similar. The inequality in the average weight of the guinea fowl at hatching would appear to be at the origin of this observation. It would therefore be important to consider the 'egg weight' criterion in improving the growth performance of local guinea fowl. This assertion was confirmed by Ayorinde (2004), who also pointed out that this criterion could be used in genetic selection operations.

During animal monitoring in the initial period (from 0 to 5 weeks), it was observed that guinea fowl experienced mortality during the first two weeks of rearing. Ayorinde (1991) suggests that guinea fowl (irrespective of genetic groups) have the highest mortality rate during the first six weeks of rearing. The GP variety had the lowest mortality rate of 12.06%, while the PB and BL varieties had rates of 22.07% and 30.66% respectively. The guinea fowls with egg weights in the C1 category had the highest mortality rates for each variety. The criteria of egg weight and guinea fowl variety could be one of the necessary solutions to reduce the mortality rate of guinea fowl in family and large-scale farms.

Conclusion

This experiment revealed that the egg weights of the different guinea fowl varieties studied varied from 30g to 50g, but they had the same characteristics in each of the weight categories ((C1 [30-35g]; C2 [35-40g]; C3 [40-45g]; C4 [45-50g]). The maximum number of eggs collected was noted in the 35-40g weight category for each of the varieties. In each of these varieties, the egg weight category did not influence the fertility rate, but the hatching rate increased with the egg weight. The average hatch weight was higher for guinea fowl hatched from heavier eggs. These also recorded the best growth performance. Among these, the guinea fowl of the pearl grey variety performed better than the other varieties, both in terms of weight growth and resistance. This study therefore confirms the effect of egg weight on guinea fowl reproduction and the need to select a more resilient variety for optimum production.

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References

Agwunobi LN, Ekpenyong TE. 1990. Nutritive and economic value of guinea fowl (*Numida meleagris*) production in developing countries. Journal of the Science of Food and Agriculture **52**(3), 301–308. https://doi.org/10.1002/jsfa.2740520303

Ahaotu EO, Nwafor C, Onyebuchukwu PA, Okpara O. 2019. Carcass, organ weights, and egg quality characteristics of guinea fowl layers fed varying levels of butterfly pea leaf (*Centrosema pubescens*) meal. Sustainability, Agriculture, Food and Environmental Research **7**(1), 37–51. http://dx.doi.org/10.7770/safer-V0N0-art1658

Ayorinde KL. 1991. Guinea fowl (*Numida meleagris*) as a protein supplement in Nigeria. World's Poultry Science Journal **47**(1), 21–26. https://doi.org/10.1079/WPS19910003

Ayorinde KL. 2004. The spice of life. The seventy-first inaugural lecture: University of Ilorin.

Dahouda M, Senou M, Toleba SS, Boko CK, Adandedjan JC, Hornick JL. 2008. Comparaison des caractéristiques de production de la pintade locale (*Numida meleagris*) en station et dans le milieu villageois en zone soudano-guinéenne du Bénin. Livestock Research for Rural Development **20**(12). http://www.lrrd.org/lrrd20/12/daho20211.htm

FAO. 2008. Revue de secteur avicole ivoirien. P. 77.

Houndonougbo PV, Chrysostome AA, Houndonougbo FM, Hedi A, Bindelle J, Gengler N. 2014. Évaluation de la qualité externe et interne des œufs de cinq variétés de pintades locales élevées au Bénin. Revue CAMES **2**(2), 42–47. http://publication.lecames.org/index.php/svt/article/view/263/282

King'ori AM. 2011. Review of the factors that influence egg fertility and hatchability in poultry. International Journal of Poultry Science **10**(6), 483–492. https://www.researchgate.net/publication/286738636

Koné GA, Kouassi GF, Kouakou ND, Kouba M. 2018. Diagnostic of guinea fowl (*Numida meleagris*) farming in Ivory Coast. Poultry Science **97**(12), 4272–4278. https://doi.org/10.3382/ps/pey290

Kouamé YA, Nideau D, Kouakou K, Tona K. 2019. Effect of guinea fowl egg storage duration on embryonic and physiological parameters, and keet juvenile growth. Poultry Science **98**(11), 6046–6052. https://doi.org/10.3382/ps/pez264

Kuit HG, Traoré A, Wilson RT. 1986. Livestock production in Central Mali: Ownership, management, and productivity of poultry in the traditional sector. Tropical Animal Health and Production **18**, 222–231. https://doi.org/10.1007/BF02359538

Lombo Y, Dao BB, Ekoue K. 2011. Élaboration d'un itinéraire technique d'élevage de pintadeaux adapté en élevage familial au Togo. Neuvième Journées de la Recherche Avicole, Tours, 29 et 30 mars 2011, p. 5. https://cabidigitallibrary.org/doi/full/10.5555/20113368815

Mishra S, Kataria JM, Sah RL, Verma KC, Mihra JP. 2002. Studies on the pathogenicity of Newcastle disease virus isolate in guinea fowl. Tropical Animal Health and Production **33**, 313–320. https://doi.org/10.1023/A:1010588003281

Moreki JC, Mothei KM. 2013. Effect of egg size on hatchability of guinea fowl keets. International Journal of Innovative Research in Science, Engineering and Technology **2**(10). https://citeseerx.ist.psu.edu/

Nwagu BI. 1997. Factors affecting fertility and hatchability of guinea fowl eggs in Nigeria. World's Poultry Science Journal **53**(7), 279–286. https://doi.org/10.1079/WPS19970022

Onunkwo DN, Okoro IC. 2015. Predicting egg quality and egg production traits using egg weight and body weight respectively in three varieties of helmeted guinea fowls in humid tropics. International Journal of Livestock Research **5**(3), 111–121. http://dx.doi.org/10.5455/ijlr.20150329124016

RGPH. 2014. Recensement Général de la Population et de l'Habitat (Côte d'Ivoire): Résultats globaux, p. 25.

Sanfo R, Boly H, Sawadogo L, Brian O. 2012. Performances de ponte et caractéristiques des œufs de pintade locale (*Numida meleagris*) en système de conduit améliorée dans la région centre du Burkina Faso. Revue d'Élevage et de Médecine Vétérinaire des Pays Tropicaux **65**(1–2), 25–29. https://doi.org/10.19182/remvt.10129

Sanfo R, Boly H, Sawadogo L, Ogle B. 2007. Caractéristiques de l'élevage villageois de la pintade locale (*Numida meleagris*) au centre du Burkina Faso. Tropicultura **25**(1), 31–36.

Sanfo R, Traoré F, Yougbare B, Ouali W. 2017. Effect of the egg weight of guinea fowl (*Numida meleagris*) on growth and reproduction parameters of chicks in Burkina Faso. Revue d'Élevage et de Médecine Vétérinaire des Pays Tropicaux **70**(4), 121–125. https://doi.org/10.19182/remvt.31527

Sanou LC. 2005. Caractéristiques des œufs de la pintade locale (*Numida meleagris*) et leurs relations avec les paramètres d'incubation, la croissance et la viabilité des pintadeaux. Mémoire de fin d'études, Université de Ouagadougou, Burkina Faso, p. 77.

Sauveur B. 1988. Reproduction des volailles et production d'œufs. INRA, Paris, p. 449. https://hal.science/hal-00895931

Sodjedo C, Pitala W, Laré L, Lombo Y. 2022. Effect of the season and the sex ratio on the laying performance and on the reproduction performance of indigenous guinea fowl (*Numida meleagris*) in South Togo. Journal of Animal & Plant Sciences **52**(2), 9503–9511. https://doi.org/10.35759/JAnmPlSci.v52-2