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Research Article

PRODUCTION CHARACTERISTICS OF SAHEL AND MIDWEST ECOTYPES OF GUINEA FOWLS OF BURKINA FASO

Kalo OUATTARA[1]., Ollo Chérubin HIEN*[2]., Boureima DIARRA[1]., Salomon BOUDA[1] and Gaston Marie Adrien BELEM[1]

[1]Département Elevage, IDR, Université Nazi Boni (ex Université Polytechnique de Bobo-Dioulasso) 01 BP 1091 Bobo-Dioulasso 01, Burkina Faso
[2]IN.E.R.A. / Farako-Bâ, 01 B.P. 910 Bobo-Dioulasso 01, Burkina Faso

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A B S T R A C T

The objectives of this study were to assess the production potentials of the ecotypes of guinea fowls of the Sahel and Midwest regions of Burkina Faso.
Therefore, 400 eggs were collected from both regions, sorted and incubated. Ninety (90) individuals of each ecotype were followed for 28 weeks at an agricultural experiment station.
The results showed that the Sahel ecotype has values higher for weight of the collected eggs (41.8 vs. 37.9 g), large diameter (3.9 vs. 3.8 cm), chick hatching weight (27.6 vs. 24.2 g) and live weight at 28 weeks of age (1304.9 vs. 1245.1 g).Daily feed consumption and average daily gain were not significantly different between ecotypes. Age at first oviposition appeared 5 weeks earlier in the Midwest ecotype (17 vs. 22 weeks). Eggs of the Sahel ecotype were relatively heavier (31.0 vs. 30.1 g). Gizzard yield was higher in the Midwest ecotype (1.9 vs. 1.5%). Compare to the Sahel ecotype of guinea fowl, that of the Midwest is characterized by an earlier onset of egg-laying, a weight gains fasterduring the first 20 weeks butslower thereafter.

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INTRODUCTION

In poultry farming, the breeding part of the guinea fowl is of particular importance. Native to Africa, where it still lives in the wild in some areas, the guinea fowl (*Numida meleagris*) is one of the most domesticated species in Africa. In West Africa, it is the most abundant avian species after chicken (FAO, 2006).

Poultry farming provides food, meat and income and is an easily accessible activity to rural families in Burkina Faso. This activity occupies 80% of the population (MRA , 2007 : Ministère des Resources Animales. Diagnostic de la sous filière de l'aviculture traditionnelle au Burkina Faso. Rapport final). Ninety-five percent (95%) of poultry products come from traditional poultry production, 20% of which originates from guinea fowl (DGPSE, 2009:Direction Générale de la Prévision et des Statistiques de l'Élevage. Ministère des Ressources Animales, Burkina Faso). The expansion of guinea fowl breeding is linked to its meat and eggs which are popular within the population and have been recommended to address protein deficiency due to its short breeding cycle.

Corresponding author:* **OlloChérubin HIEN
IN.E.R.A. / Farako-Bâ, 01 B.P. 910 Bobo-Dioulasso 01, Burkina Faso

A selection program is undertaken on the populations of guinea fowls breeds in Burkina Faso. The overall objective is to acquire a better knowledge of the ecotypes in view of their preservation and their genetic improvement. The objectives of this study were to assess the production potentials of the ecotypes of guinea fowls of the Sahel and Midwest regions of the country.

MATERIALS AND METHODS

Sites of experiment

Figure 1 shows the areas of egg collection and the sites of guinea fowl farm. Eggs were collected in the north zone of the Sahel region and in the north zone of the Midwest region. The choice of the zones in each region was based on the abundance of guinea fowls. The test on the rearing productivity of the ecotypes was conducted at the Farako-Bâ station of the Institute of Environment and Agricultural Research.

Located in the extreme north of Burkina Faso, the Sahel region is an area characterized by low rainfall (less than 400 mm) and annual shrub and thorny steppes. The Midwest region is characterized by the northern sudanian climate with an average rainfall varying between 600 and 1000 mm per year and the south sudanian climate with an average rainfall of more than 1000 mm year. The vegetation consists of savannah types of shrubs and woods and of light forest galleries (MEF, 2009:

Ministère de l'Economie et des Finances. MonographiedelarégionduCentre-Ouest.RGPH-2006).

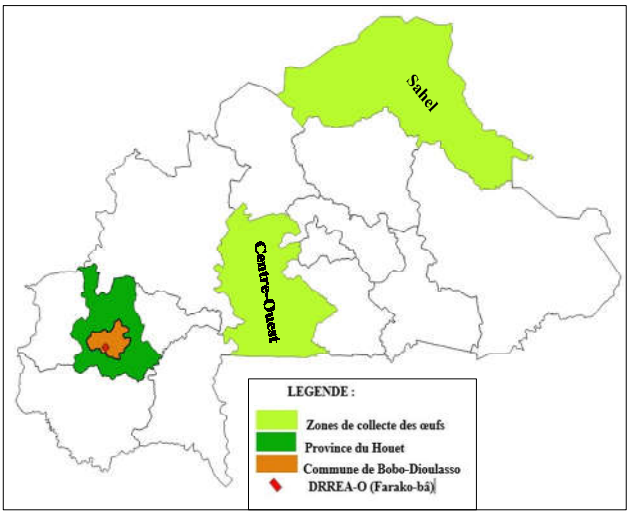

Figure 1 Geographical locations of Sahel, Midwest and Houet Provinces of Burkina Faso

The station of Farako-Bâ, located 10 km from the town of Bobo-Dioulasso (Houet Province), longitude 4 ° 20 'west, latitude 11 ° 06' north and altitude 405 m,is in the southsudanian zone. The climate is sudano guinean with a dry season from November to May and a rainy season from May to October. The average annual rainfall is between 900 and 1200 mm. The vegetation is a grassy savanna with dense trees.

Eggs' collection

Two hundred (200) eggs were collected from breeders in each region. These eggs had a maximum storage duration of seven (07) days in relation to their laying time. They were packed in cardboard boxes and then transported by road to the station. They were sorted and selected around average meaningful weights and dimensions for each ecotype.

Rearing

Poultry houses: A building consisting of four pens with an area of 17.8 m2 each sheltered the birds. The building was disinfected and kept empty space 10 days prior to the introduction of the animals. A footbath containing a disinfectant was installed at the entrance of each pen to limit the introduction of germs. The waterers were washed daily with soap and rinsed with water. The feeders were washed and disinfected every week. The rice hulls bedding was renewed every four (4) weeks.

At hatching, the chicks of each region were housed in a chicken coop. The soil density of the chicks was 40 / $m^2$from 0 to3 weeks of age and 20 / $m^2$from 3 to 6 weeks.At 12 weeks, all subjects were individually labeled with wing rings. After identification the guinea fowls of each region were then divided into two (02) batches at a rate of 3.2 / m^2.At 13 weeks, perches were installed in each pen to give more comfort to the animals. All birds were individually weighed every 2 weeks at 08H00.

***Prophylactic measures*:** The chronogram of onset of disease in guinea fowl, established by FAO (1992) and re-adapted by Hien *et al*. (2009) and Diallo (2016) served as a reference for the design of the medical prophylaxis program consisting essentially of vaccines, antibiotics, vitamins, internal deworming agents and anticoccidial agents.

Heating: Heating was done using a coal furnace and 6 - 60-wattlight bulbs in each chicken coop. The furnaces were removed after 30 days and the lamps interrupted at 42 days of age. The temperature was monitored using a thermometer in eachpen.

Feeding: Feed was weighed and served *ad libitium* every day at 07H00. Water was available all time. First age and adult feeders and waterers were used when appropriate. Guinea fowls were fed according to their developmental stages. The ingredients and nutritional composition of the diets are shown in table 1.

***Measured parameters*:** Eggs were weighed using an electric scale with 1g precision. Lengths and large diameters were measured with a caliper.Fertilitywas calculated as number of fertile eggs x100/ number of eggs incubated; apparent hatchability as number of hatched eggs x 100/ number of eggs incubated; true hatchabilityas number of hatched eggs x 100/ number of fertile eggs; embryo mortality as number of dead embryosx100/ numberof fertile eggs; in shell mortality asnumber of chicks dead in shell x 100 / number of fertile eggs.

Table 1 Ingredients and nutrient composition of the rations

	Starter		Growth
	0 to 10 days	10 to 56 days	57 to 196 days
	Ingredients, %		
Galdus[1]	100%	0.0	0.0
Maize		53.7	66
Fish meal		9.5	7
KLC 5[2]		5.5	3
Oyster shell		1.5	4
Roasted soybeans		14	8
Wheat bran		15.5	11.7
Iodized salt		0.3	0.3
Total		100	100
	Nutrients concentration		
ME (kcal/kg)	3150	2900	2909
Protein (%)	22	20.14	16
Lysine (%)	1.3	0.84	0.71
Methionine (%)	0.6	0.45	0.32
Methionine + Cyst (%)	0.95	0.64	0.55
Calcium (%)	0.95	1.23	1.96
Phosphorus (%)	0.60	0.85	0.67

[1]Galdus: Industrial feed
[2]KLC: Koudis layer concentrate

***Mortality*:** In case of mortality, the date of death and some main symptoms were recorded.Feed consumption, growth rate and laying parameters were also measured.

RESULTSAND DISCUSSION

Eggs collected in the regions

Egg size: Average weight of the eggs collected in the different regions was about 39.9 g. Coefficients of variations of egg parameterswithin each ecotype were small and similar, about 4% or less for egg length and large diameter and about 8 and 10% respectively for egg weight and hatching weight (table 2), mainly due to the egg calibration. However, compared to Midwestern eggs, those collected in the Sahel had values higherby 0.6, 2.4, 10.5 and 14.2% respectively for length,

diameter ($p < 0.05$), weight ($p < 0.05$) and chick hatching weight ($p < 0.05$).

Table 2 Measurementsand hatchability of eggs collected in the Sahel and the Midwest of Burkina Faso

	Sahel n = 200	Midwest n = 200	Average n = 400	P
	---------- Egg measurements ----------			
Length, cm	4.8 ± 0.2[a]	4.8 ± 0.2[a]	4.8 ± 0.2	NS
large diameter, cm	3.9 ± 0.1[a]	3.8 ± 0.2[b]	3.8 ± 0.1	***
Weight, g	41.8 ± 3.5 [a]	37.9 ± 3.1[b]	39.9 ± 3.3	***
Hatching weight, g	27.6 ± 2.6[a]	24.2 ± 2.7[b]	25.9 ± 3.2	***
	---------- Hatchability, % ----------			
Fertility	82.1[a]	74.2[b]	78.1	
Apparent hatchability	80.1	87.9 [a]	84.0	
True hatchability	65.8[a]	65.3[a]	65.5	
Embryos mortality	7.7 [a]	4.3 [b]	6.0	
Shell mortality	12.8 [a]	7.8[b]	10.3	

[a, b]: values on the same line bearing different superscripts differ significantly; NS = not significant (P > 0.05); *** = (p < 0.001); n = number of observations

Sanfo *et al*. (2015) also found that the eggs of guinea fowl of the Sahel are larger and heavier than those of the Center of the country. Earlier studies had reported that egg length is not well correlated with weight but that hatching chick weight isstrongly correlated with egg weight (Sanou, C.L., 2005; Diallo, C.S., 2016: Mémoiresd'ingénieur dudéveloppement rural. Institut du Développement Rural, Universté Polytechnique de Bobo-Dioulasso, Burkina Faso). *Hatching Performance:* Fertility of Sahel eggs was found higher ($p < 0.05$), 82.1vs.74.2% for the Midwest eggs (table 2). Although apparent hatch ability was found higher ($p < 0.05$), for the Midwest eggs, 87.9 vs. 80.1%, the true hatching ratewas similar between the two regions, about 65.5%. Embryos and in shell mortality of Sahel eggs respectively,7.7 and 12.8% were respectively higher by 79.1 and 64.1% than those of the Midwest.Contrary to our result, kyere *et al*. (2017) had reported that eggs weighing 23- 39 ghad lower hatch ability(37.9%) than eggs weighing 40-42g (50.5%).

The Fertility rates of our study are lower than the of 87.3%; and 86.7% reported respectively by Sanou (2005) and Diallo (2016)probably due to a storage time longer than10 days or inadequate transport conditions which can cause shocksor micro-cracks. Shocks canbreak the chalazaes that maintain the yolk in the center of the egg while micro-cracks permit entrance into the eggs of microbes that can kill the fetus (Yoda, S, 2011. Mémoired'ingénieur du développement rural. Institut du Développement Rural, Université Polytechnique de Bobo-Dioulasso, Burkina Faso). These situations increase embryo and in shell mortality, thereby reduce hatching rate of high fertility eggs as those of the Sahel eggs.

The average true hatchability obtained in this study (84.0%) is close to the 82.7% reported by Sanfo *et al*. (2007b), but higher than the 75.0 and 74.1% reported respectively by Saina (2005) in Zimbabwé (Saina, H.Masterthesis. University of Zimbabwe, Harare, Zimbabwe) in Zimbabwe and Lombo *et al*. (2011) in Togo (Lombo, Y., Dao, B., Ekoue,K.S. Neuvièmes Journéesdela RechercheAvicole, Togo).

Symptoms and mortality

Cases of lameness and legs paralysis were observed from the 8th day of age in the Midwest ecotype but 5 days later, on the 13th day in that of the Sahel. At week 4, cases of hard crop and anorexia were observed in all ecotypes. From the 18th week onwards, cases of picking were noted in both ecotypes.

During the 28 weeks, average mortality rate was11, 1%. The Sahel ecotype suffered a mortality rate of 10.4%, of which 7.2% related to diseases and 3.2% related to accidents. In the Midwest ecotype, the mortality rate was 11.8%, of which 6.8% related to accidents. Most of the mortalities occur within the first 8 weeks. Accidental mortalities were caused by trampling, smothering during weighing and ingestion of foreign bodies. The autopsy on the corpses revealed pieces of wood or thread in the crops and gizzards of some chicks.

Symptoms of lameness, hard jabs, pecking, ruffled feathers and plucking were also observed earlier by Dahouda (2009) in Benin (Dahouda, M.Thèsede doctorat en sciences vétérinaires. Université deLiège, France) and Savadogo (2013) in Burkina Faso (Savadogo, B. Mémoired'ingénieurdudéveloppement rural, Université Polytechnique de Bobo-Dioulasso, Burkina Faso).Mortality in guinea fowls have been so far very high in Burkina Faso; the average mortality rate of the 2 ecotypes (11.1%) during the 28 weeks was lower than the 21.0, 66.0, 13.2 and 50.0% respectively reported by Hien (2002), Lombo *et al*. (2011), Savadogo (2013) and Diallo (2016). A lower rate of 8.6% was reported by Sanfo *et al*. (2015) after 120 days of breeding. This could be due to the improvement of the comfort of the birds, namely to the supply of sugar in the drinking water, good quality guinea fowls' rations, maintenance of adequate brooding temperatures. All these other authors have cited cold temperatures and inadequate feed to be among the main causes of guinea fowl mortality.

Sexual maturity

Sexual behavior began at the 16th week of age in the Midwest ecotype. These behaviors were manifested by hunting between males and between males and females. The weakest were subjected to aggression by the other subjects. These assaults have led some to move away from feeders and drinking troughs. Some weak subjects were partially plucked and others severely injured by their fellows.

Feed Consumption

Individual daily feed consumption increased from the 1st to the 18th weeks of age, respectively from 10.2 to 79.0 g in the Midwest ecotype, and 9.3 to75.6 g in the Sahel. Average consumption over the whole experimental period (1st to the 28th week) were similar for the two ecotypes, 50.1 and 53.5 g respectively for the Sahel and Midwest ecotypes. However, the Midwest ecotype consumed more feed ($p < 0.01$) from the 5th to the 8th week of age, then from the 13th to the 18th week and also from the 23rd to the 24th week of age.

In guinea fowl, feed consumption increases with body weight (Kyere *et al* 2017). Agbolosu *et al*. (2012) reported that feed consumption in Ghana can reach 71.9 g/d at 18 week of age. Feed should be given into longer feeders so as to permit all birds to feed at the same time, that wouldavoid wastage due to the exited nature of this species (Savadogo, 2013). A palliative could be the manufacture of a guinea fowl type feeder equipped with guards.

Live weights

Hatchingweight of Sahel chicks were 14.0% heavier ($p < 0.001$), 27.6vs.24.2 g (table 3). The average weight of all hatching chicks (25.9g) is in the range of 22 to 26g obtained by other authors (Dahouda, 2009; Hien *et al*., 2009; Sanfo *et al*., 2015; and Kerketta and Mishra, 2016). Afterward,

individuals of the Sahel ecotypeweighed less between the 2nd to the 20th week, but more between the 24th to the 28th weeks, probably because emanating from heavier eggs**.**

Table 3 Age and weights of the Sahel and Midwest ecotypes of guinea fowls in Burkina Faso

Age, weeks	Ecotypes			
	Sahel	Midwest	Average	P
S_0	27.6 ± 2.6[a]	24.2 ± 2.7[b]	25.9 ± 3.2	***
S_2	103.8 ± 15.1[a]	104.1 ± 14.2[a]	103.9 ± 14.6	NS
S_8	390.6 ± 93.4[a]	452.8 ± 106.4[b]	420.43 ± 104.5	***
S_{12}	647.7 ± 123.2[a]	729. 4 ± 133.0[b]	686.82 ± 134.1	***
S_{16}	971.1 ± 112.0[a]	1049.4 ± 135. 6[b]	1010.2 ± 138.3	***
S_{18}	1060.1 ± 126.9[a]	1090.3 ± 149.3[a]	1075.1 ± 139.0	NS
S_{20}	1065.0 ± 123.9[a]	1072.4 ± 137.6[a]	1068.7 ± 130.6	NS
S_{24}	1215.9 ± 130.3[a]	1232.7 ± 145.9[a]	1224.3 ± 138.2	NS
S_{26}	1270.9 ± 128.9[a]	1246.0 ± 140.0[a]	1258.4 ± 134.8	NS
S_{28}	1304.9 ± 122.1[a]	1245.1 ± 129.5[b]	1275.0 ± 129.1	**

[a. b.:] values on the same line bearing different superscripts differ significantly; NS = not significant; NS: Not significant (P>0.05); * = (P<0.05); ** =(P<0.01); *** = (P<0.001)

According to Sklan *et al*. (2003) heavier chicks at hatch improves marketing body weight by enhancing skeletal muscle growth. For both ecotypes males weighed more than females during the first 20 weeks. Females overweight males sharply at the 21th week for the Midwestern ecotype but in a more lagging way from the 22th to the 24th week for the Sahel ecotype, age at which average weight for both sexes had reach 1.2kg. At the 28th week females were heavier (p <0.05) thanmales in the Sahel ecotype. Sanou (2005) and Diallo (2016) had also observed a higher weight of females as early as the 6th week of age. In a study by Dahouda *et al*. (2008) males and females weighed equally 1.1 kg at 6 months when nondewormed but 1.2kg when dewormed.

Variations in live weights comprise the influences of the environmental conditions specific to the region of the experiment station and those of the different egg collection zones. However, such phenomenon as heavier Sahel female weight at the 28th week has been attributed to genetic difference by Houndonougbo *et al*., (2014).

Coefficients of variation in the weights of birds of the two ecotypes followed the same trend from hatch to 28 weeks of age (Fig 2).

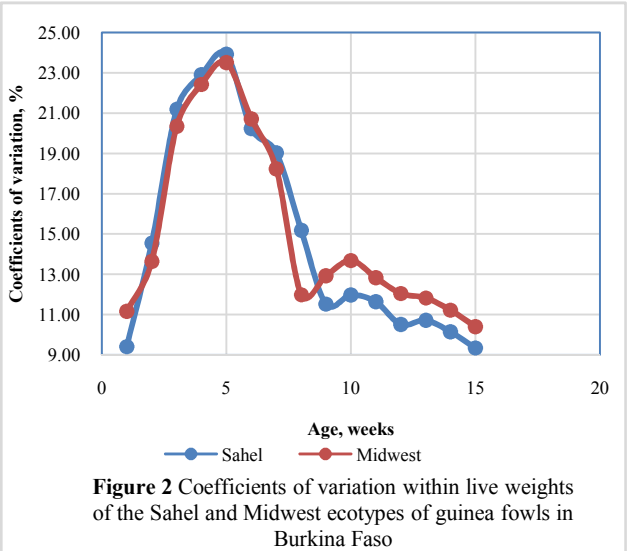

Figure 2 Coefficients of variation within live weights of the Sahel and Midwest ecotypes of guinea fowls in Burkina Faso

Values evolved in a quadratic manner, increasing first from 10% at hatch up to 24% at 8 weeks and then decreasing to 10% again at 28 weeks. The increases above 10% were likely due to differences in egg weights, the imprecision of the measures due the smaller size of the chicks and the excited state that is characteristic of the wild nature of guinea fowl. Decreases below 24% were probably due to the maturation and the decrease in the density of the birds. From the 12th to the 28th week, variations were generally higher in females than in males, respectively, 18.6 to 11.5% vs. 14.7 to 8.6% because variations fell below 10% for males of both ecotypes starting from the 22th week. They were also higher in Sahel birds than in Midwestern birds, respectively 18.1 to 9.7 vs.15.2 to 10.4%.It appears that selection for weight standardization in each ecotype can be done by selecting hatching eggs in a narrower weight range.

Table 4 Live weights of males and females of the Sahel and Midwest ecotypes of guinea fowls in Burkina Faso

Age, weeks	Ecotype				
	Sahel		Midwest		
	Male	Female	Male	Female	P
S14	871.2 ± 120.8[b]	809.5 ± 103.2[c]	953.9 ± 109.2[a]	912.5 ± 114.5[ab]	***
S16	995.7 ± 121.9[b]	935.4 ± 135.1[c]	1077.5 ± 116.4[a]	1020.8 ± 151.2[b]	***
S18	1079.7 ± 122.4[a]	1032.4 ± 129.4[a]	1114.0 ± 116.2[a]	1067.0 ± 177.5[a]	NS
S20	1084.1 ± 114.5[a]	1037.6 ± 133.3[a]	1095.2 ± 112.8[a]	1049.0 ± 159.5[a]	NS
S22	1160.3 ± 98.2[a]	1150.8 ± 152.1[a]	1167.6 ± 92.8[a]	1206.1 ± 181.4[a]	NS
S24	1213.9 ± 106.4[a]	1219.2 ± 160.8[a]	1215.8 ± 107.3[a]	1252.0 ± 178.4[a]	NS
S26	1253.8 ± 104.0[a]	1289.4 ± 165.6[a]	1230.3 ± 110.4[a]	1264.2 ± 166.2[a]	NS
S28	1277.6 ± 110.4[b]	1337.5 ± 143.2[a]	1237.1 ± 105.3[b]	1252.2 ± 153.4[b]	**

[a,b,c:] valueson the same line bearing differentsuperscripts differ significantly; NS = not significant (P > 0.05); ** = (P < 0.01); *** = (P < 0.001)

Table 5 Laying performance of females of the Sahel and Midwest ecotypes of guinea fowls in Burkina Faso

variables	Ecotypes		P
	Sahel	Midwest	
Age at first egg, week	22	17	-
Weight at first egg	1150.8 ± 152.6[a]	1043.9 ± 164.4[b]	***
Egg weight, g	31.1 ± 3.7[a]	30.1 ± 4.1[b]	**
Rate of lay, %	11.6 ± 3.7[a]	23.2 ± 19.3[b]	***

*a. [b.:] values on the same line bearing different superscripts differ significantly; NS = not significant (P > 0.05); ** = (P < 0.01); *** = (P < 0.001)*

Average daily gain: The ADG was similar between the Sahel and Midwest ecotypes, values were respectively 6.6 vs. 6.3 g. They are higher than the 3.8, 5.9 and 5 g obtained respectively by Sanfo *et al*. (2007b), Sanfo *et al*. (2008) and Sanfo *et al*. (2015), but lower than the 8.6 g observed by Saina (2005) on local guinea fowls reared in semi-intensive conditionsin Zimbabwe and much lower than the 16.8 to 18.7 g obtained by Teye *et al*. (2000) with the ISA ESSOR exotic strain reared in the guinean climate in Ghana.

Like in earlier studies (Hien *et al*., 2009 and Sanfo *et al*., 2015), females in this study had also higher ADG than males (5.3 vs. 4.6 g).

Yields of carcasses and organs

Yields of carcasses and organs refer to slaughter weights at 28 weeks (table 6). Yields of wings (10.0%) and liver (1.0%) were not influenced by ecotype and sex. Yields of carcass (75.7%), blood (3.6%), thigh (21.7%), legs (2.3%), and heart (0.6%) were influenced by sex but not by ecotype. The overall average carcass yield of 75.7% observed in this study was higher than the 71, 0 and 65.4% reported respectively by Dahouda (2009) and Ouédraogo (2016) (OUEDRAOGO, S. Mémoire d'ingénieur du développement rural, Université Polytechnique de Bobo-Dioulasso),

Table 6 Yields of carcasses and organs of males and females guinea fowls of the Sahel and Midwest ecotypes in Burkina Faso

Variables	Sahel Ecotype		Midwest Ecotype		Average (n=24)	Significance		
	M (n=6)	F (n=6)	M (n=6)	F (n=6)		E	S	E*S
Live weight, g	1183.0 ± 52.0^{ab}	1235.8 ± 128.4^{ab}	1141.0 ± 80.5^{b}	1252.5±78.0^{a}	1203.1 ± 94.5	NS	*	NS
Carcass yield, %	74.9 ±1.6^{ab}	76.8 ± 1.7^{a}	74.4 ± 2.6^{b}	76.8 ±2.6^{a}	75.7 ± 2.2	NS	*	NS
% Blood	3.9 ± 0.4^{a}	3.2 ± 0.5^{b}	4.3 ± 0.7^{a}	3.0 ± 0.7^{b}	3.6 ± 0.6	NS	***	***
% Feather	7.5 ± 1.3^{a}	6.6 ± 1.3^{a}	7.2 ± 2.3^{a}	2.9 ± 2.4^{b}	6.1 ± 2.2	***	***	***
% Head	3.6 ± 0.4^{a}	2.9 ± 0.4^{c}	3.3 ± 0.4^{b}	2.7 ± 0.4^{c}	3.1 ± 0.4	*	***	***
% Legs	2.5 ± 0.2^{a}	2.2 ± 0.2^{bc}	2.5 ± 0.3^{ab}	2.1 ± 0.3^{c}	2.3 ± 0.2	NS	**	**
% Wings	10.2 ± 0.7^{a}	9.7 ± 0.6^{a}	10.2 ± 0.4^{a}	10.0 ± 0.5^{a}	10.0 ± 0.6	NS	NS	NS
% Thighs	23.3 ± 1.4^{a}	21.0± 1.5^{bc}	22.2 ± 1.2^{ab}	21.0 ± 1.6^{c}	21.7 ± 1.6	NS	***	**
% Gizzard (empty)	1.4 ± 0.3^{b}	1.6 ± 0.2^{b}	1.7 ± 0.4^{b}	2.2 ± 0.4^{a}	1.7 ± 0.4	**	**	***
% Liver	1.0 ± 0.1^{a}	1.0 ± 0.1^{a}	1.0 ± 0.1^{a}	1.1 ± 0.1^{a}	1.0 ± 0.1	NS	NS	NS
% Heart	0.8 ± 0.1^{a}	0.5 ± 0.1^{a}	0.7 ± 0.1^{a}	0.5 ± 0.1^{b}	0.6 ± 0.1	NS	***	***

$^{a. b. c:}$ Values on the same line, bearing the same superscript letter are not different significantly;NS = Non significant (P>0.05); * = (P<0.05); ** = (P<0.01); *** = (P<0.001); E= ecotype; S= sex; E*S= interaction ecotype and sex. F = female; M = males; n= total number

but close to the 77.6% obtained by Kerketta and Mishra (2016) in India on lavender and local varieties of guinea fowls. However, Sanfo *et al*. (2008) had reported much higher yields of 84.3% with 22 weeks old guinea fowl. Like in the study of Hien (2009), carcass yield was found higher ($p < 0.05$) in female than in males (76.8 vs. 74.6%).

The large format known to the guinea fowl of the Sahel is partly due to its high amount of feathers and its relatively bigger head, respectively 7.1 vs. 5.0% and 3,2 vs. 3,0%. Compare to males, females had lower yields in blood, feather, head and legs, thigh and heart; yields values were lowest in Midwest females. The significantly lower percentage of feathers in females than in males (4.7 vs. 7.3%) could be explained in part by the aggressions exerted by males on the females leading to a loss of feathers on the rump of some females.

Panyako *et al*. (2016) claimed that the size of the heads can be a criterion to sex guinea fowl because males have larger heads, respectively 3.4 vs. 2.8% in this study. The yields of the thigh (21,7%) and the wings (10,1%) obtained in our study are respectively comparable to the 22,5 and 9,7% obtained by Singh *et al*. (2014) on Indian guinea fowls.

The significantly higher gizzard yields in the Midwest ecotype (1.9 vs. 1.5%) could be explained by a genetic difference between the ecotypes or its slightly higher food consumption. Gizzard was also heavier in females (1.9 vs.1.6%), been remarkably heaviest in Midwest females (2.2%) for reasons that need explanations.

Onset of lay

Age and weight at onset of lay: Laying began in the dry season (January 05, 2017) at the 17thweek of age and at a body weight of 1043.9 g for the Midwest females, but 5 weeks later (22ndweek) and at a heavier ($p < 0.001$) body weight of 1150.8 g for the Sahel females.

Onset of lay can be later than 22 weeks. Sanfo *et al*., 2007a) reported 30.4 weeks and Dahouda *et al*., (2008), 36 weeks. Although, egg laying started in January, in a short photoperiod season unfavorable to egg-laying, the precocity of onset of lay observed in our study could be due to confinement rearing in a permanently lighted environment. Under permanent photoperiod, guinea fowl can lay in all seasons and experience great sexual precocity (Hien, 2011).

In the study by Kyere *et al*. (2017) age at sexual maturity was reduced from 179 to 150days when lighting hours were increased from 12 to 18 hours a day.

Rate of lay increases with age. Sanou (2005) reported 44.2% for females aged 104 weeks. Local guinea fowls are recognized as spawning in the rainy season in sub humid to arid areas. The spawning in January showed that this perception could not be generalized. These off-season laying are very encouraging and provide a solution to the large-scale development and exploitation of this species in relation to the high consumption of its eggs and meat.

Laying rate: During the experimental period, average rate of lay of the Midwest female was 23.2% exactly the double of the 11, 6% found with the Sahel females.

Laying curve for Midwest females was quite above that of the Sahel females, showing a lower rate of lay of 2.3% but with much earlier onset at 17th week of age compare to the higher rate of lay of 6.7% at an onsetlate by 5 weeks, the 22nd week for Sahel females (figure 3).

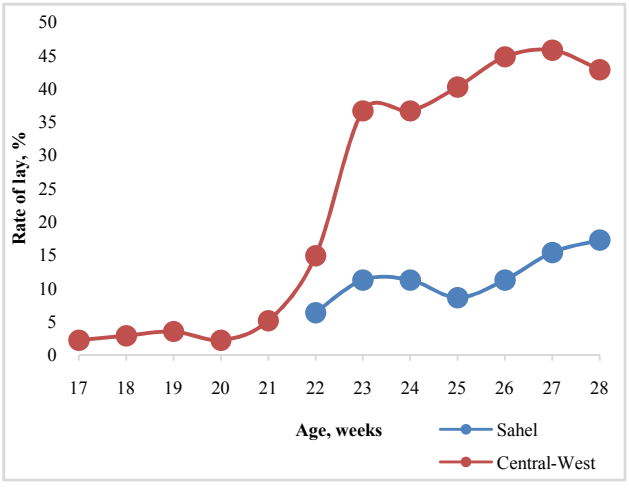

Figure 3 Laying rate of the Sahel and Midwest ecotypes of guinea fowls at onset of lay in the first laying cycle in Burkina Faso

Moreover, laying rates increased to reach 45.8% at the 27th week of age with Midwest females, but 18.2% at the 28th week with the Sahel females. Rate of lay was quite heterogeneous for each ecotype, showing much more variation among Midwest females (83.2 vs 31.9%), foretelling a more intense selection pressure on this character.

Egg weight: Only Midwest females laid eggs until the 22th week, but all weighed less than 25g; first eggs obtained thereafter from Sahel females were all above 25g. Egg weights of the two ecotypes were similar between the 23rd to the 28th weeks, increasing from 29, 0 to 33, 5g (figure 4). So far, no egg had attained the 40 g observed among those collected in the regions.

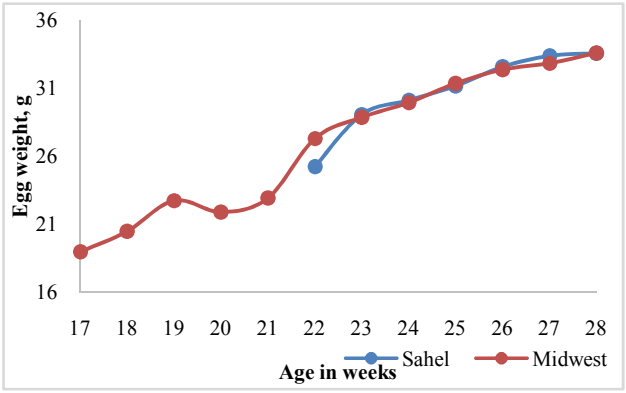

Figure 4 First egg weights of the Sahel and Midwest ecotypes of guinea fowls at onset of lay in the first laying cycle in Burkina Faso

Variations in weights decreased first from 19, 0 to 14,0% between the 17th to the 23rd weeks corresponding to eggs weighing less than 29g and further from 9,0 to 6,0% between the 24th to the 28th weeks corresponding to eggs heavier than 29g (figure 5).

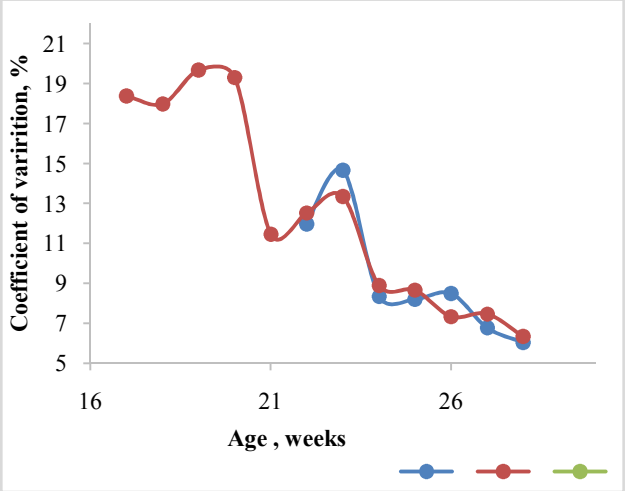

Figure 5 Coefficients of variation within first egg weights of the Sahel and Midwest ecotypes of guinea fowls at onset of lay in the first laying cycle in Burkina Faso

The average egg weight obtained in this study (30.6 g) was similar to the 29.2 g obtained by Sanfo *et al*. (2012) on guinea fowls in their first laying cycle.

CONCLUSION

Egg weights and live weights at 28 weeks were significantly higher in the Sahel than in the Midwest ecotype of guinea fowl.

Under permanent lighting, age atonset of lay was found to be 17 weeksin the Midwest ecotype, 5 weeks shorter compare to the Sahel ecotype.

Selections for egg weight, live weights, age at onset of lay and rate of lay will help establish standards of meat and egg types lines in each ecotype of guinea fowls.

References

Agbolosu, A.A., Teye, G.A., Adjetey, A.N.A., Addah, W. and Naandam, J.2012. Performance characteristics of growing indigenous guineafowls from uppereast, upper west and Northern regions of Ghana. *Agriculture and Biology Journal of North America.*3(8)336-339.

Dahouda, M., Sènou, M., Toléba, S. S., Boko, C. K., Adandédjan, J. C.et Hornick, J. L. 2008. Comparaison des caractéristiques de production de la pintade locale (*Meleagris numida*) en station et dans le milieu villageois en zone soudano-guinéenne du Bénin. Livestock research for rural development 20 (12)

FAO, 2006. Première évaluation delastructure etdel'importance dusecteuravicole commercial et familial en Afriquedel'Ouest. Synthèsedes rapports nationaux. 48p

Hien, O.C., Ouedraogo, C. L., Diarra B., and Traore, B.2009. Effets duparasitismeinterne surlap roductivité despintadeslocalesauBurkinaFaso.TROPICULTURA. 27, 3,184-190

Hien OC, Diarra B, Boly H, And Sawadogo L. Effect of improving health status on testicular development of guinea fowl. (*Numida meleagris*) reared under natural photoperiod in the Sudanian zone of Burkina Faso. International journal of Poultry Science: 2011: 10 (2): 113-119.

Houndonougbo, P.V., Chrysostome, A.A.C., Houndonougbo, M.F., Hedi A., Bindelle J., Gengler,N. 2014. Evaluation dela qualité externe et internedes œufs decinq variétés depintades local esélevées au Bénin. Revue. CAMES. Vol.02 N°.02: 2424-7235.

Kerketta N., and Mishra S.2016. Growth Performance, Carcass Characteristics and Meat Quality of Pearl and Lavender Varieties of Guinea Fowl *(NumidaMeleagris)* in Tropical Climate of Chhattisgarh. *Open Access Journal of Veterinary Science & Research* (1):000103.

Kyere, C G., Annor, S Y., Kagya-Agyemang, J K. and Korankye, O. 2017. Effect of egg size and day length on reproductive and growth performance, egg characteristics and blood profile of the Guinea fowl. Livesctock research for rural Developpement: 29 (9)

Panyako, P.M., Imboma,T., Kariuki,D.W., Makanda,M., Oyier,P.A., Malaki, P.,Ndiema E.K.,Obanda,V., Agwanda B., Ngeiywa, K.J., Lichoti,J., Ommeh,S.C.2016. Phenotypic characterization of domesticated and wildhelmeted Guineafowl of Kenya. Livestock research for rural development: 28 (9) http://www.irrd.cipav.org.co/irrd28/9/notesto-authors.htm.[Consulted on25/11/2016à15h24mn]

Sanfo, R., Boly, H., Sawadogo,L., Ogle,B. 2007a. Caractéristiquesdel'élevagevillageoisde lapintadelocale*(NumidaMeleagris)* aucentredu BurkinaFaso, TROPICULTURA, 25 (1): 31-36.

Sanfo,R., Boly,H., Sawadogo,L., Ogle,B.2007b. Poidsdel'œufdelapintadelocale(*Numida meleagris*) danslarégion centrale duBurkinaFaso: rapportsaveclesvariables de l'incubationartificielleetla production despintadeaux.TROPICULTURA,25(3)184-188

Sanfo,R., Boly,H., Sawadogo,L., BrianO. 2008. Performance spondéralesde lapintade locale (*Numidameleagris*) ensystème

d'alimentationamélioréedanslazone centrale duBurkinaFaso. Revue Élevage et Médecines vétérinairesdes Paystropicaux., 61(2): 135-140.

Sanfo, R., Ouoba-Ima, S., Salissou, I., Tamboura, H. H. 2015. Survieet per formances de croissance despintadeauxenmilieucontrôlé aunord duBurkinaFaso. *International Journal of Biological and Chemical Sciences.* 9(2): 703-709.

Singh,M. K., Singh,S. K., Sharma, R.K., Singh,B., Kumar,Sh., Joshi,S.K., Kumar,S., and Sathapathy, S. 2014. Performance and carcass characteristics of guinea fowl fed on dietary Neem *(Azadirachtaindica)* leaf powderasa growth promoter. *IJVR*, Vol.16, No. 1, Ser. No. 50, Pages78-82.

Sklan D, Heifetz S and Halevy O 2003 Heavier chicks at hatch improves marketing body weight by enhancing skeletal muscle growth. *Poultry Science* 82: 1778-1786.

Teye, G.A., Adams, M.2000. Constraints to Guinea Fowl production in Northern Ghana. A case study in the Damongo Area. *Ghana Journal of Agricultural Science*.33:153-157.

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