

Guinea fowl breeding trial in the off-season: The case of the "Galors" in Niger

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Abstract

This study is part of a trial of guinea fowl egg production in the off-season through the creation of a microclimate. The microclimate serves to create temperature and humidity conditions similar to those of the rainy season. During the study, the quantities of eggs obtained, the weight of the eggs and the hatching rate were compared according to the seasons. The main objective of the study was to contribute to the improvement of guinea fowl egg laying outside the rainy season, the only egg laying period in Niger. The study involved twenty-four (24) guinea fowls of the Galor breed (the starting number was 30, but 6 mortalities were recorded), including 18 females and 6 males of 9 months of age. The study was conducted for 12 months (three seasons) from July 2019 to June 2020. The seasons are described as follows: S1: November to February (cold season), S2: March to June (hot season); S3: July to October (rainy season). Concerning egg production, the results are 566, 555 and 113 in S1, S2 and S3 respectively. The season effect on hatching rate was significant ($p = .001$), it was 42%, 57% and 67% for S2, S1 and S3 respectively. The average egg weight was higher in dry season with 37 ± 2 g, 29 ± 3 g in rainy season and 25 ± 2 in hot season. The results highlighted the possibility of guinea fowl egg production throughout the year due to the creation of a microclimate.

Key words: Microclimate, guinea fowl, egg production, hatching rate, seasons.

Introduction

One of the major challenges facing Sub-Saharan African countries is the fight against poverty and malnutrition by making the best use of available resources that can be easily exploited by farmers. In Niger, livestock is the sector of choice, as it contributes significantly to the improvement of the country's agricultural trade balance by ranking first

in total export earnings from agro-sylvopastoral products with 22% (Niger, 2012, 2013). It occupies 87% of the population and provides a livelihood exclusively for 20% of them (Niger, 2013). According to the statistical services of the Ministry of Livestock (MEL, 2013, 2017) the Nigerien livestock population was 36, 325,445 heads. Yet the sector is fragile in the face of droughts. Indeed, any severe drought remains fatal for Nigerien livestock; this was the

case of the 1973 and 1980 droughts, which led to a 50% decline in the cattle herd in favour of small ruminants and camels (Karimou, 2005). Poultry farming can be practiced where other species are virtually impossible because of its cohabitation with village herders. The local chicken represents the highest species (55% of the poultry flock), followed by guinea fowl (26%) and pigeon (12.26%). Duck is in fourth place with 3.5%, followed by goose and turkey, which together represent 0.04% of the total bird population in Niger (RGAC, 2008). Poultry meat is the most popular and the selling price is twice that of chicken. However, guinea fowl only reproduce during the rainy season (June to September) total egg production per year (production of guinea fowl subject to the microclimate producing during the three seasons versus production of guinea fowl subject only to the natural egg-laying season which corresponds to the rainy season, the only egg-laying period in West Africa). It will therefore be very interesting to find an alternative to ensure this production throughout

the year. To meet the market demand for eggs, food needs in protein for a population whose growth rate is constantly increasing with 4.9% per year according to the INS (2013).

Materials and Methods

Study area

The study was conducted at the Boubakar BA University. The experimental site is located in the urban commune of Tillabéri in the western part of the country between the coordinates 1° and 2° East longitude; 14° and 16° North latitude (Figure 1). The year is divided into three seasons. A cold season (S1) that extends from November to February, followed by the hot season (S2) from March to June and the rainy season (S3) that extends from July to October. The fig.1 below illustrate the map of the study area.

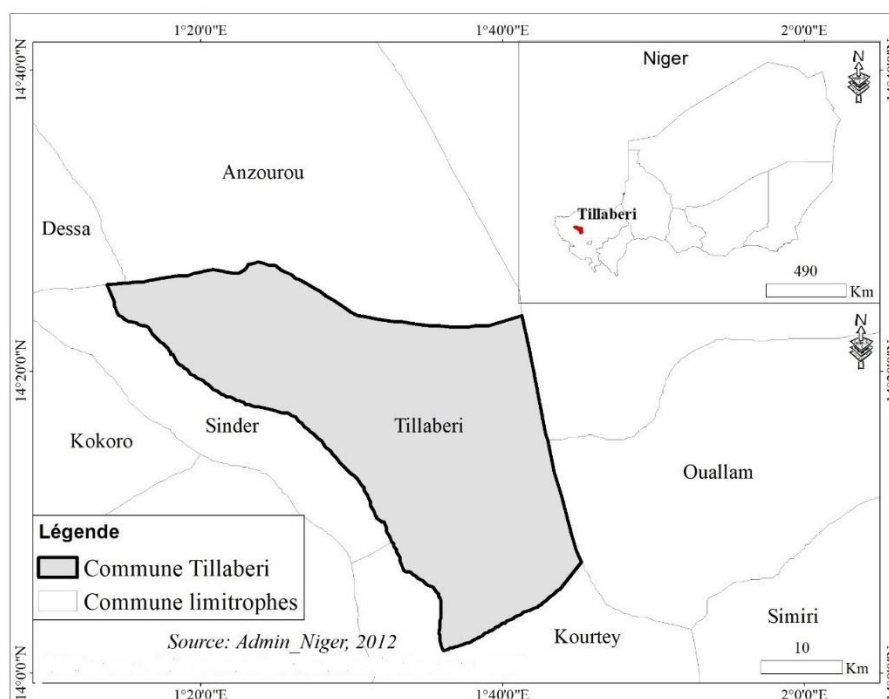


Fig. 1: Location map of the Urban Commune of Tillabéri

Biological material

Twenty-four (24) guinea fowl of the Galor breed were studied, including 18 females and 6 males. In Niger only hens are raised on a large scale. That of the guinea fowl is left to the villagers with numbers varying from 10 to 20 per woman. Modernization is in its early stages

Technical equipment

Two types of troughs were used. Modern troughs (photo 1) and containers found on the local market (photo 2).



Photo 1: Modern watering hole



Photo 2: Traditional drinker

Locally made feeders (photo3) were used for feeding.



Photo 3: Feeders

The guinea fowl were housed in chicken houses built with local equipment. The houses were equipped with a Sekos

system and the whole area is fenced with wire mesh to secure the birds. (Photo 4).



Photo 4 : Chicken house

The eggs are collected, weighed and stored in trays.

Data collection

Data sheets have been developed for the collection of seasonal data

Fogging device and creation of microclimate.

Water is supplied at the rate of the rainy season so that the temperature and humidity are similar to that of the rainy season. A thermometer is placed just to bring water if there is an increase in temperature, and stop watering if there is a decrease in temperature compared to the references of the rainy season in Niger.



Fig. 2 : Humidification system

An automatic incubator was used to incubate the eggs

Methodology

Solar panels that charge batteries for the night

The feed used is manufactured as follows: The feed is composed of a mixture of concentrate, cracked corn, concentrates and wheat bran with proportions of 25%, 25% and 50% respectively. The proportions, quantities and composition of the feed are summarized in table (1) below.

Table 1 : Composition de la ration alimentaire

Components	Proportions	Compositions
30% concentrate	25%	Vitamin E 200mg / kg, Iron7 90mg / kg, Copper 50mg / kg
But crushed	50%	Starch 13.7g, potassium165mg
Sound	25%	Vitamin B6 11, 3mg / kg, Vitamin B1 8.7mg / kg

The feed is the same for all seasons. In order to secure the birds in terms of health, medical prophylaxis and hygiene techniques were applied in accordance with the legislation in force in Niger.

A) Methodology in the rainy season

No changes have been made to the environment as the guinea fowl are in their natural laying period.

B) Methodology in warm and cold season

- For the simulation of the rainy season and the creation of the microclimate, the following steps were adapted: Growing alfalfa in the guinea fowl range to create greenery similar to that of the winter season; - Installation of pipes that spray the guinea fowl with water and irrigate the alfalfa. All connected to a water tank - Installation of misting

pipes inside the building. The hose is connected to a tap and the misting depends on the flow rate of the tap. - The birds are sprayed with water three times a week in order to maintain a humidity level similar to that of the winter season. Fogging is done periodically - At night the hen house is lit with a 120 watt bulb.

- **Egg collection**

The eggs are collected every week. At each collection an egg is left in the nest to encourage the guinea fowl not to change nests. A sample of 100 eggs was weighed each season to determine the average egg weight.

- **Hatching rate**

For each season, a quantity of 100 eggs is incubated in an automatic incubator with a

capacity of 120 eggs. The temperature and humidity are adjusted in accordance with the breeding conditions of the species.

Results

Monthly laying of guinea fowl eggs during the seasons

Data analysis and processing

All the data collected during the two periods were compiled with the Excel spreadsheet and then subjected to statistical analysis with the SPSS16.0 software.

The number of eggs collected per season is shown in Tables 2, 3 and 4 below.

Table 2: Spawning in the rainy season (S3)

Dates	Number of guinea fowl used in the experiment	Evolution of the number of guinea fowls laying eggs during the month	Eggs laid per week	Total laying	monthly	Monthly laying rate per guinea fowl
7/7/2019	18		4	45		
14/7/2019	18	3	5			15
21/07/2019	18		18			
28/07/2019	18		18			
07/08/2019	18		33	135		19
14/08/2019	18	7	43			
21/08/2019	18		23			
28/08/2019	18		36			
07/09/2019	18		37	262		24
14/09/2019	18	11	59			
21/09/2019	18		88			
28/09/2019	18		78			
7/10/219	18		36	124		
14/10/2019	18		32			10
21/10/2019	18	12	36			
28/10/2019	18		20			
Total	18		566	566		68

Table 3: Cold season egg laying (S1)

Dates	Number of guinea fowl used in the experiment	Evolution of the number of guinea fowls laying eggs during the month	Eggs laid per week	Total monthly laying	Monthly laying rate per guinea fowl
7/11/2019		12	26		
14/11/2019	18		26	122	10
21/11/2019	18		30		
28/11/2019	18		40		
7/12/2019	18	12	40		
14/12/2019	18		45	201	17
21/12/2019			56		
28/12/2019			60		
7/1/2020			42	147	
14/01/2020	18	11	35		13
21/01/2020	18		35		
28/01/2020	18		35		
7/02/2020	18		30		
14/02/2020	18	8	25	85	11
21/02/2020	18		20		
28/2/2020			10		
Total	18		555	535	51

Table 4: Warm season egg laying (S2)

Dates	Number of guinea fowl used in the experiment	Evolution of the number of guinea fowls laying eggs during the month	Eggs laid per week	Total monthly laying	Monthly laying rate per guinea fowl
7/3/2020	18	7	4		
14/3/2020	18		4		
21/3/2019	18		4	16	2
28/3/2019	18		4		
02/4/2019	18	7	4		
09/4/2019	18		4	16	2
22/4/2020			4		
29/4/2020			4		
8/5/2020		7	5		4
16/5/2020	18		5	30	
23/5/2020	18		10		
30/5/2020	18		10		
06/6/2020	18	7	6		
13/6/2020	18		10	45	6
20/6/2020	18		15		
27/6/2020			20		
Total	18		113	113	14

Egg weight by season

Table 5 shows egg weights by season.

Table 5: Egg weights by season.

Seasons	Weight (g)	Number of eggs weighed
Rainy season	37± 2	100
cold season	29± 3	100
hot season	25±2	100

Eggs laid during the rainy season weigh more, 8 g more than those laid during the dry season.

Hatching rate

The hatching rate was 65% for the rainy season, 57% for the cold period and 42% for the warm season.

Discussion

Power supply

During the trial seasons, the basic diet was the same. The guinea fowls are fed a mixture of concentrate, wheat bran and cracked maize. Microclimate creation, alfalfa cultivation to maintain plant biodiversity are used during dry and cold seasons. These results are similar to Tossé et al. (1991) and Bessin et al. (1998) who report feeding birds with concentrate, wheat bran, maize and termites.

Egg production

In Niger, guinea fowl only lay eggs during the rainy season. This season lasts 4 months, from June to October (Karimou 2005). However, the periods of the seasons and their duration vary greatly in Africa. According to Ayeni (1983). This period extends from June to November in Burkina Faso (Nagalo, 1984). The present study shows that through the creation of a microclimate and the increase of the photoperiod, with adequate feeding, guinea fowl can lay eggs all year round. Indeed, after the rainy season, egg laying continued throughout the year with an increase in egg laying performance. To the 68 eggs of the rainy season, 51 and 14 eggs of the cold and warm periods were added respectively, giving a total production of 133 eggs per guinea fowl throughout the year. In these comparator countries the results correspond to the annual production without fogging. Our results are superior to those of guinea fowl in Burkina Faso, which have between 80 and 130 eggs (Nagalo, 1984). Similarly to those found in Nigeria which vary from 60 to 100 eggs

(Sonaiya and Swan, 2004). In an improved management system in the central region of Burkina Faso, Sanfo et al (2012) report two dry season egg laying cycles with durations of 4.8 months for the first and 7.5 months for the second. Their average performance which was 31.1 and 121.5 eggs per guinea fowl is lower than our results with a performance of 133 eggs per guinea fowl. Our experience allows us to align around the laying period of 8 to 8.5 months in temperate countries (Le coz, 1992).

Egg weight

The heaviest weight was obtained in the rainy season 37 ± 2 g, followed by the cold season 29 ± 3 g and then the hot season with 25 ± 2 g. The results obtained in the rainy and cold periods corroborate those of Sanfo et al (2012) who found an average egg weight of 29.2 ± 1.7 g in the first cycle compared to 37.8 ± 3.5 g in the second. Our results in the rainy season 37.3 g are similar to those from central Mali (Kuit et al. 1986) and Nigeria in the range of 35.8 to 44.6 g (Ayorinde, 1991). The weights obtained in our work are lower than the results of Aboud (2002) in Tanzania, where the average weight of guinea fowl eggs reared under village conditions was 43.03 g.

Hatching rate

Using an automatic incubator, we recorded 65%, 57% and 42% for the rainy, cold and hot seasons respectively. The low rate in the hot season could be explained by the excessive temperatures sometimes exceeding 45 degrees in the shade. The fogging is used only for guinea fowl for laying. For hatching the eggs are put in an incubator placed in a building outside the microclimate zone. These rates are lower than those of Sonaiya (1992) who reported 85.2% in artificial incubation. Our results are also lower than the results obtained by Defly et al (1999) respectively 86% and 72.9% for the heavy and light varieties of Togo.

Conclusion

The creation of a microclimate has made it possible to highlight the possibility of having guinea fowl egg production throughout the year. The question of seasonality is therefore not absolute. The results showed that this activity can contribute in general to the multiplication of guinea fowl numbers in Niger. As a result, the needs of the population in guinea fowl eggs will be increasingly covered with egg-laying performance per guinea fowl increasing from 68 to 133 eggs per year. The improvement of the environment and the breeding conditions by creating a microclimate allows guinea fowl egg production throughout the year. It is an excellent way to fight poverty because it increases family income. It is also a way to fight against malnutrition and to increase the number of animals in the flocks.

Acknowledgements

The authors thank REGIS AG for installing the microclimate equipment and disseminating the results to farmers.

References

- Aboud A.A.O. Kashindy F.P., (2002). Productivity of the Guinea Fowl (*Numida meleagris*) under village conditions in Tanzania. Bull. Anim. Hlth. Prod. Afr. p50, 31-40;
- AYENI J.S.O. (1983). The biology and utilization of helmeted guinea fowl in Nigeria: food of helmeted guinea fowl in Kainji Lake Basin. Afr. J. Ecol. 1983, 21, 1-10;
- AYORINDE K.L., 1991. Yield and chemical composition of Cyprus bulb in Kainji Lake Basin. Nig. J. Nutr. Sci., 12: 26-27 ;
- Bessin R., Belem A.M.G., Bouessini H., Compaore Z., Kaboret Y, (1998). Enquête sur les causes des mortalités des pintadeaux au Burkina Faso. Rev. Elev. Méd. Vét. Pays Trop., p51, 87-93. Burkina Faso revue d'élevage et de médecine vétérinaire des pays tropicaux, 2012, 65 (1-2) : 25-29 ;
- DEFLY A., DOGBE A., ADMEFA K. (1999). Caractéristiques de l'aviculture traditionnelle. Etat actuel des connaissances au Togo et ailleurs. Lomé, Togo, Institut togolais de recherche agricole, 30 p.
- FARINA F., DEMEY F., HARDOUINJ; (1991), Production de termite pour l'aviculture villageoise au Togo. Tropicultura, 9 p181-187 ;
- Karimou B. (2005). Facteurs non génétiques influençant le gain de poids et la croissance chez la chèvre rousse de Maradi. Mémoire de DEA. ULG, Belgique. 39 p ;
- KUIT H.G., TRAORE A., WILSON R.T., (1986). Livestock production in Central Mali: Ownership, management and productivity of poultry in traditional sector. Trop. Anim. Health Prod., 18: 222-231 ;
- LAURENSEN, P. Détermination des paramètres zootechniques de la pintade locale dans la région du Borgou (mémoire d'Ingénieur). Faculté des Sciences Agronomiques de Gembloux : Gembloux, 2002, 81 p ;
- LE COZ DOUIN J. L'élevage de la pintade. Edition Point Vétérinaire : Maison Alfort 1992, 252p ;
- Mel (2013) : stratégie de développement durable de l'élevage (sddel) Mishra s. kataria n.m, sah rl, verma kC, mishra j.p. studies on the ;
- MEL/NIGER: MINISTERE DE L'ELEVAGE (2013). Rapport statistique d'élevage 2013 78p.

- Ministère de l'Agriculture et de l'Elevage, rapport d'étude de l'évaluation d'impact du prodex, version finale du 30 octobre 2017 ;
- Nagalo M., (1984). Contribution à l'étude du parasitisme chez la pintade commune (*Numida meleagris*) en Haute Volta: les helminthes parasites du tube digestif. Thèse de Médecines Vétérinaires. EISMV Dakar. N°9.112p ;
- Niger, (2008). Recensement Général de l'Agriculture et du Cheptel (RGAC 2005- 2008) : Résultats définitifs Volume II (Volet cheptel). Ministère du Développement Agricole Ministère des Ressources Animales.- 170p ;
- Niger (2012). Initiative 3N pour la sécurité alimentaire et le développement agricole durable : Les Nigériens nourrissent les nigériens. Cadre stratégique et Coût estimatif des programmes de l'initiative pour la période 2012 -2015. Haut-commissariat à l'initiative 3N.- 59p ;
- Niger (2013). Stratégie de Développement Durable de L'Elevage (SDDE 2013- 2035). Ministère de l'Elevage (ME) - 83p. 80;
- Sanfo R., Boly H., Sawadogo L., Brian O. Laying performances and egg characteristics of the guinea fowl (*Numida meleagris*) under improved breeding system in the central region of;
- Sonaiya E. B., Swan S. E. J., (2004). Production en aviculture familiale. Manuel technique FAO sur la production et santé animales, 126p ;
- SONAIYA E.B., (1992). La pintade : état des connaissances dans les zones arides à semi-humides d'Afrique de l'Ouest. In : Compte rendu de l'atelier organisé sur le développement de la pintade en régions sèches africaines, Ouagadougou, Burkina Faso, 19-23 oct. 1992. Rome, Italie, FAO, 41 p