

*Original Research***Characteristics of Rural Guinea Fowl (*Numida meleagris*) Breeding System in the Sub-Prefecture of Baktchoro, Chad****Madjina Tellah<sup>1\*</sup>, Djalal Ardjoun Khalil<sup>1</sup>, Andarawous Ballah Tina D.<sup>2</sup>, Leng Tchang Brice<sup>1</sup> and Mopate Logtene Youssouf<sup>3</sup>**<sup>1</sup>Higher National Institute of Sciences and Techniques of Abéché (INSTA); Department of Breeding Sciences and Techniques, BP 130 Abéché, CHAD<sup>2</sup>Centre of Agriculture, Forestry and Pastoral training /Institute of Agriculture, forestry and pastoral Sciences (CFAP/ISASP), Department of Animal Health and Production, N'Djamena, CHAD<sup>3</sup>Livestock Research Institute for Development (LRID), Animal Production Program, Farcha BP. 433, N'Djamena, CHAD**\*Corresponding author:** [madjina\\_tellah@yahoo.fr](mailto:madjina_tellah@yahoo.fr)

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**Abstract**

*The characteristics of rural Guinea fowl (*Numida meleagris*) breeding system in the sub-prefecture of Baktchoro were determined by survey among 62 breeders from 22<sup>nd</sup> August to 2<sup>nd</sup> September 2016 in 4 cantons and 174 villages. The survey was done in 10% random choice of the breeding Guinea fowl villages. In each village, 30% of Guinea fowl breeders were retained of individual discussions. It was carried out on the production practices and zootechnical performances. It concerned 2020 Guinea fowls whose 1606 females and 414 were observed. The effective per producer was  $32.59 \pm 2.73$  Guinea fowls including  $25.90 \pm 2.46$  females and  $6.69 \pm 0.48$  males. Sexual maturity was reached at 8 months for all sexes. Females laid 98.71 eggs with a career duration of 2 years. The incubation rate was 58.68%, hatching rate 92.76% and weaning rate 89.69%. The constraints to the breeding were the losses of Guinea fowls by wildness, diseases, stealing or predation. Added to this are the lack of labor, the problem of feeding and the lack of technical supervision. The rural Guinea fowl system ensures food security and the socio-economic needs of breeders in sub-prefecture of Baktchoro. The improvement of Guinea fowl breeding conditions in this area would make it possible to supply eggs to other cities, particularly to the N'Djamena city.*

**Key words:** Baktchoro, Chad, Characteristics, Guinea Fowl, Rural Breeding System**How to cite:** Tellah, M., Djalal, A. K., Tina, D. A. B., Brice, L. T. & Mopate, L. Y. (2019). Characteristics of Rural Guinea Fowl (*Numida meleagris*) Breeding System in the Sub-Prefecture of Baktchoro, Chad. International Journal of Livestock Research, 9(2), 8-17. doi: 10.5455/ijlr.20181214074130**Introduction**

Poultry breeding is an important part of the traditional production systems in the dry and sub-humid regions of Africa. This breeding is a source of income diversification for small breeders (Fall *et al.*, 2016). Extensive

poultry breeding is characterized by low investment costs (Gueye, 1998). Its exploitation (consumption and sale) is a source of protein and improves the farmer incomes, which makes it possible to insure the current needs (medical care, clothing, schooling of the children, acquittal of civic taxes) and feeding (FAO, 1992; Fall *et al.*, 2016). Thus the development of poultry production is one of the best ways to improve the farmer living conditions (Dahouda *et al.*, 2008; Mbuza *et al.*, 2017). The annual production of eggs by the guinea fowl during the laying season is higher than the hen or cane for all production cycles combined. Guinea Fowl breeding in particular, is a promising activity in poultry, especially in the dry regions of Africa (FAO, 1992; Boko *et al.*, 2012). This short-cycle production provides opportunities almost everywhere, because of the selling production possibility in low-value units (a few eggs, young poultries), which puts them within reach of the most modest buyers (Dahouda *et al.*, 2007; Dahouda *et al.*, 2008). The guinea fowl, once considered a wild bird in Chad, has become a domestic poultry (Gang-Lang, 2003). Increasingly, its breeding is privileged at the expense of chickens. Its egg productions during the rainy season is renowned of Baktchoro Sub-Prefecture in the Tandjile district. In addition, preliminary studies on the practices of guinea fowl breeding, their zootechnical performances and the constraints are necessary for the development of this production. The aim of this study was to determine the characteristics of rural Guinea fowl system in the sub-prefecture of Baktchoro in order to propose improvement actions.

## **Materiel and Methods**

### **Study Zone**

The sub-prefecture of Baktchoro has an area of 782 km<sup>2</sup> with 66,056 inhabitants. It is located in the west Tandjile Department, between the 8<sup>th</sup> and 12<sup>th</sup> parallel north. It is limited on the north by sub-prefectures of Koyom and Kim, on the west sub-prefecture of Pont Carol (Kabia Department), on the south by sub-prefectures of Kelo and Dougou and finally on the east by Kolong sub-prefecture. This zone is located in Sudanian with two seasons: a rainy season (April-October) and a dry season (October-Mars). The annual rainfall varies from 1000 to 1100 mm of rain. It is shrub savannah area with a canopy composed of perennial and annual grasses. The inhabitants are traditionalist's agro-pastoralists and livestock is the order of importance for small ruminants, cattle, pigs and poultry (chickens, ducks and guinea fowl).

### **Data Collection Method**

The survey was conducted from 22<sup>nd</sup> August to 2<sup>nd</sup> September 2016 in four cantons (Marba, Dyh, Tchire, and Kakraou) of the sub-prefecture of Baktchoro. A pre-survey of the administrative authorities, department heads, canton chiefs and breeders made it possible to collect information allowing to better know the environment and to build the questionnaire, which was subsequently tested. The survey was based on 10% random selection of the villages. Interviews were conducted with 30% of the producers in each village. The

interview focused on producer profiles, production practices, producer constraints and zootechnical performance.

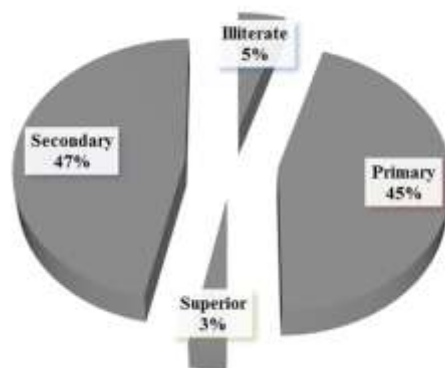
### Statistical Analysis

The analysis was performed using the XLSTAT software (6.1.9) for the descriptive statistics (frequencies, means, standard deviations, minimum and maximum). Analysis of variance (ANOVA) was performed to find the differences between the averages. The Newman Keuls test was used to assess the significance of the mean differences at the 5% threshold.

## Results

### Breeders' Profile

Guinea fowl breeding in Sub-Prefecture of Baktchoro was held by men aged  $41.47 \pm 1.49$  years old (21-80 years old). They were all married at least one woman ( $1.32 \pm 0.09$ ). Their family size was 9 at least ( $9.08 \pm 0.45$ ) with at least 5 actives ( $5.26 \pm 0.31$ ). Most of them are Christians (88.71%) and their education level varied (Fig. 1).



**Fig. 1:** Education level of guinea fowl breeders in sub-prefecture of Baktchoro

Secondary followed primary levels of education were the highest and illiterate and superior levels were the lowest ( $p < 0.05$ ).

### Production Practices

The vast majority of the breeders surveyed (80.65%) started the Guinea fowl breeding's between 2000 and 2012 and 19.35% between 1978 and 1999. Purchased eggs were mostly hatched by hens (98%) or to a less extent canes (2%). The property of the farmyard was individual (100%). The main habitats were tree branches (38.78%), roofs of houses (33.87%), shelter (20.97%) or shared shelter (6.45%) with other poultrys. The food was provided by the owners themselves (100%). The main types of feed distributed to Guinea Fowl were sorghum, rice, maize, penicillium millet, and sesame and cucumber seeds.

## Structure and Performances

The Guinea fowl phenotype in the sub-prefecture of Baktchoro revealed that gray Guinea fowls (Fig. 2) had the highest proportion (89%) and other phenotypes the lowest proportions: white Guinea fowls (6%) and black (5%). This difference was significant ( $p < 0.05$ ).



**Fig. 2:** The gray guinea fowl

The different categories of the backyard and the percentage of replacement Guinea fowls (breeding) was estimated with 35.61% males and 25.90% females (Table 1). The number of eggs laid, incubated, hatched and weaned Guinea Fowls varied (Table 2).

**Table 1:** The guinea fowl flock composition (n) in farmer cantons in sub-prefecture of Baktchoro

Flock Composition	Means $\pm$ SD	Replacement Young Guinea Fowls
Cock guinea fowl	6.69 $\pm$ 0.48	
Hen guinea fowl	25.90 $\pm$ 2.46	
Young guinea fowl males	12.58 $\pm$ 1.41	4.48 $\pm$ 0,41
Young guinea fowl females	22.47 $\pm$ 1.66	5.82 $\pm$ 0,56
Total (N)	32.59 $\pm$ 2.73	5.15 $\pm$ 0,48

SD = Standard Deviation

**Table 2:** Productivity of guinea fowl in sub-prefecture of Baktchoro

Production Parameters	Means $\pm$ SD	Minimum	Maximum
Laid eggs (n)	98,71 $\pm$ 0,63	90	120
Incubation rate (%)	58.68 $\pm$ 2.41	16.67	75
Hatching rate (%)	92.76 $\pm$ 2.33	85.33	100
Weaning rate (%)	89.69 $\pm$ 2.11	80	97.78

SD = Standard Deviation; n = No. of animals

These parameters varied by canton (Table 3). The number of laid eggs was the highest in Dyh Canton, intermediate in Kakraou and Tchire Cantons, and the lowest in Marba Canton ( $p < 0.05$ ). The number of incubated and hatched eggs were the highest in Dyh canton, intermediate in Kakraou and Tchire Cantons and the lowest in Marba Canton ( $p < 0.05$ ). The number of weaned Guinea fowls was the highest in Marba

canton and the lowest in Dyh, Kakraou and Tchire cantons ( $p < 0.05$ ). Then, the productivity of Guinea fowls was the most in Dyh canton.

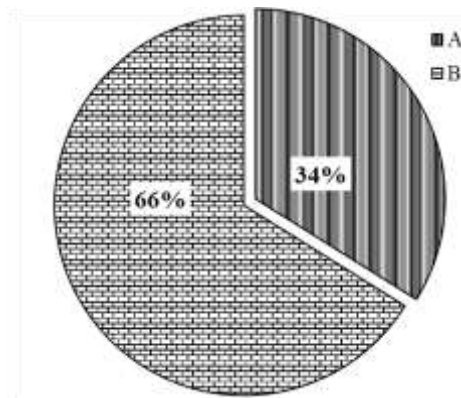
**Table 3:** Productivity of guinea fowls in the different cantons in sub-prefecture of Baktchoro

Canton	Laid Eggs (n)	Incubated Eggs (n)	Hatched Eggs (n)	Weaned Guinea Fowls (n)
Marba	94.00 <sup>a</sup>	69.00 <sup>a</sup>	67.60 <sup>a</sup>	62.80 <sup>a</sup>
Dyh	102.22 <sup>b</sup>	72.78 <sup>a</sup>	70.56 <sup>b</sup>	60.56 <sup>b</sup>
Tchire	97.50 <sup>ab</sup>	52.25 <sup>b</sup>	47.75 <sup>a</sup>	43.50 <sup>b</sup>
Kakraou	98.64 <sup>ab</sup>	54.12 <sup>b</sup>	49.25 <sup>a</sup>	44.43 <sup>b</sup>

*a, b- Means with different superscript vary significantly ( $P < 0.05$ )*

### Product Exploitation

In average  $6.29 \pm 0.65$  (19.30%) Guinea fowls were sold and  $5.65 \pm 0.57$  (17.34%) consumed or an exit rate of 36.64% per year. For the study area, 390 Guinea fowls sold at an average price of  $1,491.94 \pm 5.65$  FCFA yielded an average of  $581,856.6 \pm 2,203.5$  FCFA. A total of 350 Guinea fowls were consumed per year. Concerning eggs, 158,163 eggs at 50 FCFA per unit yielded 7,908,150 FCFA. For 3,551 eggs consumed, the estimated value was 177,550 FCFA. Returns from the sale of mostly eggs and Guinea fowls were used to insure the family basic needs of Guinea fowls breeders like health, children schooling, purchase of cereals for the family consumption, agricultural labor, and purchase of agricultural equipment (Fig. 3).



**A:** Agricultural labor and buying of other consumption products, **B:** Cereal buying, health, school fees of children, animal buying and other services

**Fig. 3:** Uses of returns from the sale of eggs and guinea fowls in the sub-prefecture of Baktchoro

### Production Constraints

The overall annual losses were 711 Guinea fowls averaging  $11.47 \pm 1.09$  Guinea fowls per breeder. The production constraints of the Guinea fowls were indicated in the Fig. 4.

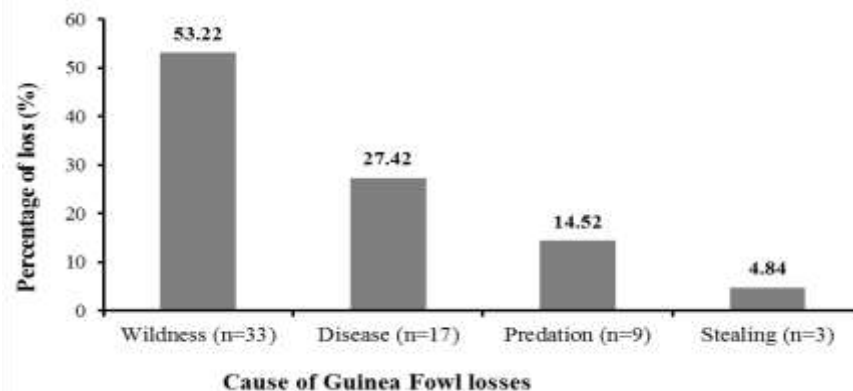


Fig. 4: Loss of guinea fowls in sub-prefecture of Baktchoro

The most loss causes of Guinea fowls were wildness followed by diseases, predation and stealing ( $p < 0.05$ ). The other obstacles to rural Guinea Fowl breeding system were the technical supervision lack, lack of labor and the feeding problem (Fig. 5).

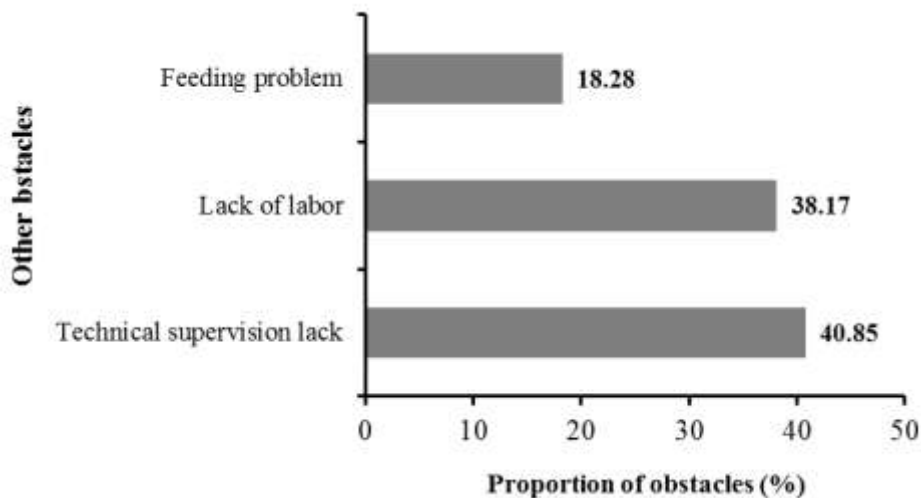


Fig. 5: Other obstacles of guinea fowl losses in sub-prefecture of Baktchoro

The technical supervision lack followed by the lack of labor were the most important obstacles and feeding problem was the lowest ( $p < 0.05$ ).

## Discussion

### Breeders' Profile

The survey showed that all Guinea fowls breeding were held by men aged more than forty years old. This activity is also practiced by men in Burkina Faso (Sanfo *et al.*, 2007), in Benin (Dahouda *et al.*, 2007; Dahouda *et al.*, 2008), in Senegal (Fall *et al.*, 2016) and in Rwanda (Mbuza *et al.*, 2017). The men age

reported by this study was higher than the one reported by Sanfo *et al.* (2007) of 30 years old in Burkina Faso. These authors reported that men's ages ranged from 25 to 60 years old. The Guinea fowl breeders were all married at least one woman and their family size was 9 at least. Most of them are Christians and their education level varied from illiterate to superior. Then those had secondary and primary levels formed almost the totality. The income source diversifications to ensure family needs, would explain the household head investments in this activity. The same observations were made among poultry breeders in the south of Chad (Mopate and Maho, 2005; Mahamat and Moukhtar, 2006) and in Senegal (Fall *et al.*, 2016). The size of the Guinea fowl farmer's families differs somewhat from that of the chicken farmers among the active (7 persons) who are ranging from 4 to 10 in south of Chad (Mopate and Maho, 2005).

### Production Practices

The Guinea fowl breeding started in the sub-prefecture of Baktchoro between 1978 and 1999 and developed really between 2000 and 2012. Purchased eggs were mostly incubated by hens or canes. The property of the farmyard was individual. The main habitats were tree branches, roofs of houses, shelter or shared shelter with other poultry. This observation has been in agreement with those reported in Burkina Faso and elsewhere in Chad (Nagalo, 1984; Gang-Lang, 2003; Issa *et al.*, 2013). The breeding was practiced mainly for the sale and consumption of eggs. These observations corroborate those made by other authors (Mopate and Idriss 2002; Gang-Lang, 2003; Issa *et al.*, 2013).

The food was provided by the owners themselves. The main types of feed distributed to Guinea fowls were associated at least three to be served. The feeding system observed in our study overlaps that reported in the literature. The Guinea fowl seek their own food around the huts and in the fields (Nagalo, 1984; Gang-Lang, 2003; Dahouda *et al.*, 2007). The age of puberty for males and spawning for females was 8 months. This confirms previous observations on the same study area (Gang-Lang, 2003). This age is higher than the observations made in Burkina Faso of  $6.2 \pm 0.6$  months in the male and  $7.1 \pm 1.8$  months in the female in traditional breeding (Sanfo *et al.*, 2007) whereas in improved age, this age has been 5.7 months (Sanfo *et al.*, 2009a). These authors report that an improvement in feeding conditions reduces the age at hatching, induces "unreasoning", lengthens laying time and increases the number of eggs per Guinea fowl per year (Dahouda *et al.*, 2008). Incubation was provided by chickens and canes. This confirms the observations of Gang-Lang (2003) and Sanfo *et al.* (2007).

### Structure and Performance

The Guinea fowl phenotype indicates that the gray-haired ones were very much in the majority. This result corroborate the observations reported in Burkina (Sano *et al.*, 2009<sup>a</sup>). The Guinea fowl flock farmers was described and the percentage of replacement Guinea fowls (breeding) was estimated. Number of eggs laid,

incubation rate, hatching rate and weaning rate of Guinea fowl were better in Dyh Canton compared to the other three cantons (Kakraou, Tchire and Marba). This difference is explained by the effects of the breeding practices (care and feeding). Thus, the Dyh canton seems to have good breeding practices for Guinea Fowls than that the other cantons of the Baktchoro sub-prefecture. This supposes the existence of a close link between productivity parameters and farming practices (Dahouda *et al.*, 2008). Good husbandry practices improve the productivity parameters of the Guinea fowls in the study area (Sano *et al.*, 2009<sup>b</sup>). The average size of the females was higher than the males. The replacement rate was more for males than females. The age of male puberties and the female laying was the same at 8 months. This age of sexual maturity was lower than 9 months reported in Benin by Dahouda *et al.* (2008).

Incubation, egg hatching and weaning rates were higher in Dyh Canton than in the three other Cantons (Marba and Kakraou and Tchire,  $p < 0.05$ ). The exploitation duration of laying Guinea Fowls was 2.6 years, with 60% up to 3 years and 40% up to 2 years. These parameter variations corroborate the Sano *et al.* (2009<sup>a</sup>) results reported in Burkina Faso. But the hatchability rate ( $92.76 \% \pm 2.33$ ) was higher than  $59.43\% \pm 0.40$  reported in India by Akilarasan *et al.* (2017). This hatchability justify the development of Guinea fowl breeding in the study area.

### Product Exploitation

The Guinea Fowls and their eggs were sold and consumed. The guinea fowls sold at an average price of  $1,491.94 \pm 5.65$  FCFA and egg at 50 FCFA per unit. Notwithstanding the years, unit selling prices were higher than those reported in Burkina Faso at 1,300 FCFA per adult male and 1,350 FCFA per female (Sanfo *et al.*, 2007). Part of the Guinea fowl eggs are consumed and the other is sold at 50 FCFA per unit against 34 FCFA in Burkina Faso (Sanfo *et al.*, 2007). The returns of the sale of Guinea fowls and eggs were more useful in agricultural labor and buying of other consumption products than cereal buying, health, school fees of children, animal buying and other services.

### Production Constraints

The breeders lost their Guinea fowls by constraints. In order those constraints were wildness followed by diseases, predation and stealing ( $p < 0.05$ ). Those constraints were related to the traditional production systems reported by Gueye (1998). Among the other obstacles to Guinea fowl breeding there were the technical supervision lack, lack of labor and the feeding problem. Technical supervision lack and lack of labor were the main obstacles than feeding problem to the rural Guinea fowls breeding system in sub-prefecture of Baktchoro. This testifies to the extensive state of Guinea fowl breeding system in the study area. These observations were consistent with those reported in traditional poultry farming in Nigeria (Saidou *et al.*, 1994), in Chad (Mopate *et al.*, 1999; Mopate and Maho, 2005), in Mali (Kaboret *et al.*, 2002),

in Burkina Faso (Sanfo *et al.*, 2007) in Benin (Dahouda *et al.*, 2007; Dahouda *et al.*, 2008; Boko *et al.*, 2012; Ouedraogo *et al.*, 2015), in Togo (Lombo *et al.*, 2011) and in Senegal (Fall *et al.*, 2016).

## Conclusion

The study made it possible to determine the characteristics of the rural Guinea fowl production and identify constraints. The Guinea fowl breeding contributes to the reduction of food insecurity and to the improvement the producer socio-economic conditions of this sub-prefecture. Thus, improved breeding conditions for rural Guinea fowl and adequate supervision would allow better production of eggs to supply other cities, particularly N'Djamena, which has a strong demand for this product.

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