

Study of Guinea fowl (*Numida meleagris*) production system in the urban commune of Madarounda, Niger.

Authors' contributions

All authors have collaborated to do this work. Author MHO did the methodology, data curation, writing original draft, formal analysis and conceptualization. Author BN did the writing review and editing. Author YOM did the data collection. All authors approved the final version of the manuscript.

Original Research Article

ABSTRACT

The local guinea fowl (*Numida meleagris*) is native to Africa and belongs to the Gallinaceae family. A study was conducted among guinea fowl breeders in the urban commune of Madarounfa to determine the constraints of guinea fowl production in the area. Sixty (60) breeders were interviewed using a structured questionnaire in six (6) villages 15km apart to collect information on the conduct and practice of guinea fowl breeding. Results revealed that the guinea fowl breeders from this study are men. The production purpose of the guinea fowl in the urban commune of Madarounfa is for selling (53%), self-consumption (32%), and gift/donation (10%). Scavenging is the feeding system (100%) which is mostly used. Constraints related to guinea fowl production as identified by the study are mainly diseases (32%), lack of training (22%), lack of feed (17%), and lack of funding (17%). It is clear that the development of the sector necessarily involves strengthening the surveillance of avian diseases, coupled with veterinary monitoring and supervision of producers.

1. INTRODUCTION

Family poultry farming is very popular and important in developing countries [1]. Local poultry occupies a prominent place in poultry production in sub-Saharan African countries. As a result, traditional poultry farming appears to be an excellent means of household resilience in rural and urban areas [2], [3] and [4].

The grey guinea fowl or common guinea fowl (*Numida meleagris*) is the most domesticated strain in the world. According to Le Coz-Dawn [5], it originated in West Africa. Guinea fowl breeding first spread throughout Africa in the form of farm breeding, then later spread to Europe, Asia and America. Strains adapted to the sub-Saharan African region are called hardy, because they have only been subject to natural genetic selection. They are

Formatted: Font: Italic

characterized by a very slow growth rate. The motley appearance of the plumage gave rise to the name "pintata" in Portuguese, then "pintada" in Spanish, from which finally came the French name of "pintade" [6].

Livestock farming in Niger is practiced by nearly 87% of the active population either as a main activity or as a secondary activity after agriculture [7]. Among the poultry species raised in Niger, guinea fowl comes in second place after chicken with 26% of the poultry herd. It plays a vital nutritional, socio-economic, and cultural role due to its short production cycle, the absence of religious prohibitions in its consumption, its accessible cost, and its capacity to regenerate income compared to ruminant breeding [8]. Despite this importance, the productivity of local poultry (meat and eggs) is below the demand expressed by consumers [9]. Therefore, poultry productivity must be improved.

Guinea fowl meat is more appreciated than chicken meat due to its organoleptic qualities; according to Baeza et al. [10], the carcass yield is 68.7% in males compared to 68.2% in females. In West Africa, guinea fowl is highly valued for its meat and eggs [11]. Its breeding occupies a prominent place, given its social and nutritional importance in the lives of populations [12]. Guinea fowl meat has a higher protein content than chicken meat [13]. It therefore constitutes a source of income for communities [14]. That's why the guinea fowl is a poultry very appreciated by the population of Niger. Only Niger knows very few studies on guinea fowl breeding. However, to improve livestock production, it is necessary to know the production system and identify the constraints. That justifies this study with the main objective of characterizing the local guinea fowl production system in the urban commune of Madarounfa to contribute to the development of guinea fowl breeding in Niger.

2. METHODOLOGY

2.1 Study area

The urban commune of Madarounfa is located in the department of Madarounfa in the region of Maradi/Niger. The urban commune of Madarounfa is limited to the north by the commune of Djiratawa, to the east by the commune of Dan Issa, to the west by the commune of Safo and to the south by the commune of Gabi. The population is essentially made up of Hausa (65%), Fulani (18%) and Tuareg (9%) [15].

Madarounfa has a forest classified by decree No. 4400 of 1950 with an area of 830 ha. The forest is located near Lake Madarounfa where the pedoclimatic conditions are favorable to the development of vegetation (sandy soils, alluvial plains). The wooded savannah forest heritage has been well preserved and the floristic composition is varied, composed of species such as *Tamarindus indica*, *Mitragina inermis*, *Anogessus leocarpus*, *Acacia albida*,

Bauhinia rufescens, *Acacia seyal*, *Acacia senegal*, *Diosperos mesphilimermis*, *Haephaene thebaica*, *Pliostigma reculatum*, etc. The 800 ha Madarounfa lake is a refuge for an abundant and varied birdlife (storks, ducks, teals, sandpipers, camérons, pelicans, etc.) [16].

Commented [u1]: Check this

2.2 Survey

A survey was carried out among guinea fowl breeders in the urban commune of Madarounfa based on the questionnaire to determine the guinea fowl production system and the flock size of poultry of each producer.

Commented [u2]: font

2.2.1 Choice of Villages

The investigation concerned the urban commune of Madarounfa. six villages were chosen. The choice of these villages was made with the support of the Madarounfa departmental livestock directorate. The criteria for choosing villages are a significant number of guinea fowl producers per village and that the villages are at least 15km apart.

2.2.2 Choice of Respondents

In each village ten guinea fowl producers were chosen. A total of sixty producers were questioned as part of this work. The choice of producers was guided by the village chief who knows the guinea fowl producers in his village.

2.3 Statistical analysis of the data

After preparing the data collected in excel 2016, authors carried out a descriptive analysis with SPSS version 26 software [17].

3. RESULTS AND DISCUSSION

3.1 Socio-economic characteristics of producers

The producers of guinea fowl breeding in the urban commune of Madarounfa are men even if the study reveals that among managers there is 5% of women (Table 1). This situation can be explained by the fact that the management of this breeding is complicated and that men would be better able to resolve amicably the conflict situations that the breeding of guinea fowls could cause [18], [19]. This result is slightly different from that found by Moussa et al. [20] in the urban commune of Tessaoua where women represent 13% of producers. However, in Burkina Faso poultry farming in general is a women's activity [21]. These producers are mostly married (98.3%) and 60% of them are between 30- and 50-years old similar results were found by Issa et al. [22] in Chad and by

Mbengue [23] in Senegal. The practice of guinea fowl breeding in Niger is an old activity (81.7% of the respondents kept guinea fowl for more than 5 years). All the producers have never received training or capacity building on the practice of guinea fowl breeding. The main objective of guinea fowl breeding in Niger is selling (53%), self-consumption (32%), and gift/donation (10%) (Table 1). This result is similar to the result found by Moussa et al. [20] in the urban commune of Tessaoua.

Table 1. Socioeconomic Status of the guinea fowl breeders of the urban commune of Madarounfa.

Parameters and variables	Sample size	Frequency (%)	Parameters and variables	Sample size	Frequency (%)
Producer gender			The main activity of guinea fowl breeder		
Male	60	100	Breeding	30	50
Female	0	0	Farming	30	50
Total	60	100	Total	60	100
Age group			Seniority in guinea fowl breeding		
<30 years	8	13.3	2-5 years	11	18.3
30-50 years	36	60.0	>5 years	49	81.7
50-70 years	15	25.0	Total	60	100
>70 years	1	1.7	Purpose of guinea fowl breeding		
Total	60	100	Sell	32	53
Manager of guinea fowl breeding			Gift/donation	6	10
Men	44	73.3	Distraction	3	5
Women	3	5.0	Self-consumption	19	32
Son	13	21.7	Total	60	100
Total	60	100	Training in guinea fowl breeding		
Marital status			Yes	0	0
Married	59	98.3	No	60	100
Single	1	1.7	Total	60	100
Total	60	100			

3.2 Composition of the poultry flock

The poultry flocks consisted of several species. The average flock size of chickens represents the largest proportion. Out of a total of 2443 poultry encountered, 56.6% are chicken. This number of chickens is followed by the guinea fowl (42.4%), then the duck (0.6%) and finally the pigeons (0.4%) (Table 2). This composition somewhat reflects the national distribution of poultry in Niger which shows the predominance of chicken followed by guinea fowl then pigeon, duck, etc. [24].

Table 2. Composition of poultry flocks in the urban commune of Madarounfa

Species of poultry	Sample size	Frequencies (%)
Guinea fowl	1037	42.4
Chicken	1382	56.6
Pigeon	9	0.4

Duck	15	0.6
Total	2443	100

3.3 Favorite guinea fowl colors

The Guinea fowl with gray plumage were mainly preferred for 68.3% of producers (Table 3). They were followed by the ashes, the gray with white breast and the white with 25%, 5% and 1.7% respectively. This result corroborates that obtained by Moussa et al. [20] in the urban commune of Tessaoua. The choice of these colors is mainly due to personal preference for 46.7% of producers and due to the tradition (26.7%).

Table 3. Guinea fowl preference

Parameters	Modalities	Sample size	Frequency (%)
Guinea fowl color preference	White	1	1.7
	Gray	41	68.3
	Gray with white breast	3	5.0
	Ash	15	25.0
	Total	60	100
Reason for guinea fowl color preference	Tradition	16	26.7
	Personal preference	28	46.7
	Sale	7	11.7
	Calm	3	5.0
	Rapid growth	1	1.7
	Easy to identify	2	3.3
	Availability	1	1.7
	Strength	2	3.3
	Total	60	100

3.4 Technical characteristics

3.4.1. Housing and feeding

Guinea fowl does not have a specific habitat. 58.3% of producer kept their bird outside the house. Scavenging is the main production system. This free-range breeding method is found in the majority of regions of sub-Saharan Africa [25], [26], [27]. The principal reason for choosing this production system is the lack of infrastructure for 51.7% of the producers. But the majority of producers (91.7%) are giving supplement to their bird. The type of supplement is the agricultural sub-products (Table 4).

Table 4. Housing and feeding characteristics of the guinea fowl in the urban commune of Madarounfa

Parameters and variables	Sample size	Frequency (%)	Parameters and variables	Sample size	Frequency (%)
Housing of guinea fowl			Production system		
In the house with us	25	41.7	Scavenging	60	100
			Total	60	100

Outside the house	35	58.3	Reason for choosing the production system		
Total	60	100	Property	5	8.3
Supplement			Animal health	9	15.0
No	5	8.3	Economic	5	8.3
Yes	55	91.7	Lack of training	4	6.7
Total	60	100	Lack of infrastructure	31	51.7
Type of supplement			Tradition	6	10.0
Agricultural sub-products	56	93.3	Total	60	100
No supplement	4	6.7			
Total	60	100			

3.4.2 Health monitoring

Among producers, only 16.7% vaccinate their guinea fowl and 95% do not receive visits from veterinary agents at their farm. The mortality rate per year is above 50% for 75% of producers. For this reason, the majority of producers noted a period of inactivity of the local chicken production due to avian diseases (61.7%) (Table 5). These results are similar to those found par Moussa et al. [28] on local chicken production system in Niger.

Table 5. Health monitoring of guinea fowl in the urban commune of Madarounfa

Parameters and variables	Sample size	Frequency (%)	Parameters and variables	Sample size	Frequency (%)
Vaccination of guinea fowl			Mortality rate in case of diseases		
Yes	10	16.7	<25%	3	5.0
No	50	83.3	25-50%	12	20.0
Total	60	100	>50%	45	75.0
Breeding inactivity period			Total	60	100
Yes	37	61.7	Maladies courantes de la pintade		
No	23	38.3	Fever of two days	9	15.0
Total	60	100	Cholera	43	71.7
Reason of breeding inactivity			Hypocalcemia	2	3.3
Sales difficulties	5	8.3	Avian influenza	2	3.3
Avian disease	32	53.3	Don't know	4	6.7
Non-stop	23	38.3	Total	60	100
Total	60	100			
Veterinary agents visit					
Once a year	2	3.3			
When need	1	1.7			
Never	57	95.0			
Total	60	100			

3.4.3 Guinea fowl egg management policy

Guinea fowl eggs are mainly intended for brooding (43%), sale (43%) and consumption (14%) (Fig.1).

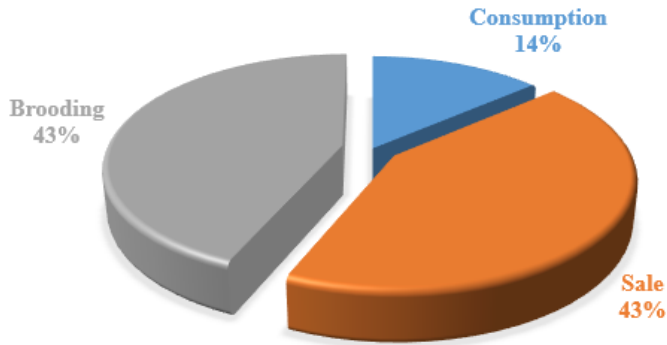


Figure 1. Management of eggs laid by guinea fowl

Commented [u3]: mention study area

3.5 Constraints and solution of guinea fowl production

Avian diseases constitute the largest obstacle of guinea fowl production for 32% of producers. Then comes the lack of training (22%), the lack of feed (17%), the lack of funding (17%), etc. Fig. 2 shows the various problems that hinder the raising of the guinea fowl in the urban commune of Madarounfa. These results are similar to the result found by Dao et al. [29] in Burkina Faso.

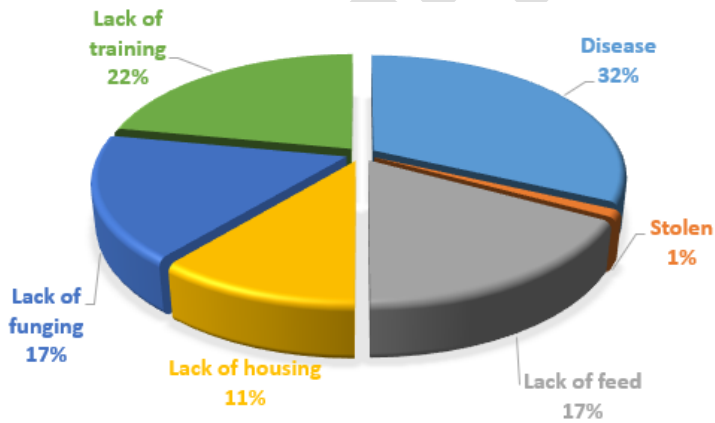


Figure 2. Main constraints on guinea fowl breeding in the urban commune of Madarounfa

Commented [u4]: Mention study area

To address or combat these constraints related to guinea fowl farming, it is essential to train guinea fowl producers (28%), then support them with a minimum fund for livestock reconstitution (25%) with timely

vaccinations (24%) and regular technical monitoring (23%). Fig. 3 summarizes the main solutions.

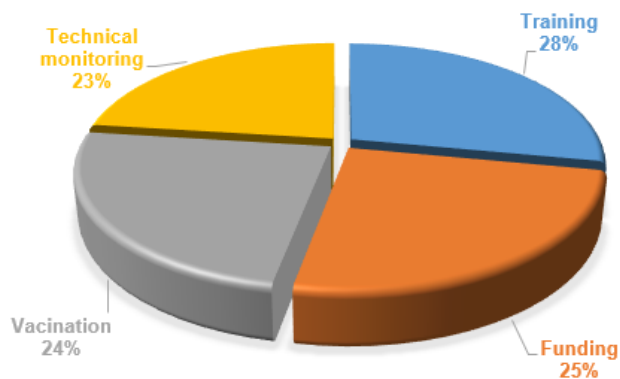


Figure 3. Solution against the constraints of guinea fowl breeding in the urban commune of Madarounfa

Commented [u5]: Mention study area

4. CONCLUSION

This study falls within the framework of promoting guinea fowl breeding in Niger. It appears from this study that the breeding of guinea fowl in the urban commune of Madarounfa is essentially the prerogative of men, especially married men. Gray guinea fowl are the types most loved by the population. These guinea fowl are raised without a specific habitat with a scavenging production system. Guinea fowl breeding in village settings suffers from shortcomings in terms of health, food, production system and environment. The veterinary monitoring, the technical training and the financial support are parameters which could allow a good improvement in productivity in the farming environment of guinea fowl breeding in Niger.

ACKNOWLEDGEMENT

Our thanks go to the management of the livestock department of Madarounfa who provided us with an agent who helped us in identifying villages.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

ETHICAL STATEMENT

All the producers who participated in this survey were first informed about the main purpose of the study and their participation was voluntary and anonymous. A verbal agreement was obtained from each producer at the beginning of his interview.

REFERENCES

1. Gningini Alain Kone, 2019. Effect of the incorporation of rubber seed cake (*heva brasiliensis*) or cashew seed cake on the performance of guinea fowl (*Numida meleagris*) in Ivory Coast: doctoral thesis dissertation from Agrocampus Ouest known University of Brittany Loire. 26p
2. Kondombo SR. 2005. Improvement of village chicken production in a mixed (chickenram) farming system in Burkina Faso. PhD Thesis, Wageningen Institute of Animal Sciences, Animal Nutrition Group, Wageningen University, The Netherlands, p. 208.
3. Traoré FG, Traoré A, Bayala B, Dayo GK, Tapsoba AS, Soudré A, Sanou M, Tindano K, Tamboura HH. 2018. Characterization and typology of Guinea fowl (*Numida meleagris*) farming Systems in Burkina Faso. Int. J. Adv. Res., 6(1): 6-21. DOI: <http://dx.doi.org/10.21474/IJAR01/6177>.
4. Fall A. K., Dieng A., Samba A.N.S., Diallo A. 2016. Family urban poultry farming in Senegal: characterization and socio-economic role in the commune of Thiès. Life, earth and agronomy sciences. REV. CAMES - VOL.04 NUM.02. 2016 * ISSN 2424-7235
5. Le Coz-Douin J., 1992. Guinea fowl breeding, Nancy (France), Editions du point vétérinaire, 252 p.
6. Hien O. C., 2002. Effects of improved health conditions on testicular development, LH and laying of local guinea fowl in Burkina Faso. Doctoral thesis in Biological Sciences, UFR-Svr, University of Ouagadougou, 126 p.
7. FAO. 2010. Livestock sector review in Niger: 115 p.
8. Ayssiwédé SB, Dieng A, Houinato MRB, Chrysostome CAAM, Issa Y, Hornick JL, Missouhou A. 2013. Breeding of traditional or indigenous chickens in Senegal and Sub-Saharan Africa: current situation and constraints. Ann. Med. Vet., 157(2): 103-119. <http://hdl.handle.net/2268/165669>.
9. Ibrahima TRAORE, Salimata POUSGA, Fernand SANKARA, Kalifa COULIBALY, Jacques-Philippe NACOULMA, Marc KENIS, Guy Apollinaire MENSAH and Georges Anicet OUÉDRAOGO. 2020. Study of the feeding behavior of local guinea fowl (*Numida meleagris*, L.) in western Burkina-Faso. Int. J. Biol. Chem. Sci. 14(1): 154-169, January 2020. ISSN 1997-342X (Online), ISSN 1991-8631 (Print). Available online at <http://www.ifgdg.org>.

10. BAEZA E., JUIN H., REBOURS G., CONSTANTIN P., MARCHE G., LETERRIER C. 2001. Effect of genotype, sex and rearing temperature on carcass and meat quality of guinea fowl. *Br. Poult. Sci.* 2001, 42, 470- 476.
11. Houndonougbo P. V., Chrysostome A. A. C., Houndonougbo M. F., Hedi A., Bindelle J., Genglel' N., 2014. Evaluation of the external and internal quality of eggs of five varieties of local guinea fowl raised in Benin, *Review, CAMES*, 2 (2): 2424-7235.
12. Laurenson P., 2002. Determination of the zootechnical parameters of local guinea fowl in the Bargou region. Engineering thesis, Faculty of Agronomic Sciences of Gembloux, 81 p.
13. INSTITUT D'ELEVAGE ET DE MEDECINE VETERINAIRE DES PAYS TROPICAUX (IEMVT). 1983. Manual of poultry farming in tropical areas, second edition. Ministry of Cooperation: Maison Alfort, 186p.
14. Sanfo R., Boly H., Sawadogo L., Ogle R, 2007. Characteristics of village-based farming of local guinea fowl (*N. meleagris*) in central Burkina Faso. *TropicuJllra*, 25 (1): 3136.
15. Livelihood Profile of the Department of Madarounfa. Available on https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://hea-sahel.org/wp-content/uploads/2018/02/NE-profil-niger-ne-07-madaroufa-octobre-20097987208.pdf&ved=2ahUKEwIP2pPn8qHAXVwUUEAHVGIF_QQFnoECBQQBq&usq=AOvVaw06PJzYMcY-nMkGtjHx_hWa
16. UNESCO, 2006. The classified forest, Lake Madarounfa and the tombs of 99 saints. Available at <https://whc.unesco.org/fr/listesindicatives/5057/>.
17. IBM Corp. Released 2019. IBM SPSS Statistics for windows, version 26.0. Armonk, NY: IBM corp
18. Sanfo R., Boly H., Sawadogo L., Ogle R, 2007. Characteristics of village breeding of local guinea fowl (*N. meleagris*) in central Burkina Faso. *TropicuJllra*, 25 (1): 3136.
19. Seydou A., 2012. Analysis of the supply of backyard poultry to the city of Niamey (Niger). Master's thesis in animal production and sustainable development, Cheick Anta Diop University of Dakar, Dakar, (5): 31 p.
20. Ousseini Moussa Hassan, Brah Nouri, and Souley Garba Mahamadou Laminou. 2024. "Production Characteristics of Local Guinea Fowl (*Numida Meleagris*) in the Urban Commune of Tessaoua, Niger". *Asian Journal of Advances in Agricultural Research* 24 (7):70-79. <https://doi.org/10.9734/ajaar/2024/v24i7524>.

21. Bansé O, Jean SZ, Laya S. 2017. Characteristics of poultry farming in the Sahelian zone of Burkina Faso. 2017;263-280.
22. Issa Y, Mopate LY, Missohou A. 2012. Marketing and consumption of traditional poultry in sub-Saharan Africa. Journal of Animal & Plant Sciences. Flight. 2012;14(3):1985-1995. Available:<http://www.m.elewa.org/JAPS>; ISSN 2071 – 7024
23. Mbengue AM. 2019. Poultry farming in the commune of Thiès (Senegal): characteristics and contribution to household income. End of study thesis at ISFAR in Bambey. 2019;34(46):47p.
24. FAO, Food and Agriculture Organization, 2009. Review of the poultry sector in Niger. 69p
25. Idi A. 1998. Peasant practices in traditional poultry farming in Niger. International Network for Family Poultry Development Newsletter. 1998;8(3).
26. Dahouda M. 2003. Breeding of local guinea fowl in the Borgou department of Benin: Comparison of production characteristics on station and in rural areas. DEA dissertation, Faculty of Veterinary Medicine of Liège, Belgium. 2003;35p.
27. Saina H.2005. Guinea fowl (*Numida meleagris*) production under smallholder farmer management in Guruve district, Zimbabwe. M.Phil. Thesis, Department of Animal Science, Faculty of Agriculture, University of Zimbabwe. 2005;108p.
28. Moussaa HO, Keambouc TC, Himaa K, Issab S, Motsa'ad SJ, and Bakassoa Y.2019. Indigenous chicken production in Niger. Vet Anim Sci. 2019; 7: 100040. DOI: 10.1016/j.vas.2018.11.001
29. DAO Issa. 2018. Socioeconomic and phenotypic characterization of focal guinea fowl (*Numida mefeagris*) populations in Burkina Faso. Engineer's thesis in rural development.