

Socio-economic and technical characteristics of donkeys in the far northern region of Cameroon

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Abstract

The Socio-economic and technical characteristics of donkey farming were carried out in 3 locations (Bogo, Gazawa and Zamaï respectively) of the far northern region of Cameroon. Hence, 149 farmers were sampled through a survey using a semi-structured questionnaire. From the study, the results obtained indicate that donkey breeding is an activity mainly carried out by men (91.3%) who are married (95.3%) and are of the Muslim religion (52.3%). None of the farmers have had any training in donkey's husbandry leading to great losses due to poor management of the herds. However, 67.1% of them have been successfully breeding donkeys for more than 5 years. The principal objective of breeding here is to provide a means of transportation for goods, people and agricultural products (92.6%). Donkey herds vary from 1 to more than 15 animals and more than 80% are kept in open fields. Feeding is on natural pastures (100%) with irregular supply of mineral supplements. The major constraints to donkey farming are lack of pasture during dry season (100%) and water scarcity (82.5%). Nevertheless, all the breeders reported that donkey farming remains profitable (100%). Hence, there is need in setting a breeding program for the improvement donkey husbandry.

Keywords: breeding program, constraints, farming, herds, husbandry, management

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Introduction

According to the FAO (2009) livestock represents 40% of the global agricultural production and contributes to the livelihoods and food security of nearly 1.3 billion people. Moreover, it constitutes a lever on which one can count for the improvement of the nutritional and social status of the population in Africa (Faye and Alery, 2001). For food security in the developing world, livestock biodiversity is essential and fundamental for economic development (FAO, 2021). Many African countries are characterized by a great wealth of animal genetic resources (local breeds) which allow us to meet future challenges (FAO, 2016); as is the case with the donkey (*Equus asinus*). The donkey is one of the domestic animals used for hiking, transportation, agriculture, milk, skin or meat production and due to its strength it constitutes a very important working tool (Tapsoba, 2012). According to Roamba (2014) donkeys are found in almost all agro-climatic zones and their population in the world is estimated at 41 million (Kugler *et al.*, 2008).

In Cameroon, the donkey population is estimated to be about 50,000 heads (INS, 2013) and it is mostly found in the Northern Region. Despite the many services provided to rural populations, the donkey remains one of the most neglected mammals in the world (Abebe, 2015; Befikadu *et al.*, 2015) and ignored by public authorities in decisions relating to the development of animal husbandry. Any action to improve the performance of an animal population in general and donkeys in particular requires its prior knowledge. Hence, the need to carry out a study in order to provide baseline information for the development of a husbandry program for the improvement of a breeding system in the regions where donkeys reproduced is very important.

Therefore, the present study was undertaken in order to set baseline information on the characteristics of donkey husbandry. Specifically, it aimed at establishing the Socio-economic and technical characteristics of donkey farming in Cameroon.

Material and methods

Study zone

This study was carried out on herds of donkeys in the locations of Bogo, Gazawa and Zamaï, in the far northern region of Cameroon located in the Sudano-Sahelian zone. The climate is of the Sudano-Sahelian tropical type, punctuated by an annual monomodal rainy season which includes a long dry season (October to May) and a very short rainy season (June to September). Rainfall varies from 700 to 800 mm per year (Cardinale *et al.*, 1996).

The vegetation is made up of several species: *Pennisetum spp.*, *Schoenefeldia gracilis* in the *yaérés* (flood zones) and woody species (*Combretum glutosium*, *Annona senegalensis*, *Strychnos spinosa* etc.) on sandy soils.

Sampling and data collection

A total of 149 volunteer farmers in possession of at least one donkey were surveyed in three locations (Bogo, Gazawa and Zamaï) with the help of the different delegations of the Ministry of Livestock and Fisheries (MINEPIA).

The identification of donkey farmers was done using the snow ball technique (Irina-Maria Dragan and Alexandru Isaic-Maniu, 2013). For each selected farmer, information relating to Socio-economic characteristics (sex, age, religion, number of people in charge, marital status, etc.) and technical characteristics (breeding system and method, housing, food, performance of growth, etc.) were collected using interviews, direct observations and a semi-structured questionnaire. Table 1 gives the distribution of the number of farmers surveyed by locality.

Table 1 Distribution of donkey breeders surveyed by locality

Location	Respondents	Total (%)
Gazawa	94	63.1
Bogo	30	20.1
Zamaï	25	16.8
Total	149	100.0

Data generated were analysed using descriptive statistics to calculate mean values and percentages using the Statistical Package for Social Science (SPSS) software version 21.0 (Motsa'a *et al.*, 2021).

Results

Socio-economic characteristics of donkey breeders

The Socio-economic characteristics of the respondents presented in Tables 2 and 3 shows that independently and whatever the locality, donkey farming is an activity mainly practiced by Muslims (52.3%), who are married (90.6%) men (91.2%) aged between 40-60 years old (63.1%). When comparing the locations, women are represented in a small proportion in the locations of Gazawa and Bogo. Age groups of less than 40 years are the least represented regardless of the locality. The Guizigua ethnic group is strongly represented in Gazawa (64.4%) while the Bororos group dominates in the locations of Bogo and Zamaï.

Table 2 Socio-demographic characteristic of donkey farmers

Characteristics	Location			
	Gazawa	Bogo	Zamaï	Total(%)
Sex				
Male	57.0	17.4	16.8	91.2
Feminine	6.0	2.7	0	8.7
Age range (years)				
	2.0	0.7	0.0	2.7
20 - 40	46.3	8.7	8.0	63.1
40 – 60	14.8	10.7	8.7	34.2
Tribe				
Guizigua	53.7	4.7	6.0	64.4
Mofou	6.7	10.1	8.1	24.9
Peuhl	2.6	5.4	2.7	10.7
Religion				
Christians	22.8	17.4	7.4	47.6
Musulims	40.3	2.6	9.4	52.3
Marital status				
Single	4.6	2.7	2.0	9.3
Married	58.4	17.4	14.8	90.6

Number of persons under the farmers care (person in charge)

The distribution of the people in charge according to the locations illustrated in figure 1 show that irrespective of the locality, the number of people taken care of varies from 1 to more than 20 people. The most represented are those with less than 5, followed by at most 10. Those with more than 20 people are poorly represented. There is a strong representation of donkey farmers with 5-10 people in charge in Zamaï. Those with more than 20 people in charge are only represented in Gazawa.

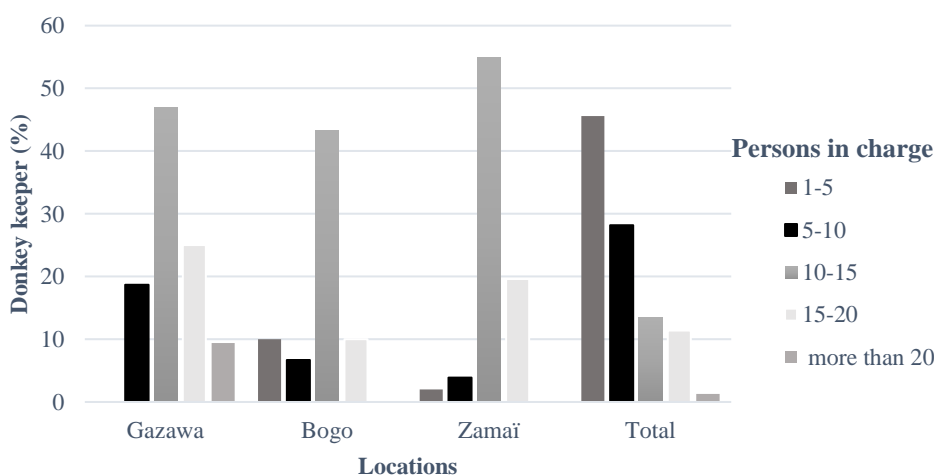


Figure 1 Distribution of the person in charge according to the locations

Level of education

The distribution of breeders according to the level of education is illustrated in Figure 2. It appears that most of the farmers have undergone at least primary education irrespective of the locality with Zamaï having the highest (76%) proportion.

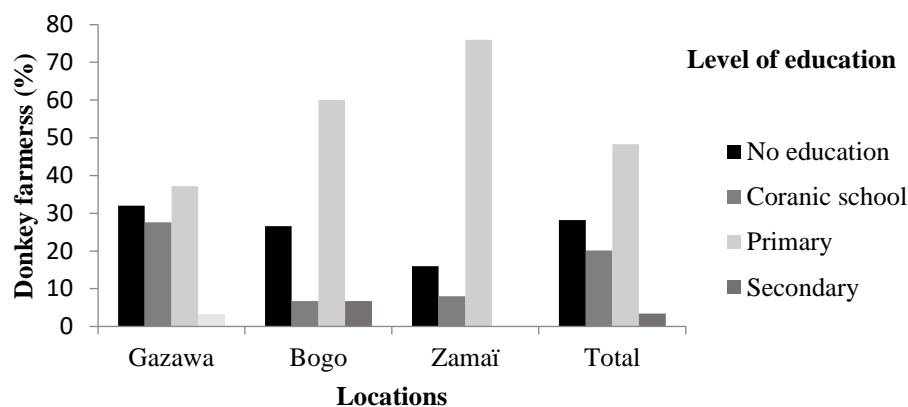


Figure 2 Level of education of donkey farmers with respect to the locations

Other Breeding Species and Breeding Purposes

The distribution of the respondents according to the other species reared and farming objectives with respect to the locations is presented in Table 3. It shows that irrespective of the locality, donkey farming is associated with that of several other animal species, the predominant association being with the local poultry (36.9%), followed by small ruminants (20.8%). Pure donkey farming is non-existent.

Farming goals vary from one locality to another. Transport and agriculture (92.6%) stand to be the main reasons people practice donkey farming in the study zone.

Table 3 Distribution of other species reared, breeding objectives according to the locations

Characteristics	Location			
	Gazawa %	Bogo %	Zamaï	Total %
Farming objectives*				
Transport and agriculture				
Sale	60.4	16.8	15.4	92.6
Transport and sale	0.7	0.0	0.0	0.7
Transport and rental	0.7	0.7	0.0	1.3
Transport and tradition	0.7	1.3	0.0	2.0
	0.7	1.3	1.3	3.3
Other farmed species*				
Poultry	22.1	8.0	6.7	36.9
Cattle	12.8	2.0	0.7	15.4
Cattle+equine	2.0	1.3	1.3	4.7
Bovine + small ruminants	10.1	5.3	2.7	18.1
Pigs	0.7	0.0	0.0	0.7
Small ruminants	14.1	2.7	4.0	20.8
Beekeeping	0.7	0.7	0.0	1.3
Equine	0.7	0.0	1.3	2.0

* A breeder could have several choices

Years of experience in donkey farming

Figure 3 illustrates the years of experience in donkey breeders in the study zone with respect to the locations. In general, the seniority varies from 1 to more than 20 years. Regardless of the locality, the majority of respondents have less than 15 years of experience. Farmers with at 1-5 years of experience (which is the most presented) are mostly found in Gazawa (more than 40%).

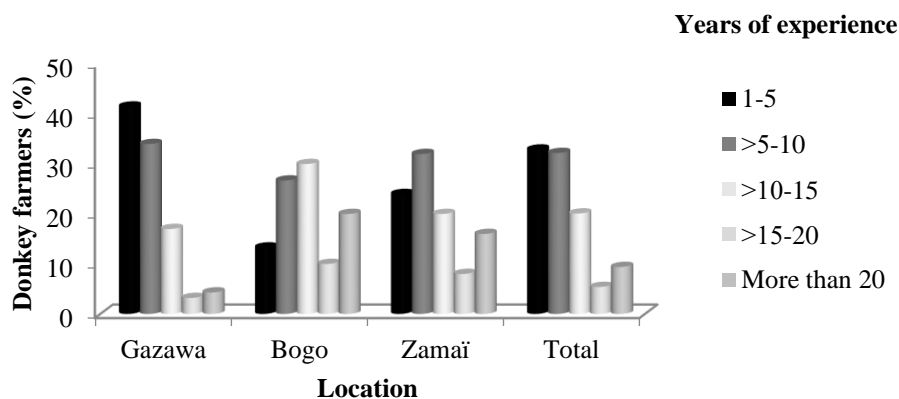


Figure 3 Distribution of donkey farmers (%) according to seniority in donkey farming and by location

Main activities

The main activities of farmers illustrated in Figure 4 shows that irrespective of the locality, agriculture is the main activity for most respondents. It is noted that no breeder has donkey farming as their main activity.

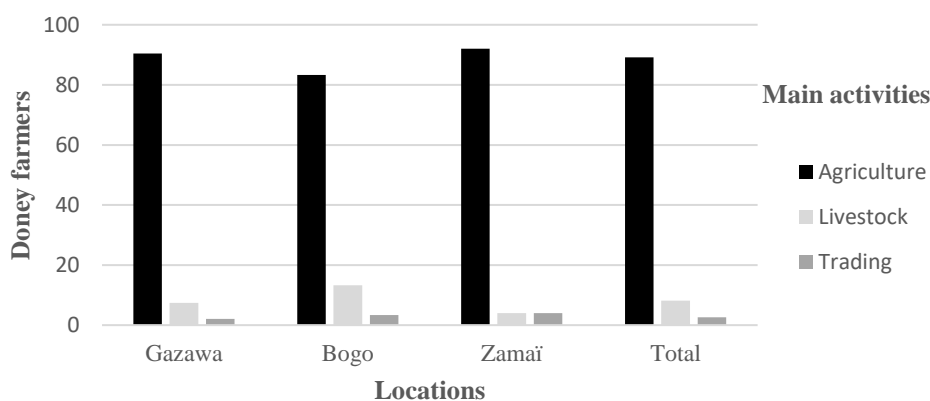


Figure 4 Distribution of the respondent's main activity according to the locations

Origin of parent stock

Figure 5 illustrates the origin of parent stock according to the locations. It appears that irrespective of the locality, farmers mostly buy (more than 80%) their parent stock.

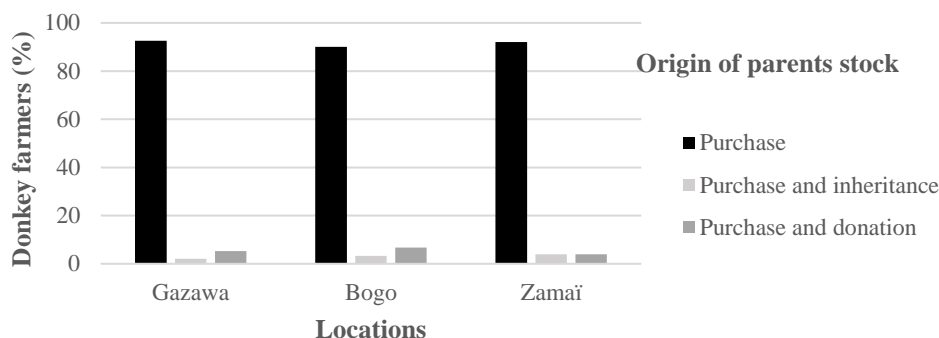


Figure 5 Distribution of origin of parent stock with respect to the locations

Technical characteristics of donkey farming

Number of donkey

Table 4 summarizes the distribution of farmers herd size according to the various locations. It shows that regardless of the locality, the greatest number of respondents holds at most 5 heads (92.6%).

Table 4 Distribution of farmers herd size with respect to the locations

Number of donkey	Location			
	Gazawa %	Bogo %	Zamaï %	Total %
1 ≤ 5	55.7	20.1	16.8	92.6
5 ≤ 10	4.0	0.0	0.0	4.0
10 ≤ 15	0.7	0.0	0.0	0.7
> 15	2.7	0.0	0.0	2.7

Farming systems and methods

The farming systems and methods are illustrated in Figures 6 and 7 respectively. It is observed that donkey farming is exclusively extensive (Figure 6) and is in two variants: permanent scavenging and seasonal scavenging. However, seasonal straying (more than 80%) stands to be the most represented irrespective of the locality with sedentary mode (Figure 7) of production. Irrespective of the locality, nomadism and transhumance are weakly represented.

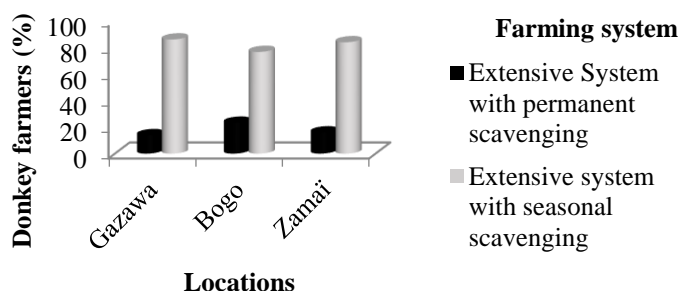


Figure 6 Farming system according to the locations

Housing

Whatever the locality, there is no conventional housing for the donkey. Most often, the animals are kept around the family compound, sometimes under a tree or in full sun. They are shackled using a rope connecting a foreleg to a stake firmly planted in the ground. They usually spend their night on verandas, in abandoned houses or kitchens.

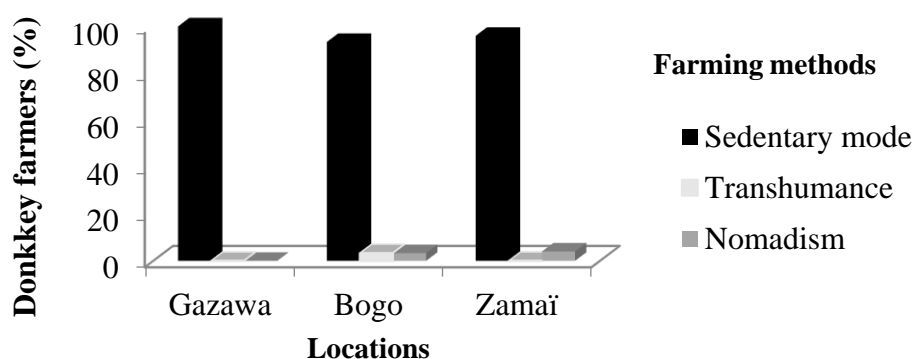


Figure 7 Distribution of donkey farmers (%) according to farming methods and by locality

Feeding and water sources

Most fodder resources come from natural vegetation. The contribution of concentrated foods in the diet is non-existent; the only supplementation is the distribution of kitchen salt or rock salt (figure 8).

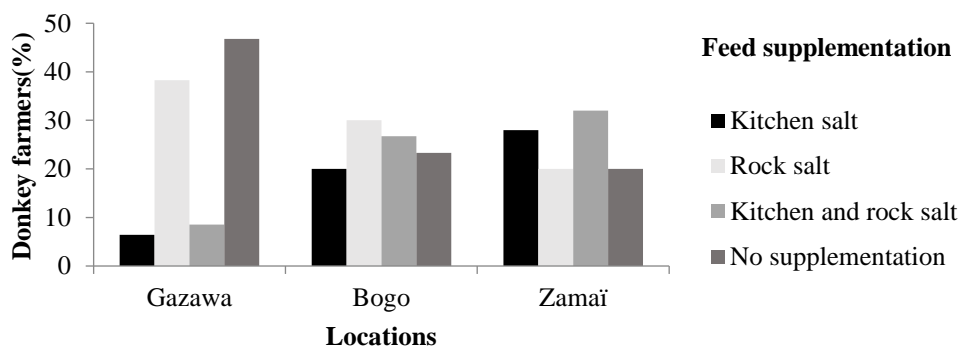


Figure 8 Feed supplementation for donkeys

The different water sources according to the locations are presented in Table 5. Farmers mostly get water from rivers (76.5%).

Table 5 Distribution of water sources according to the locations

Sources of water supply*	Gazaawa %	Bogo %	Zamai %	Total %
Rivers	50.3	14.1	12.1	76.5
Wells	6.0	2.0	2.0	10.1
Rivers and wells	6.7	4.0	2.7	13.4

*A breeder could have several choices

Disease symptoms observed

Table 6 summarizes the main disease symptoms observed in the study zone. It shows that the symptoms are diverse irrespective of the locality. Lack of appetite (51.0%) asthenia (40.3%) and cachexia (23.5%) are the main symptoms encountered.

Table 6 Main disease symptoms observed by farmers in the various locations

Main disease symptoms*	Locations			
	Gazawa %	Bogo %	Zamaï %	Total %
Asthenia	26.8	3.4	2.0	32.2
Cachexia	8.1	2.0	2.0	12.1
Diarrhoea	5.4	1.3	1.3	8.1
Lack of appetite	14.1	7.3	6.7	28.1
Dyspnea	3.4	3.4	2.6	9.4
Foot inflammation	2.0	1.3	1.3	4.7
Discharge (eyes, nose, mouth)	3.3	1.3	0.7	5.4

* A breeder could have several choices

Causes of death

The main causes of mortality in donkey farming in this study are illustrated in Figure 9. Irrespective of the locality, the major causes of death are diseases followed by insufficient pasture for grazing.

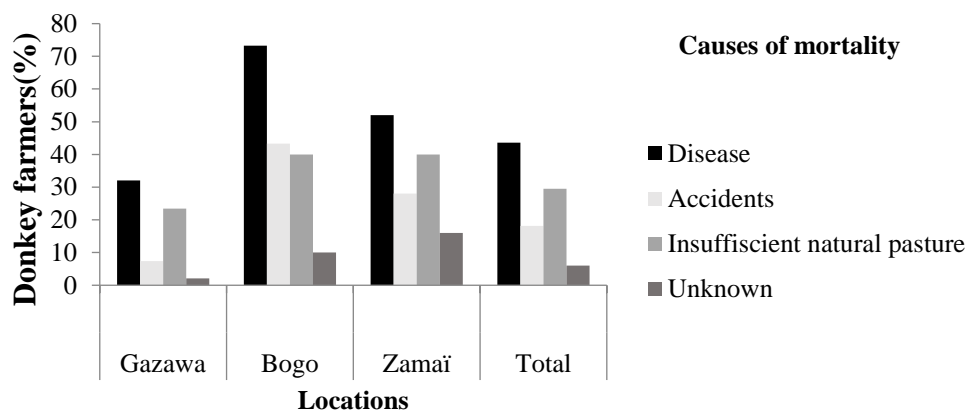


Figure 9 Distribution of donkey farmers (%) according to the different causes of mortality and by locality

Sanitary measures practiced

The distribution of donkey farmers according to the sanitary measures practiced is illustrated in figure 10. In general, the most practiced measure is deworming (63%). The locations where the non-practice of sanitary measures is strongly represented are those of Zamaï and Bogo.

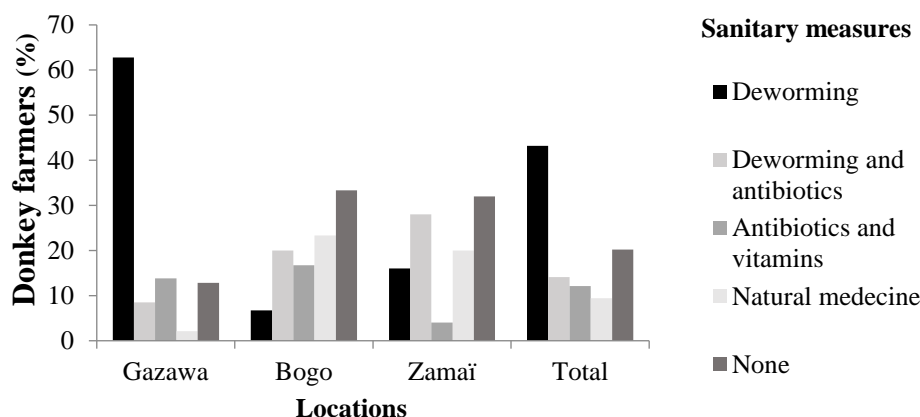


Figure 10 Distribution of donkey farmers (%) according to sanitary measures practiced and by locality

Deworming frequency

The deworming frequency of animals according to the locations is presented in Table 7. Deworming of animals is done once a year in Gazawa (33.6%) while in Bogo, 9.4% of the farmers do not deworm and only 4.7% of them carry out this activity twice a year in Zamaï.

Table 7 Distribution of donkey drivers (%) according to the frequency of deworming

Deworming frequency	Locations			
	Gazawa %	Bogo %	Zamaï %	Total %
Once a year	33.6	4.0	3.3	41.0
Twice a year	11.4	4.0	4.7	20.1
Trice a year	3.4	2.7	1.3	7.4
none	14.8	9.4	7.4	31.5

Sales

Figure 11 illustrates the selling price of donkeys with respect to the locality. Most farmers sell their animals at 140-150000CFA francs irrespective of the locality (40%, 49% and 68% for Zamaï, Bogo and Gazawa respectively).

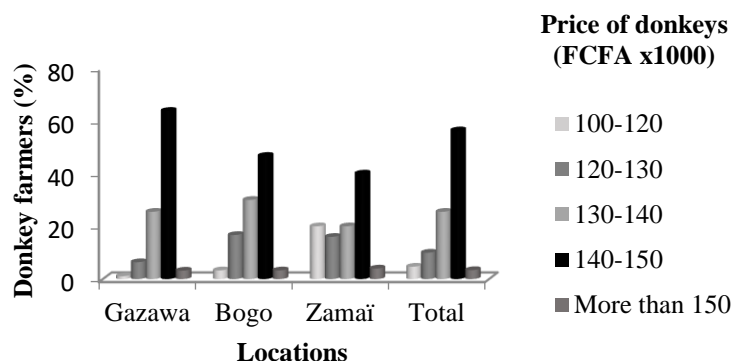


Figure 11 Selling price of donkeys with respect to the locality

Reasons for selling donkeys

Reasons for selling donkeys are illustrated in Figure 12. Irrespective of the locality, the reason for selling is threefold. The most predominant reason is old age (more than 90%) followed by the need for money (more than 30%).

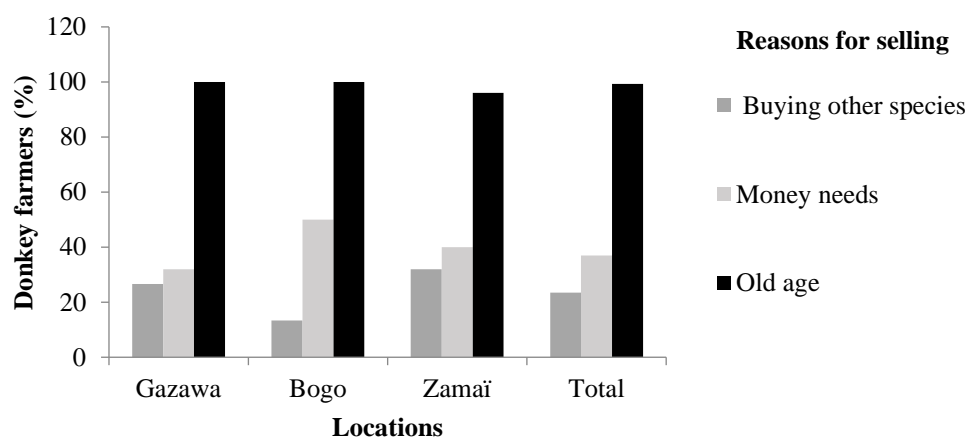


Figure 12 Reasons for selling donkeys with respect to the locations

Constraints and perspectives to donkey farming

Table 8 gives a summary of the problems faced by the respondents in the different locations and the perspectives. The major constraints regardless of the locality are lack of supervision (100%) and pastures in the dry season (100%). Despite these constraints, a very small percentage (0.7%) of farmers expressed the wish to give up while a majority (82.5%) intends to improve and increase their animal herds.

Table 8 Constraints and perspective to donkey farming according to the locations

Parameters and characteristics	Locations			
	Gazawa %	Bogo %	Zamai %	Total %
Constraints*				
Conflicts	8.5	20.0	28.0	14.1
Insufficient water points	100.0	40.0	44.0	82.5
Pathologies	14.9	23.3	20.0	17.4
Lack of supervision	100.0	100.0	100.0	100.0
Lack of pasture in the dry season	100.0	100.0	100.0	100.0
Theft	0.0	30.0	24.0	10.1
Perspectives*				
To give up	0.0	0.7	0.0	0.7
Put more financial means	80.0	36.7	32.0	63.1
Improving and increasing the herd	100.0	43.3	64.0	82.5

* The same breeder gave several answers

Zoo technical characteristics

Herd structure

The distribution of donkey according to the sex is illustrated in figure 13. It illustrates that irrespective of the locality, the percentage of males is higher than the female one (more than 50%) in the herd (figure 14).

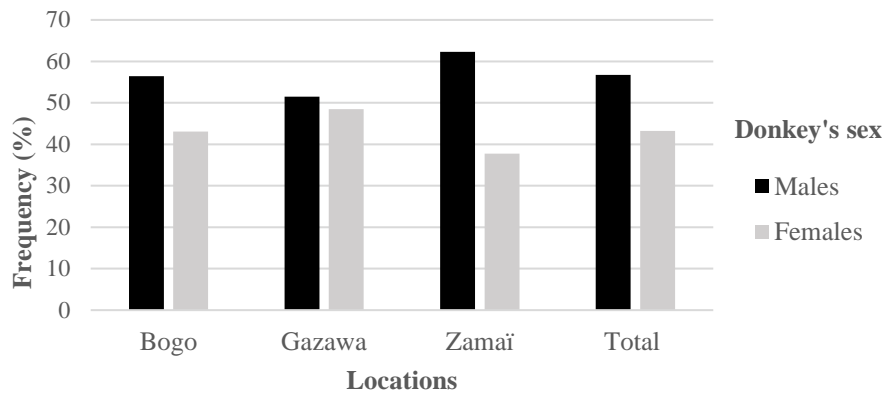


Figure 13 Distribution of donkeys (%) according to the sex by locality



Figure 14 Donkey herds in the far north region

Age

Distribution of donkeys according to the sex and age by locality is illustrated in figure 15. Irrespective of the locality, age varies from year 1 to 7. However, the age of an animal mostly range from 3-7years old (more than 30%) whatever the locality.

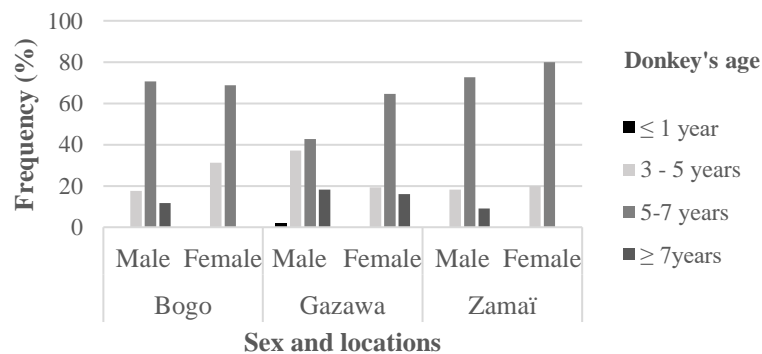


Figure 15 Distribution of donkeys (%) according to the sex and age by locations

Discussion

Donkey farming in our study is mostly carried out by men. This result is similar to those reported by Swai and Bwanga (2008) on donkeys in Tanzania, and Koko and Shuiep (2016) in Sudan where the activity is mainly practiced by men. The low presence of women in the activity can be explained by the fact that the man is the head of the family and is physically strong as donkey farming requires enough strength.

With respect to the level of education, our findings are similar to those obtained respectively by Nyock (2014) on horses in the North-West Region of Cameroon, Swai and Bwanga (2008) on donkeys in Tanzania and Avornyo (2015) in Ghana as well as Mwasame (2020) in Kenya for whom the primary level was the majority. This could be due to the fact that the work of the donkey farmers is more physical, but it is also an advantage or an opportunity for the less educated or uneducated.

The main farming objective of respondents in this study was transportation, which is contrary to Tapsoba (2012) for whom 59% of the farmers keep donkeys for field work against 27% for transport and similar to those of Swai and Bwanga (2008) where they use it also for public transport. The use donkey as a means of transport could be justified by the poor state of the roads. Hence, most farmers and inhabitants of use donkeys for transport.

Farmers mostly buy their parent stock. This finding is similar to that reported by Tapsoba (2012) in Burkina Faso and contrary to Nyock (2014) in the North-West where horse breeders obtained it by inheritance (93%). This could be explained by the Muslim religion which considers the donkey the same way as the pig in our study area.

With regard to marketing, the prices charged are set according to the needs of the breeders; which would explain the fluctuations recorded according to the categories of animals offered for sale. In addition, the sale concerns only adult animals regardless of gender. This is contrary to the findings of Tapsoba (2012) for whom the preferential sale of foal (donkey under 3 years old) is practiced in addition to adults and this according to gender. The non-formalization of the donkey activity could explain the over-the-counter sale.

The extensive sedentary breeding type and the absence of housing for donkeys are similar to the results found by Tapsoba (2012) and Aroua (2020). The fact that this breeding is not taken into account as speculation of animal production by the breeding services could be due to the fact that donkey farming remains traditional.

Contrary to our study area where the diet is essentially of natural fodder combined with salt or rock salt supplementation, 75% of donkey breeders also use concentrates in Burkina Faso (Tapsoba, 2012); the use of these concentrates can be explained by the presence of a donkey slaughterhouses and the renewed interest in the consumption of its meat in this country.

The age range of donkeys in our study zone varies from 3-7years old. This result is similar to that obtained by Khaleel *et al.* (2020) in Nigeria. This can be explained by the different uses of donkeys.

Conclusion

Donkeys as local zoogenetical resources play an important Socio-economic role in rural areas. Technically, donkeys are often kept under extensive and few farmers practice semi-intensive systems. Its husbandry presents itself as a potential income-generating activity and therefore a job opportunity in rural areas.

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Authors' contributions

Camille Laure Nguekeng: Research conception, data collectionn analysis and manuscript writing; Blaise Arnaud Touko Arnaud: Manuscript writing and work supervision; Joseline Motsa'a Sob: Data analysis ; Armel Tangomo: Data collection; Florence Fonteh: Research supervisor; Christian Tiambo Keambou: Research conception, work supervision, data collectionn analysis and manuscript writing

Conflict of interest

The authors declare no conflict of interest.

References

- Abebe, B., 2015. Impact assessment of strategic mass deworming of donkeys in selected central low land areas of Oromia region, Ethiopia. Master of Science in Veterinary Parasitology. College of Veterinary Medicine and Agriculture, Addis Ababa University. Pp 57-61.
- Aroua, M. 2020. Caractérisation morpho-biométrique, génétique et du potentiel laitier des ressources asines en Tunisie. Thèse de doctorat en sciences agronomiques laitier des ressources asines en Tunisie. Institut national d'agronomie de Tunisie. Université de Carthage.
- Avorny, F., Teye, G., Bukari, D. & Salifu, S., 2015. Contribution of donkeys to household food security: a case study in the Bawku Municipality of the Upper East Region of Ghana. Ghana. J. Anim. Sci. Technol. Developm. 3, 15-24.
- Befikadu, Z., Kiflay, W. & Sanjoy, K.P., 2015. Conservation of indigenous donkey breeds of Ethiopia: A review school of animal and range sciences, college school of Agriculture and environmental sciences. Haramaya University, Dire Dawa, Ethiopia.
- Cardinale. E., Ngo-Tama, A.C. & Njoya, A., 1996. Elevage des petits ruminants: connaissance et amélioration de la productivité. In Agriculture des savanes du Nord Cameroun. Présenté à l'atelier d'échange, Garoua, Cameroun, 25-29 Novembre 1996. Pp 97-109.
- Defeu, M. 2015. Diversité des ânes (*equus asinus*) des hautes terres du Nord-ouest Cameroun. Thèse de Master of Science en Biotechnologie et Productions Animales, Université de Dschang, FASA.
- FAO. 2009. La situation mondiale de l'alimentation et de l'agriculture : le point sur l'élevage. pp.187.
- FAO. 2016. Commission des ressources génétiques pour l'alimentation et l'agriculture. 7 p.
- FAO. 2021. Etat de la sécurité alimentaire et de la nutrition dans le monde 2021. www.fao.org.
- Faye, B. & Alary V., 2001. Les enjeux des productions animales dans les pays du Sud. INRA, Prod. Anim. 14, 3-13.
- INS. 2013. Annuaire Statistique du Cameroun, Chapitre 15: élevage et pêche. P 265
- Irina-Maria, D. & Isaic-Maniu, A., 2013. Snowball sampling completion. J. Stud. Soc. Sci. 5, 160-177.
- Khaleel, A.G. Lawal, A.L., Mudassir, N., Alhassan, M.H., Muhammad, I.A., Nasiru, S. & Ahmad-Syazni, K., 2020. Morphometric Characterization of Donkeys (*Equus asinus*) in D/Kudu Kano State for Selective Breeding and Genetic Conservation. J. Agrobiotechnol. 11, 12-21.
- Koko, F.A. & Shuiep, E.S., 2016. The Socioeconomic Value of Rearing Different Ecotype of Donkeys (*Equus asinus*) in South Darfur State, Sudan. SJST. 17, 74-84
- Kugler, W. 2008. Donkey breeds in Europe. Inventory, description, need for action, Conservation. Report 2007/2008. Monitoring Institute for Rare Breeds and Seeds in Europe & Save Foundation. p 62.
- Motsa'a, J.S., Defang, H.F., Hako, T.B.A., Ojong, E.T., Mube, K.H., Nguékem, C.L., Tagning, Z.P.D., Mouchili, M. & Keambou, T.C., 2021. Socioeconomic and productive characteristics of indigenous pig farming in Cameroon. Appl. Anim. Husb. Rural Developm. 14, 32-39.
- Mwasame, B.D., 2020. Analysis of the Socio-economic contribution of donkey ownership and use to household livelihoods in Kiambu County, Kenya. Master of Science in Agricultural and Applied economics, University of Nairobi. Kenya.
- Nyock, R.A.F., 2014. Caractéristiques socio-économiques et techniques de l'élevage équin dans la région du nord-ouest Cameroun. Mémoire d'Ingénieur Agronome, FASA, Université de Dschang.
- Roamba, R.C., 2014. Caractérisation morphobiométrique et biochimique des asins (*Equus asinus*) du Sénégal. Thèse de doctorat Vétérinaire. Ecole Inter-Etats des Sciences et Médecine vétérinaire (EISMV). Université Cheikh Anta Diop de Dakar. Faculté de Médecine, de Pharmacie et d'Odontologie.
- Swai, E.S. & Bwanga, S.J.R., 2008. Donkey keeping in Northern Tanzania: Socio-economic roles and reported husbandry and health constraints. Livest. Res. Rural Dev. 20(5)
- Tapsoba, M., 2012. Aspects socio-économiques de l'âne, les pathologies dominantes et leur prise en charge au Burkina Faso. Thèse de doctorat vétérinaire à l'université Cheik Anta Diop de Dakar. Ecole inter état des sciences et médecine vétérinaire.