

# Characteristics of Breeding Practices, and Reproduction Performances of Sows in Traditional Pig Farming in Moundou City, Chad

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## Abstract

*The objective of this study was to determine the characteristics of breeding practices and reproductive performance of sows in traditional family traditional pig farming in Moundou City. The study was conducted by a survey among 100 pig breeders and concerned 1,771 pigs. Data collected covered farmer profiles, the origin, and structure of pig flocks, reproductive parameters of sows, constraints encountered by farmers, and prospects. Data collected was analyzed using XL-STAT software (6.1.9). It appears that the majority of pig farmers were men, aged in their forties, and married with a middle school level of education in the majority. Ngambaye ethnic group was in the majority while Lele ethnic group was the most experienced. Pigs were acquired exclusively by purchase. The average flock size was  $17.71 \pm 0.43$  pigs with  $10.11 \pm 0.39$  females. The average litter size was  $7.8 \pm 0.14$  with a gradual increase in advanced farrowing. The weaning was practiced at  $11.8 \pm 0.14$  weeks and early puberty in the male ( $4.4 \pm 0.06$  months). Interval weaning-fertilizing service was  $4.94 \pm 1.04$  weeks. The age at first farrowing was  $10.88 \pm 0.12$  months and  $1.99 \pm 0.01$  farrowing per year. The most dominant difficulty was the lack of feeding and neighborhood. The most encountered disease was dermatosis of which its treatment was the only means of struggle used. Treatment is done by breeders with street drugs. Most pig farmers of Moundou City expressed expanding their breeding. Despite traditional pig farming, the reproduction performance of sows was encouraging with 8 piglets a litter, farrowing a year. However, monitoring of reproductive parameters by progesterone assay is necessary to determine the true performance.*

**Keywords:** Breeding, Chad, Pig, Practice, Reproduction, Traditional Farming.

## Introduction

Chad is a Sahelian country whose base of its economy is based on agricultural and pastoral activities. Livestock farming is developed, diversified, and, considered the second pillar of the national economy after oil. The livestock sector accounts for 53% of rural GDP, and 20% of agricultural GDP and supports about 40% of the rural population (MERA, 2008). The Chadian herd has 93,803,192 heads with 1,664,346 heads of pigs or 1.77% (MEPA, 2015). The Doba oil project has led to a massive influx of people to the south of the country. Faced with population growth, the high urbanization of cities, and the low productivity of bovine breeds, the production of animal proteins is not at the demand phase. To satisfy its needs, it is important to develop the breeding of animals with a short reproductive cycle such as pigs. In the tropical zone and African area, pork is raised by low-income farmers in a traditional, and family-run system (Agbokounou *et al.*, 2016; Bharati *et al.*, 2022). It is less restrictive with a low cost of acquiring pigs, a short breeding cycle, and a high prolificity (litter size) in traditional farming (Razafimanantsoa, 1988; Bulgen *et al.*, 1994; Youssao *et al.*, 2008; Youssao *et al.*, 2009; Mopate *et al.*, 2011; Bulgin *et al.*, 2019; Mopate *et al.*, 2020; Qui *et al.*, 2020). The prolificity of sows consists of 8 -15 piglets per litter, and the efficiency of sow reproductions depends on breed, breeding practices, and parity (Ognika *et al.*, 2021, Ognika *et al.*, 2016). This breeding makes it possible to reduce the poverty of vulnerable groups, especially women and young people in southern Chad (Mopate *et al.*, 2020). As a result, the efficiency of sow reproduction on a traditional farm is essential to know to explore the possibilities of improving the sustainable production of these pigs. However, fewer studies have been devoted to this subject, hence the interest in this study. The general objective of this work is to evaluate the reproductive performance of sows in Moundou City to determine the origin of the pigs, and the structure of the herd, and evaluate the reproductive performance of sows

## Materials and Methods

### Study Area

In the Sudanese zone, Moundou City, located in southwestern Chad, is between 8°34'00" North latitude and between 16°04'59" East longitude. It is the capital of the Province of Occidental Logone then the economic capital of Chad and is located about 480 km southwest of the capital N'Djamena. The climate is of the Sudanese type with a rainy season (March to November) and a dry season (October to February). Annual rainfall varies from 800 to 1200 mm. The average temperature varies between 20°C from June to February and 39°C from March to May. Its population is estimated at 163,571 people (MPE, 2009) and is made up of 93% Christians and animists (Mopate and Matna, 2012) who consume pork. Several economic activities are practiced by this population, namely agriculture; breeding (mono and polygastric); fishing, trade, and crafts. The City has four (04) municipalities and twenty-nine (29) districts.

### Methodology

This study was conducted by a single-pass survey using a questionnaire among 100 farmers and concerned 1 771 pigs in Moundou City from August to September 2019. The information wanted to be focused on: the profile of the breeder (sex, age, level of schooling, marital status, duration in the activity); the origin and constitution of the herd; and the reproductive parameters of pigs (date of birth, birth weight, weaning age, puberty age, number of piglets per farrowing, farrowing rank).

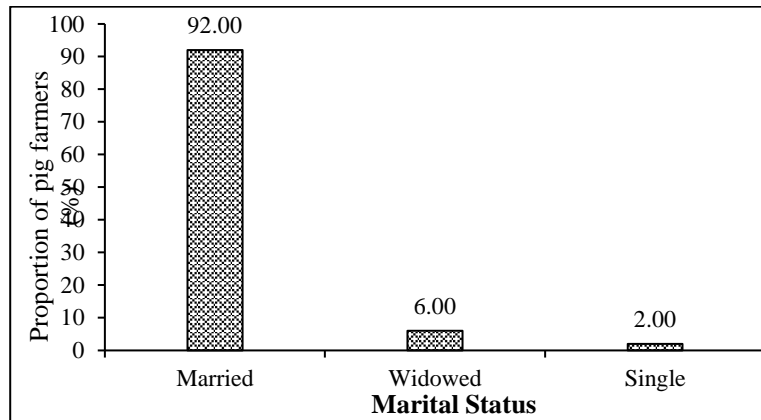
### Statistical Method

This data is entered in Word 2010 and the data was entered in Excel and the XL-STAT software (6.1.9) was used for statistical processing. Descriptive statistics were allowed to have dispersion parameters (mean, standard deviation, extremes, and frequency) and an analysis of variance (ANOVA) was performed to compare means. The parameters measured were: weaning age, puberty age, piglet numbers per farrowing, and annual farrowing frequency. The mean comparisons were made with the Newman Keuls test at the 5% threshold.

## Results and Discussion

### Profile of Pig Breeders

Pig farming in the study area is practiced by men (74 %, n = 74) and by women (26 %, n = 26). The pig farmers in Moundou City were mostly men ( $p < 0.05$ ) and married. The marital status of pig farmers in Moundou City is shown in Figure 1.



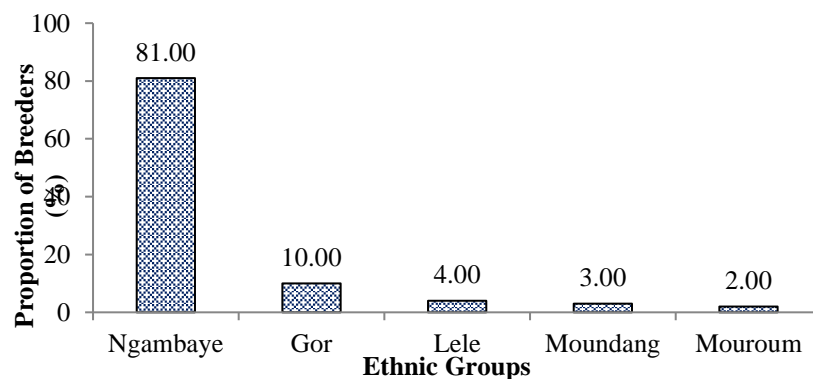
**Figure 1:** Marital status of pig farmers in Moundou City, Chad

The pig farmers in Moundou City were mostly married with the majority of herders are married and a minority being single and widowed. Their average age, the size of their families, and experience are presented in Table 1.

**Table 1:** Socio-professional characteristics of respondents

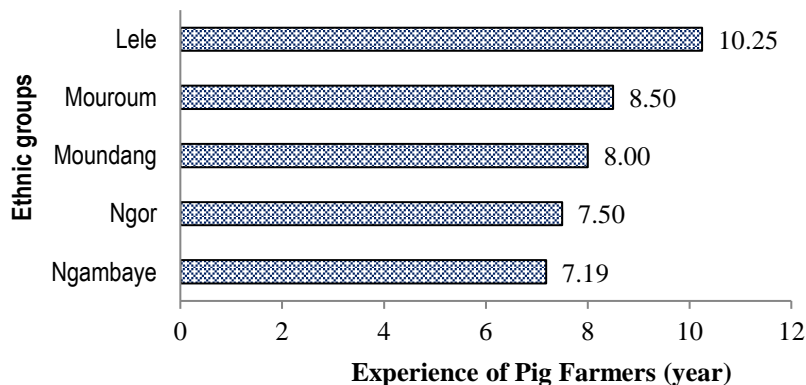
	Age (year)	Number of wives (n)	Number of children (n)	Experience (year)
<b>Minimum</b>	18.00	1.00	1.00	1.00
<b>Mean <math>\pm</math> Standard Deviation</b>	44.29 $\pm$ 1.31	1.29 $\pm$ 0.05	4.70 $\pm$ 0.19	7.39 $\pm$ 0.37
<b>Maximum</b>	70.00	3.00	10.00	17.00

The majority of the breeders were young and had less experience in pig farming. This result is a little different than that obtained in Moundou City in the same study area (Mopate and *al.*, 2020) whose men were 73%, aged 42.91  $\pm$  12.4 years, and married (84%). The results on gender, mean age and marital statute of the farmers were not different from those reported in Cameroon Motsa'a *et al.* (2018) in which most of the respondents (62.2%) were male, 35.6% were between 40-69 years old, 82% were married. Pig farming had experienced less than 10 years reported in Cameroon (Motsa'a *et al.*, 2018). The herders surveyed belong to ethnic groups in Moundou City (Figure 2).



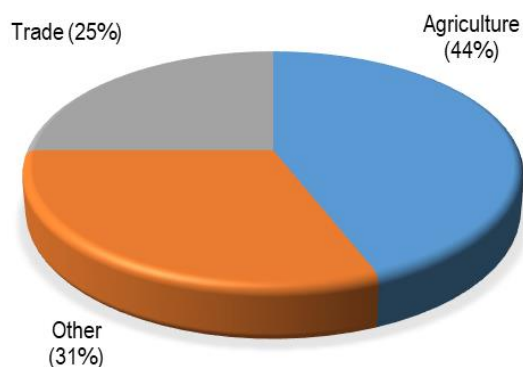
**Figure 2:** Distribution of Pig Farmer Ethnicity in Moundou City, Chad.

The Ngambaye ethnic has been the majority in pig farming because it is the indigenous ethnic group of the province. These results confirm those obtained in Cassamance (Senegal) (Ossibi *et al.*, 2019) where the Dioula represented 41.3% of the breeders surveyed. The experience of herders surveyed by ethnic group is shown in Figure 3.



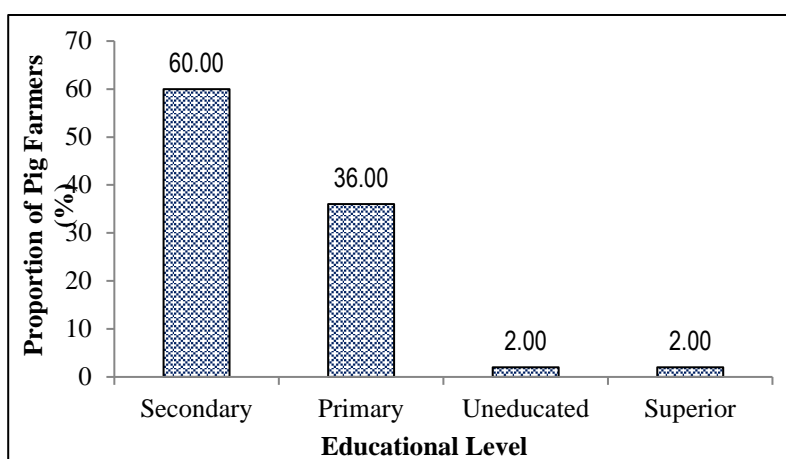
**Figure 3:** Experience of Pig Farmers by Ethnic Group

The Lele ethnic group was the most experienced in raising pigs in Moundou City, followed by Mouroum, Moundang, Gor, and Ngambaye ethnic groups. The activities carried out by the pig farmers in Moundou City are shown in Figure 4.



**Figure 4:** Activities Practiced by Pig Farmers in Moundou City

The majority of the farmers breeders surveyed were farmers and a minority of traders. Agriculture was the most practiced activity by pig farmers in Moundou City. This result, of a farmer marriage rate, is more than those obtained in Cameroon of 82% (Motsa’a *et al.*, 2018), and in Chad at 52% (Mopate and *al.*, 2011). Four levels of education were identified and ranged from uneducated to higher-level education (Figure 5).



**Figure 5:** Distribution of Pig Farmers According to Educational Level

The secondary level was majority followed by primary and minority for the uneducated and those at the higher level. The secondary level was the largest.

## Method of Herd Constitution and Structure

All pigs raised in the study area were acquired by purchase. The herd composition has been established according to the different age and sex categories of animals (Table 2).

**Table 2:** Composition of the herd in pig farms in Moundou City.

	Herd size (n)	Male (n)	Female (n)
<b>Minimum</b>	7	3	3
<b>Mean <math>\pm</math> Standard deviation</b>	17.71 $\pm$ 0.43	7.6 $\pm$ 0.28	10.11 $\pm$ 0.39
<b>Maximum</b>	26	16	20

The number of pigs encountered on farms was mostly females ( $p < 0.05$ ). The results show that all of the pigs raised in the study area come from purchases. This result is higher than that obtained in Benin (Youssao *et al.*, 2008) where the mode of purchase was 76%. The number of females was higher than the male. The high proportion of females in the herd indicates that the breeding is intended for breeding and therefore targets the production of pig meat. This average pig herd size was slightly less than  $19.27 \pm 14.55$  pigs obtained in N'Djamena (Mopate *et al.*, 2011).

## Reproduction Parameters

The average litter size was  $7.8 \pm 0.14$  piglets per farrowing (3-10 piglets) (Figure 6).



**Figure 6:** A sow's Nest on Traditional Farm in Moundou City, Chad

This result has not differed from the 7.25 piglets reported in local breed sows in Benin (Youssao *et al.*, 2008) but is superior to  $6.25 \pm 1.3$  piglets reported in Congo in local breeds of sows (Ognika *et al.*, 2021). The litter obtained in this study is lower than 15 piglets in the Large White breed in Congo (Ognika *et al.*, 2016). The size of the litter gradually increases with the increase in farrowing rank. This same observation was also made in the Groundnut Basin (Senegal) by Bulgen *et al.* (1994) and then in N'Djamena by Mopate *et al.* (2011). The average age of the first farrowing was  $10.88 \pm 0.12$  months and the proportion of piglets by sex is described in Table 3.

**Table 3:** Distribution of Piglets by Farrowing Size

	Male (n)	Female (n)
<b>Minimum</b>	1.00	2.00
<b>Mean <math>\pm</math> Standard Deviation</b>	3.42 $\pm$ 0.13 <sup>a</sup>	4.41 $\pm$ 0.15 <sup>a</sup>
<b>Maximum</b>	7.00	8.00

The change in the number of piglets by sex was not significant ( $p > 0.05$ ). The span size increased with farrowing ranks (Table 4).

**Table 4:** Variation in Range Size by Parity

	1 <sup>st</sup> farrowing	2 <sup>nd</sup> farrowing	3 <sup>rd</sup> farrowing
<b>Minimum</b>	3	5	8
<b>Mean ± Standard Deviation</b>	5.64 ± 0.1 <sup>a</sup>	7.35 ± 0.09 <sup>b</sup>	8.93 ± 0.12 <sup>b</sup>
<b>Maximum</b>	7	8	10

The letter's different superscript on the means indicates a significant difference ( $p < 0.05$ ).

The range size gradually increased from the 1<sup>st</sup> to the 3<sup>rd</sup> farrowing row.

The age at the 1<sup>st</sup> fertilizing protrusion was 6.88 months, that at the 1<sup>st</sup> farrowing was 10.88 months and the gestation duration was 114 days. The average of the reproductive and production parameters (weaning, puberty, fertilization protruding weaning interval, age at first farrowing, and litter size) are presented in Table 5.

**Table 5:** Reproduction Parameters of Sows in the Traditional Pork Farming in Moundou City, Chad.

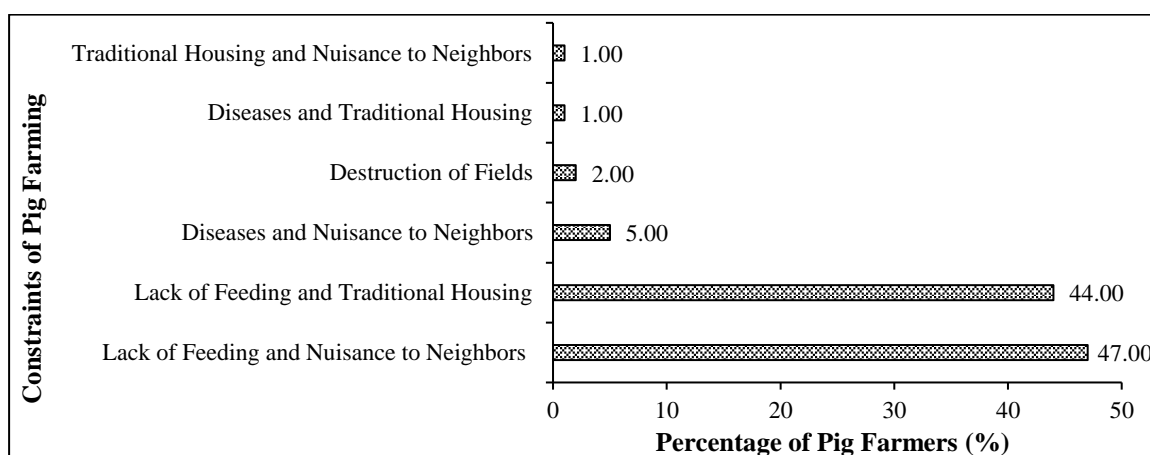
	Weaning (weeks)	Puberty (months)		IW-FS (Weeks)	A1F (months)	Farrowing Frequency a year
		Male	Female			
<b>Minimum</b>	8	3	4	3	10	1
<b>Mean ± Standard deviation</b>	11.08 ± 0.14	4.4 ± 0.06	4.94 ± 0.08	4.63 ± 1.04	10.88 ± 0.12	1.99 ± 0.01
<b>Maximum</b>	12	5	6	8	12	2

*IW-FS: Interval Weaning-Fertilizing Service; A1F: Age of 1<sup>st</sup> farrowing; FM/year: Farrowing frequency per year.*

The age of puberty in gilts was greater than 92 days in Meishan females and 185 days in Large white females, obtained in France by Despres *et al.* (1992). In males, the average age of puberty was 4.4 ± 0.06 months. The age at the first fertilization service obtained is lower than 9.8±0.97 months reported in Congo Brazzaville by Ognika *et al.* (2021). This result was lower than that obtained in N'Djamena by Mopate *et al.* (2011) whose age at first farrowing was 11 months and 7 months for age at the first fertilizing service. The number of farrowing per year averaged 1.99 ± 0.01. This result was slightly higher than the 1.87 ± 0.34 obtained in Moundou in 2010 (Mopate *et al.*, 2020). Interval weaning-fertilizing service was 4.63 ± 1.04 weeks on average. This result is less than 88 days obtained in Madagascar (Razafimanantsoa, 1988). Piglets have weaned an average of 11 weeks with early puberty in the male. The average age of weaning was more than 2 months obtained in Benin by Youssao *et al.* (2009).

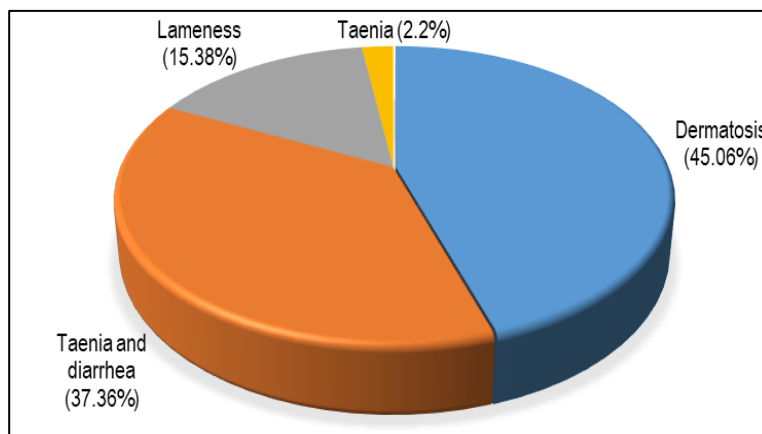
### The Constraints of Pig Farming in Moundou City

Pig farmers in the study area faced many problems (Figure 8).

**Figure 8:** The Constraints of Pig Farming in Moundou City

The most dominant problems were lack of feeding, housing, and nuisance to neighbors. The difficulty to supply food to pig farmers during the rainy season, the smell and noise, and the destruction of the fields by pigs, have been the origin of conflicts with neighbors. The problem with housing lies in the fact that construction with local materials does not allow effective cleaning and disinfection. Most pig farmers in Moundou City faced these problems,

especially in the rainy season. The same result was reported in the Democratic Republic of Congo by FAO (2012) and Bharati *et al.* (2022) reported that improving the productivity of small-scale pig farming depends on addressing the many problems it faces. In unmonitored farms, diseases are the main difficulty that causes economic losses to farmers. This case is reported in traditional pig farming in Africa by Omowon *et al.* (2019). Then, Improving the productive capacity of pig farming through the improvement of breeding conditions is an asset for the most vulnerable groups such as women and children to have financial empowerment as indicated by Bharati *et al.* (2022). The farms surveyed in the study area were plagued by numerous diseases (Figure 9).



**Figure 9:** Diseases Encountered in Pig Farmings in Moundou City, Chad

The diseases encountered on the farms were mostly dermatosis followed by tænia and diarrhea and in the minority lameness and tænia. These pathologies were dominant because the pig farmers of Moundou do not respect any rules of hygiene or food transition and the precarious state of the soil. This result confirms that obtained in Benin (Youssao *et al.*, 2008).

The method of treatment, the origin of veterinary products, and the prospects of pig farmers in Moundou City are presented in Table 6.

**Table 6:** Treatment of Diseases and Perspectives for pig farmers.

Parameters	Variables	Number of farmers (n)	Percentage (%)
Means of struggle	Treatment	91	100.00
Responsible of Animal cares	Veterinary	28	30.77
	Farmer	63	69.23
Origin of drugs	Pharmacy	39	42.86
	Street	52	57.14
Perspectives	Expand Farming	88	88.00
	Making Professional Pig Farming	12	12.00

Treatment has been the only means of control used by pig farmers and mostly done themselves. The majority of drugs were provided on the street. Expanding their farming was the most expressed perspective by the pig farmers.

## Conclusion

All pigs raised in this City were purchased with an average of  $17.71 \pm 0.43$  heads per flock, and the females were  $10.11 \pm 0.39$  heads. The litter size was  $7.8 \pm 0.14$ . They were weaned at  $11.08 \pm 0.14$  weeks of age. Interval weaning-fertilizing service was  $4.63 \pm 1.04$  weeks with  $1.99 \pm 0.01$  farrowing per year. The age at first farrowing was  $10.88 \pm 0.12$  months with an age of the first fertilizing service of 6.88 months. The reproduction performances of sows in traditional pig farming have been encouraging. The constraint most encountered by breeders was that of rationing and neighborhoods. Dermatitis has been the most common disease on farms. Treatment was the only means of control used by the surveyed breeders, much of which was carried out by the pig farmers. Veterinary drugs were mostly bought on the street. Expanding their farm size was the most expressed perspective by the pig farmers in Moundou City. However, monitoring reproduction parameters by progesterone assay is necessary to determine the true performance.

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## Contribution by Authors

Equal contribution

## Conflict of Interests

There is no conflict of interest.

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