



Dairy Farm Breeding Practices and Milk Production in the Sudano Guinean and Sudano Sahelian Zones of Cameroon

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Authors' contributions

This work was carried out in collaboration between all authors. Author HCE designed the Study, wrote the protocol, and wrote the first draft of the manuscript. Author TAE managed the literature searches, analyses of the study, performed the investigation based on a pre-designed questionnaire and author FXE supervised the study. All authors read and approved the final manuscript.

Original Research Article

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ABSTRACT

Aim: In Cameroon, research in the development of the milk sector has focused its studies on the quality (chemical and microbiological) of milk without specifically presenting the breeding context. The present work therefore, aims at shading more light on the description of the milk sector in Cameroun.

Location and Duration of the Study: The study was carried out in the Sudano-Sahelian and Sudano-Guinean zones of Cameroon from April 2012 to March 2013.

Methodology: The investigation was based on a pre-designed questionnaire. The questionnaire was filled out based on observations and discussions with the farmers.

Results: The main results show that the size of the livestock farm is largest in the Sudano-Guinean zone. Cow feed was supplemented in the two zones, milking was done manually and milk production varied according to the season and zone. In the Sudano Sahelian zone, average milk production varied from 1/L/day/cow to approximately 1.5/L/day/cow alternately during the dry and the rainy season. While in the Sudano-Guinean zone average milk production was 3.5L/day/cow during the dry season and 4.2 L/day/cow during the rainy season. In general good hygienic and milking practices were

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poor.

Conclusion: Milking practices in the Sudano Sahelian and Sudano Guinean zones are rudimentary and are not proficient enough to ensure optimum production. These constraints are due to the lack of training of dairy farmers in good breeding and hygienic practices.

Keywords: Zone; season; breeding; milk; dairy farm.

1. INTRODUCTION

The Cameroon livestock population is estimated at about 5 million cattle with 95% of this found in the Adamawa, North, Far-North and the North-West regions, with an annual milk production of about 107 000 000 L [1]. This low milk production has led to significant rise in the importation of milk and dairy products in order to satisfy the local demand of the population [2,3]. Therefore, in order to boost milk production in Cameroon, state authorities have embarked on the promotion and development of the dairy sector. In this regard, the technical, organizational and institutional problems relating to an increase in milk production has been tackled by different development programs (PNVRA, GESEP and SDDP). However aspects related to the characterization of the milk sector have not been given an equal attention, [4,5]. Several works have focused so far on the quality (chemical, microbiological) of milk [6,7,8,9], without specifically treating the breeding context. The present work therefore, aims at shading more light on the milking practices in dairy farms of the Sudano Sahelian and Sudano Guinean zones in Cameroon. Perspectives for the characterization of the milk sector are discussed, based on the existing situation and stake.

2. METHODOLOGY

2.1 Zone of Study

The study was carried out in dairy farms of two agro ecological zones of Cameroon: the Sudano Sahelian zone and the Sudano Guinean zone (Fig. 1).

2.2 Investigation

In each zone (Table 1), 30 dairy farms were randomly selected and visited. The farms selected were representative of the two zones concerned in our study. The investigation consisted on the characterization of the livestock (number of cow, average age, race involved, feeding, drinking source and milk production), description of the farms' environment, milking practices and the materials used in milk production. This investigation was carried out by filling a pre-established questionnaire, observation and interview guides. The questionnaire focused on five main areas of our study: farm environment; manpower; milking materials; milking practices; feeding habits of the cows. The quantity of milk produced in the different farms per season was obtained through observations and also by interviewing the farmers.

The questionnaire and the guides were filled out based on visual observations and interview with the farmers. The farmers were sensitized beforehand on the interest of the study and the accuracy of the information required. Data obtained was analyzed by frequencies using sphinz plus V5 and statgrahics plus 5.0. The percentage and standard deviation was

calculated using Microsoft Excel 2007. Comparing the results from these data permitted us to ascertain the impact on the yield as a result of the nature of the farm, the region and also the season.



Fig. 1. Agro ecological zone of Cameroon (Adapted from PAN/LCD, 2007 [10])

- Sudano Sahelian
 - Sudano-Guinean
- Forest
 - Highland zone
- Agro ecological zone's
 - Region's limit

The characteristics of these zones are described in Table 1.

Table 1. Characteristics of the zone of study [10]

Characteristic	Zone	
	Sudano Sahelian Zone	Sudano Guinean Zone
Location	Between 8°20' and 13°10' N lat and between 12°30' and 15°40' E long	Between 5°10' and 8°20' N lat between 9°30' and 15°40' E long
Altitude	Between 500m 1000m above sea level	Average altitude 1000m above level
Vegetation	Savannah, Steppe and Peerage	Savannah
Season	4 months of rain (July – October) and 8 months of dryness	6 months of rain (April- September) and 6 months of dryness
Pluviometry	Average is between 500 and 1000mm	Average is between 1500 and 2000mm
Temperature	Annual average : 28°C ; Max 42°C Min, Average 17°C	Annual Average Temp: 22- 42°C

3. RESULTS AND DISCUSSION

3.1 Description of Farms and Milking Practices

3.1.1 Description of farms

In the Sudano-Guinean and Sudano-Sahelian zones, most of the dairy farms are built with temporal material and are vulnerable to harsh weather. The unique dairy farm built according to standard is the inheritance of the former dairy project of the year 1980 and is located in the Sudano-Guinean zone. This farm is well structured and has a milking area while 66.67 % of farms in the Sudano-Guinean zone lack milking area. However, our survey showed that in the available milking areas, hygienic rules were not respected; thus, wastes were found on the ground and dung deliberately left on the ground as a means to improve soil fertility [11]. We noticed the presence of pest such as rats, mice, cockroaches and flies in the farms. According to these results, it appeared that the environment of the dairy farm of the areas of our studies compromised the sanitary quality of milk. Therefore, a particular attention should also be paid to the local milking practices of the two zones.

3.2 Milking Practices

3.2.1 Handling

In the Soudano-Sahelian and Soudano-Guinean zone, milking is done manually once a day in the morning mainly by women and children. The actors involved in the activity do not have appropriate uniforms and do not apply good hygienic practices such as washing of hands or teat before milking. It was also usual to find some of them with dirty nails and hair. This poor hygiene could easily cause cross-contamination of the milk. Edima *et al.*, [9] suggested that these non-conformities were due the fact that most of the dairy farmers are illiterate. In fact, only about half of the dairy staff (54 %) had elementary education. The Soudano-Sahelian and Soudano-Guinean zones include areas characterized by one of the lowest literacy rates in rural Cameroon [9].

3.2.2 Milking equipment

Milking equipment is rudimentary in the two zones of study. In the Sudano-Sahelian zone, milk coming from teat was pre-collected in calabashes (83.33%) or in metallic containers (16.67%) while, in the Sudano-Guinean zone, most farmers use plastic containers (41.18%), calabashes (23.53%) or metallic containers (35.29%). Pre-collected milk is immediately gathered into containers before taken to the transformation unit. In the Sudano-Sahelian zone, gathering containers are calabashes (66.66%), plastic cans (16.67%) or metallic cans (16.67%). Contrary to the Sudano-Sahelian zone, 50% of dairy farmers in the Sudano-Guinean zone gather milk in plastic containers. These results showed that milking equipment can compromised the microbiological and physico-chemical quality of milk. In fact the collection of milk in cans previously used for storing fuel appears to increase contamination. Moreover, studies of Gran *et al.* [12] showed that milk coming from plastic containers had higher levels of coliforms than metallic utensils. Most of the plastic containers used in the dairies are scratched, which could hinder satisfactory cleaning, thus leading to appropriate conditions for the development of microorganisms.

3.2.3 Milking

In the two zones of study, we noticed that all the farmers do not respect requirements for pre-milking and milking. Only 20 % of farmers in the Sudano-Sahelian zone and 8.33% of them in the Sudano-Guinean zone attached the tails of their cows before milking. 25% of farmers of the Sudano-Guinean zone did not attach the back legs of the cow, and 36.36% do not keep the calf far away during milking. The cleaning of udder was not effective in most cases. In the Sudano-Guinean zone, 58.33% of operators placed the milk container on the ground whereas operators in the Sudano-Sahelian zone place the milk container within their legs. These results showed that in the Soudano-Sahelian and Sudano-Guinean zones, milking was not well done and the practices favoured the contamination of milk produced. According to our observations, good hygienic practices have to be improved in the two zones of study, in order to achieve good product quality.

3.2.4 Dairy capacities

The herd size is more important in the Sudano-Guinean zone. The average was respectively 60 and 35 cattle for Sudano-Guinean and Sudano-Sahelian zones (Fig. 2).

A significant difference was observed for calves with 26.08 % of the herd in the Sudano-Guinean zone and 17.62 % in the Sudano-Sahelian zone. The high number of calves in the Sudano-Guinean zone was an indicator of the importance of nursing cow in this zone compared to the Sudano-Sahelian zone. Meanwhile, there was no significant difference ($P > 0.05$) for the number of cows. Taking into account that milk produced in the country comes essentially from nursing cows, these results do predispose the Sudano-Guinean zone to better milk production than the Sudano-Sahelian zone. Fig. 3 shows that milk production is more important in the Sudano-Guinean zone than in sudano sahélien.

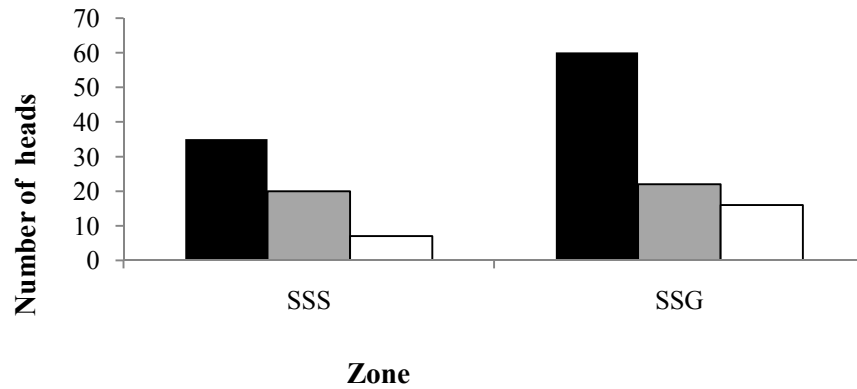


Fig. 2. Livestock farm proportion in the sudano guinean and sudano sahelian zones



Fig. 3. Influence of the agro-ecological zone and season on milk production

SSS = Sudano Sahelian Savannah; SSG = Sudano Guinean Savannah; SS = Dry season; SP = rainy season

■ Rainy season □ Dry season

On the other hand, milk production is influenced by season in the two zones ($P < 0.05$). During the dry season, the average daily production was estimated at 1 L per cow in the Sudano-Sahelian zone and at 3.4 L per cow in the Sudano-Guinean zone. During the rainy season, the production of milk increased to 1.5 L and 4.2 L in the Sudano-Sahelian and the Sudano-Guinean zones respectively. The increase in the production of milk observed during the rainy season was due to the calving rate. It was observed that more than 90 % of calving was during the rainy season as a result of; the availability of grass and water. These

results were not similar to those of Libouga et al. [6], who found in some dairy farms of the Sudano-Guinean zone a daily production of 1.2 and 0.35 L respectively in the rainy and dry seasons. Nowadays, the daily production of milk has increased as a result of the introduction of milking breed such as *Holstein* and the vulgarization of artificial insemination techniques. Moreover, milk production depends on feeding. Cattles consume mainly fresh grass during the rainy season and dry grass in dry season. But many farmers also supplement cattle nutrition with feed (Table 2). In the Sudano-Guinean zone, the owners have set up fodder fields of *Bracharia sp* and *Stylosanthes sp*, which species are highly nutritive to cattle.

We deduced from these results that the feeding of milking cow is supplemented at different proportions. The diversity of supplements given to cow indicates the will of these producers to improve milk production. In the Sudano-Guinean zone, 3.13 % of farmers serve bone flour to their cow. Although this flour is a good source of minerals, they should ensure the quality of this flour to avoid cases of bovine spongiform encephalopathies [13]. Just as supplements, drinking sources are diversified for both zones (Table 3). In the dry season, the principal source of drinking water in the Sudano-Sahelian zone is the river while in the Sudano-Guinea zone, the principal drinking sources are tap water and bore holes. This result shows the poor watering of cows in the dairy farm of the Sudano-Sahelian zone, where dryness is harsh. Indeed, during the dry season, most of the rivers of this zone dry off. This situation does force cows to go for long distances in search of water. Meanwhile, in the Sudano-Guinean zone, farm owners invested in permanent sources of water no matter the season.

Table 2. Food supplements for cow

Supplement	Frequency (%)	
	SS	SG
Chaff	25	25
Salt	33.34	34.38
Cotton grains	8.33	6.25
Licking stone	8.33	3.13
Sorghum	8.33	/
Dry hay	16.67	/
Natron	/	6.25
Bone flour	/	3.13
Bran	/	21.88

SS = Sudano- Sahelian zone; SG= Sudano Guinean zone

Table 3. Drinking sources for milk producing cows

Source	Dry season		Rainy season	
	% SSS	% SSG	% SSS	% SSG
Streams	50	26.67	66.67	35.71
Wells	33.33	/	33.33	/
Tap	16.67	33.33	/	28.57
Water tower	/	6.67	/	7.15
Bore hole	/	33.33	/	28.57

SSS = Sudano Sahelian Savannah; SSG = Sudano Guinean Savannah

4. CONCLUSION

Milking practices in the Sudano-Sahelian and Sudano-Guinean zones are rudimentary and are not proficient to ensure expected production. These constraints are due to lack of training of dairy farmers of the Soudano-Sahelian zone on one hand and to the difficulties faced by those of the Sudano-Guinean zone in applying good hygienic practices in the other hand. The emergence of the dairy sector in these zones needs more commitment both from actors and officials.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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