Inventory of the risks of contamination of milk from the neighbourhoods in traditional farms in the Poro region in Côte d'ivoire

Frederic Harding Kouaho[1] ✉ (iD)
Abdoulaye Toure[1] (iD)
Abdoulaye Soumana Gouro[2] (iD)

(✉ Corresponding Author)

[1,2]*Abdou Moumouni University of Niamey, BP 10896 Niamey, Niger.*
[1]*Email:* hardingkouaho@gmail.com
[1]*Email:* tourabdoulaye@yahoo.fr
[1]*Laboratory of Biotechnology and Valorization of Agroresources and Natural Substances, University Peleforo Gon Coulibaly, BP 1328 Korhogo, Côte d'Ivoire.*
[2]*Email:* abdoulayegouro@yahoo.fr

Abstract

This study, which highlights the situation of dairy farms as well as their development prospects, took place from May to October 2022 in the Poro region of Côte d'Ivoire. And focused on the sociodemographic, zootechnical and health characteristics of 45 traditional farms with a total of 360 dairy cows. Trade, the main activity for 51.1% of the owners, followed by agriculture 31.11%, for 88.88% of the indigenous Senufo herders and 93.33% are non-indigenous Fulani. Feed is pasture for 75.6% and 24.44% of farmers providing a feed supplement. The age of first calving is between 3 and 4 years old or 5 to 6 years old. Cows that calved the most at the age of 4 years by 46.51% compared to those calved 3 years ago 30.23%, 5 years 19.77% and 6 years 3.49% at the regional level. The frequency of milking per season varies significantly from 0.5 litres/day to 15 litres/day depending on the breeds observed ($P<0.05$). The main parasitic diseases are Trypanosomiasis 28.88%, a bi-infection (Safa (foot-and-mouth disease), Bovine Nodular Cutaneous Skin Disease (BNCSD)) 20% and Contagious Bovine Pleuropneumonia (CBPP) 13.30%. For 80% of farmers, the prevalence of clinical mastitis is 60% and 20% estimate the prevalence of subclinical mastitis to be 40%. The milk is harvested by the Fulani and 33.33% sell the milk to wholesalers in each department of the Poro region. The amount of unsold milk 22.22% filtered for some, boiled (10 to 15 minutes). This study highlights a lack of hygiene during milking and on farms. It is therefore important to carry out mastitis screening actions in traditional dairy farms in the Poro region and to structure it.

Keywords: Dairy cow, Farm situation, Ivory Coast, Mastitis.

Contents

Contribution of this paper to the literature
The study provides information on the practices used in traditional dairy farms, to inventory the risks associated with the contamination of milk in the neighborhoods and then provides information on the different diseases on the farms, which is special unlike other studies in this region. It also lays bare the values on the duration of treatment of the herd of the different farms.

1. Introduction

Côte d'Ivoire depends on the Sahelo-Sudan region for its supply of livestock meat [1]. Indeed, livestock farming plays a significant role in human nutrition through the production of milk and red meat in particular, and is a source of income for producers and farmers [2]. The deficit in animal protein, particularly in milk and dairy products, is a permanent problem facing Côte d'Ivoire. Its national production covers 51% of national meat consumption, and only 17% of that of milk and dairy products [3]. Thus, in order to meet its ever-increasing needs for milk and milk-derived products, the Ivorian state has opted for the development of the local milk sector [4]. The State, through donors, has financed various projects, including, among others, the African Development Bank (BAD)-livestock projects phase I and II, which saw the creation of 12 dairy cattle farms, and the southern dairy project financed by Belgian technical cooperation (BTC) [5]. With the aim of reducing its dependence on milk and bovine protein from Sahelian and European countries [2]which dependence gives rise to products that often do not comply with health requirements. However, despite all efforts, the results of improving milk production are mixed. If the quantity of local milk is insufficient, the hygienic and sanitary quality of the milk produced could be improved in order to make the local sector competitive. In addition, the decade of socio-political crisis has led to the absence of administration in certain areas, particularly the Savanes district, and would have led to the destructuring of achievements in cattle breeding [5]. Consequently, the dairy potential has been weakened due to the deterioration in the health status of farms, thus causing a resurgence of many diseases, particularly mastitis. It is therefore with the aim of taking stock of the situation with a view to setting up a dairy model in this region considered favorable to livestock farming that this study was established in traditional farms in the Poro region of Côte d'Ivoire. The objective of the work was to take stock of the risks of contamination of neighborhood milk in traditional farms in the Poro region of Côte d'Ivoire by applying survey sheets aimed at assessing the sociological characteristics of the actors, zootechnical characteristics of the farms, the hygiene and health conditions of the farms, as well as the circuit of collection, distribution, processing and trade of neighborhood milk. Based on this diagnosis, recommendations for improving dairy farming on farms at each farm visited in the Poro region are proposed.

2. Materials and Methods

Study Area: The region subject to this study is that of Poro, it is part of the Savannah District. The Savannah District is made up of four regions including that of Poro which are; the Tchologo, Bagoué and Kabadougou regions with a total area of 62,396 km².
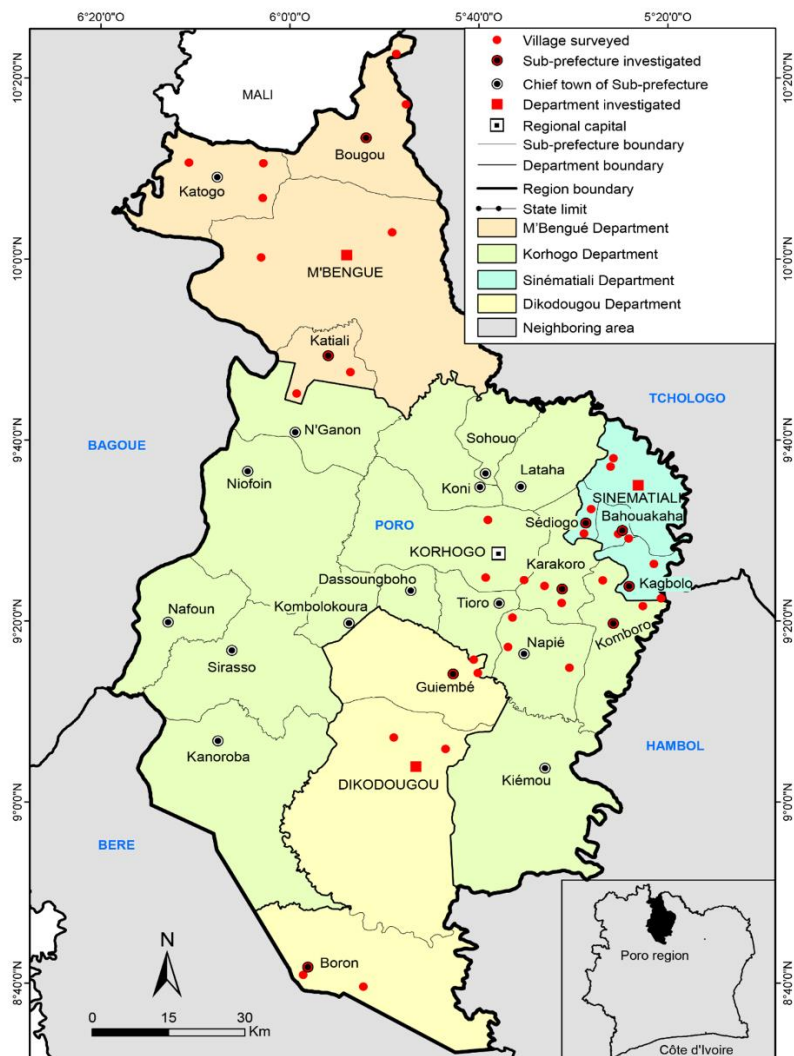

Figure 1. Map of the Poro region showing the different departments visited.
Source: BNETD/CCT,2012 P:WGS 1984, zone 30N design and realization:KOUAHO F.Harding et Zie Mamadou OUATTARA, 2024

The Poro region is a territorial community in the north of Côte d'Ivoire whose name comes from the cultural practice of the people of this locality. It is located between 8°30 and 11° North latitude, 5° and 6° West longitude and covers a total area of 13,400 km². The relief of the Savannah District is characterized by its horizontal plane made of plains and plateaus, the monotony of which is broken, in places, by the appearance of chains of hills or rocky domes that vary between 400 and 600 m in altitude [6]. On the other hand, the hydrographic network of the Poro region is crossed by permanent watercourses such as the Bandama Blanc, the Badénou and the Bou [6]. However, the vegetation of this Sudanese sector is essentially made up of gallery forests, open forests and savannahs. The savannahs are wooded, shrubby and grassy and as for the sub-Sudanese sector, it is defined by a few islands of dense forests, sometimes humid [7]. The Poro region includes the departments of Korhogo, M'Bengué, Sinematiali and Dikodougou, with the city of Korhogo as its capital. In this region, the study was conducted in 45 localities spread across each department of the Poro region; we have the villages and the different sub-prefectures Figure 1.

2.1. Material

To facilitate the link between breeders and carry out this survey, it was a question of submitting a request to the regional management of MAFR (Ministries of Animal and Fisheries Resources) of Korhogo and the departmental directors of MAFR of the Poro region for technical input in the field by their agents.

2.2. Methods

The study conducted allowed the collection of data on breeding practices, milking management, feed used and the marketing of fresh milk.

2.3. Sampling

The farms studied are chosen randomly; these farms belong to indigenous people (natives) and non-indigenous people (foreigners), taking into account their availability to participate in the study. The survey covered 45 farms spread across the four (4) departments (Korhogo, Sinématiali, Dikodougou and M'Bengué) of the Poro region.

2.4. Progress of the Investigation

A survey with a single-pass questionnaire covering farms in the Poro region was conducted among breeders and owners. Its implementation required a pre-survey among technicians in the Poro region in order to select the farms constituting the object of study. The aim was to collect information intended to identify and characterize dairy production systems, the mode of evolution of the farms and the practices of breeders. Data were collected on the characteristics of the farms, on the health status of the herd during the study period, on the feeding of the animals, the hygiene conditions on the farm, the conditions of milking milk in order to determine the risk factors for contamination of milk at production. The identification of artisans, the circuit after milking cow's milk and dangerous practices were noted. Basically, the questionnaire took into account socio-demographic data, the zootechnical and health characteristics of the farms studied.

2.5. Analysis of Survey Data

Descriptive statistics were performed for all variables. In order to facilitate data interpretation, qualitative variables were reorganized into dichotomous variables after the fact. The survey forms were entered using the EXCEL 2016 spreadsheet and served as a statistical analysis tool. 95% confidence intervals were calculated for proportions [8]. The difference between variables was considered significant at $p < 0.05$. The variables of interest are presented in the form of frequency tables.

3. Results

3.1. Neighborhood Milk Production System

3.1.1. Sociological characteristics

The people questioned are mostly breeders (herdsmen) after, owners, as well as people who are both owners and managers in a small proportion. The owners of the farms visited are mostly 88.88% natives of the region are Senufo and mostly men. On the other hand, 93.33% of the breeders are non-natives (Peuls) who come either from Burkina-Faso, Mali and Niger. Agriculture, in particular that of cotton, cereals (corn, sorghum, fonio, rice) and peanuts is also an important activity (31.11%) of the breeders after that of trade 51.11%; owners who are mostly illiterate (Table 1). It is also observed that the majority of non-natives are breeders, breeders at the same time (farmers and traders) and civil servants who are turned to the activity (Figure 2). On the other hand, most of the natives are farmers.
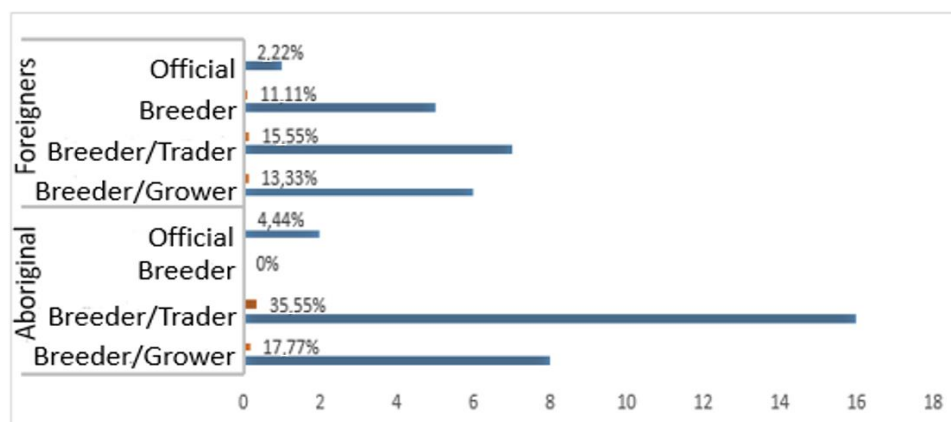

Figure 2. Presentation of the activity and ownership of the owners.

Table 1. Level of education and activity of owners of cattle farms.

Study activity	None	Koranic	Primary	Secondary	Superior	Frequencies
Breeders	2	2	1	0	0	5 (11.11%)
Traders	7	6	4	6	0	23 (51.11%)
Cultivators	3	4	2	5	0	14 (31.11%)
Officials	0	0	0	2	1	3 (6.66%)
Total	12	12	7	13	1	45

3.2. Zootechnical Characteristics of Farms

3.2.1. Racial Composition

The survey in the forty-five (45) farms visited in the Poro region made it possible to identify five types of breeds (Baoulés, Méré, N'dama, Zébu and Métisse); three (03) of which have different phenotypes of cattle which constitute the livestock. And is made up of taurins (Bos taurus) (N'Dama, Baoulé), the Méré breed (cross between male Zebu and female Baoulé), zebus (Bos indicus) which is the cross between the Zebu (Gobra x Goudali) and crossbreeds resulting from crosses between zebus and taurins or the cross between (local breeds x exotic breeds), resulting from artificial insemination were observed in the department of M'Bengué [9]. The N'Dama is short on legs, a breed with long horns and no hump. The Baoulés are small cattle with a massive head and short horns. For the zebu, it is a large, robust animal with a hump and exists in red and light gray colors for the most part. The Méré is a small breed with a single color and has a hump without curvature. The mixed breed, for its part, comes from the cross between a local and exotic breed with different colors and a very thick shape presenting a significant milk production than other local breeds. The cattle raised in the region are mostly from other countries (Figure 2).

3.2.2. Herd Composition

The number of cows and calves in the parks was 844, the Table shows the number of animals by category according to sex and the number of calves by department. The percentage of animals present in each department is 28.43% for Korhogo, 32.58% for Dikodougou, 29.97% for Sinématiali and finally 28.79% for M'Bengué. The farms visited have a workforce that varies from 26 to 200 heads of cattle (Table 2).

3.2.3. Animal Feeding

The feeding practice observed in the region by the breeders is mainly grazing 75.6% and this, for years. Compared to 24.44% of the herdsmen who bring surpluses in terms of food, purchased or produced on site (Table 3). The frequency varies significantly according to the farms ($P < 0.05$). In some places, the herds are led to the pasture every morning by the herdsmen before sunrise then return only at nightfall and others lead to the pasture around 6 am and only return around 11 am or 2 pm (in order to increase their production). During the rainy season, the majority of breeders lead their herds to the classified forests (for those who have the means) to avoid disputes and fines between farmers in case the herd ravages a plantation. The distance traveled for grazing depends on the season. However, several breeders do not use salt crystals (Nacl) at the level of the region 88.88%.

A : N'dama Race

B: Baoulé Race

C: Zebu breed

D: Méré breed

E: Mixed race
Figure 3. Shows the breeds of cows in the farms visited

Table 2. Cow numbers by department and by category.

Department	Staff					
	Farms visited	Dairy cows	Heifers	1st calving	Veau	Farms visited
KORHOGO	12	96	16	22	106	KORHOGO
DIKODOUGOU	9	72	23	12	87	DIKODOUGOU
SINEMATIALI	12	96	33	24	100	SINEMATIALI
M'BENGUE	12	96	17	28	102	M'BENGUE
Total	45	360	89	86	395	Total

Table 3. Feeding conditions for lactating dairy cows.

Power Condition	Variables	Staff numbers of Farms (N= 45)	%	95% CI
Origin of the water used At the farm level (Here)	Well	14	31.11	[24.4-38.3%]
	Pond	8	17.78	[6.2-27.8%]
	River	23	51.11	[36.5-65.5%]
Salt crystals (NACL) (Absent)	NACL	40	88.88	[78.5-97.5%]
Food practice At the herd level (Here)	Pasture	34	75.56	[62.4-87.6%]
	Food supplement (Cotton cake, cassava peel, corn bran, rice bran, sorghum, etc.)	11	24.44	[11.6-36.4%]

Note: CI : Confidence interval; N = Number of farms where the variables are observed

3.3. Management and Productivity of Cattle Farms

3.3.1. Stable Productivity

The results obtained concern productivity, it is based on the data obtained at the level of the questions asked to the breeders of the Poro region. However, the data were obtained according to the experience of the herdsmen who made predictions on the average age at first calving and the months of lactation of the calf. The herdsmen interviewed (84.44%) estimate that the primiparous is between 3 years or even 4 years normally and this depends on the feeding of the herd (Table 4). Because, we could not observe primiparous cows of 5 to 6 years in farms in the Poro region see table. This table shows that in the Poro region, the cows that have calved the most at 4 years 40/86 are more numerous than those who calved 3 years ago 26/86, 5 years 17/86 and 6 years 3/86 at the level of the region.

3.3.2. Milk Production

Most of the time, milking is done once a day early in the morning for each cow. Calves are separated from dairy cows, when they return from the pasture to the cattle pen. The majority of shepherds (95.55%) milk for years early in the morning (around 6 am and 7 am). However, they admit that milk production obtained per cow during the dry season remains low compared to that of the rainy season and according to the breeds observed (Table 5). The frequency of milk per season varies significantly according to the breeds observed (P < 0.05). The milk obtained remains for the herdsmen after production, the milk is packaged in plastic cans or plates with capacities varying between 2 and 15 liters without being filtered for the most part (Table 5). In the presence of the calf, milking is carried out in unhygienic practices.

3.3.3. Hygiene on Farms

Among the farms visited during our survey, 24.44% of the farms are mud, 17.77% dry soil and 57.77% wet soil were observed. The frequency of soil scraping per year is 15.55% once a year, 40% 2 times a year and other 20%. However, the presence of fresh stools is 71.11% compared to its absence which is 28.89% observed in the region.

The frequency of the variables varies significantly according to the farms (P < 0.05). No milking hygiene was observed (hand washing before milking, cows' teat cleaned before milking and disinfection using alcohol) (Table 6).

Table 4. Year of first calving in the different stables.

Departments	Cow of 3 years	Cow of 4 years	Cow of 5 years	Cow of 6 years old	Staff %
KORHOGO	8	12	2	0	22 (25.59)
SINEMATIALI	6	10	8	0	24 (27.90)
DIKODOUGOU	4	4	3	1	12 (13.96)
M'BENGUE	8	14	4	2	28 (32.55)
Total	26	40	17	3	86 (100)

Table 5. Quantity of milk production by breed according to seasons.

Quantity of milk produced per season	Mother	N'dama	Baoule	Zebus	Metis
Dry season	1 to 2.5 liters	1 to 2 liters	0.5 to 1 liter	1.5 to 3 liters	6 to 8 liters
Breeders' response	8 (17.77%) b	14 (31.11%) a	13 (28.88%) a	8 (17.77%) b	2 (4.44%) c
Rainy season	1.5 to 4 liters	1.5 to 3 liters	1 to 2 liters	2 to 6 liters	10 to 15 liters
Breeders' response	11 (24.44%) b	10 (22.22%) b	15 (33.33%) a	7 (15.55%) b	2 (4.44%) c
95% CI dry season	4.5	12.5	10.6	4.5	7
95% CI rainy season	6.4	5.3	13.9	3.3	7

Note: NB: a, b and c proportions of the same column assigned different letters are significantly different.

Table 6. Characteristics of the farms visited.

Features	Variables	Staff numbers of farms (N= 45)	%	95% CI
Physical characteristics of the soil	Mud	11	24.44	[11.6-36.4%]
	Dry soil	8	17.77	[6.2-27.8%]
	Wet ground	26	57.77	[43-71%]
Presence of fresh stool	Presence	32	71.11	[57.8-84.2%]
	Absence	13	28.89	[15-29.3%]
Frequency of soil scraping	1 time per year	7	15.55	[25.7-54.3%]
	2 times a year	18	40	[29.5-58.5%]
	Other	20	44.45	[25.7-54.3%]

Note: CI: Confidence interval; N = Number of farms where the variables are observed

3.4. Health Situation of Farms
3.4.1. Dominant Infections Observed in the Poro Region

Pleuropneumonia (CBPP), trypanosome, dermatosis (BNCSD), safa (foot-and-mouth disease), soumaya-fi (black fever), symptomatic anthrax, hyperkeratosis; are the pathologies encountered in the Poro region (North of Ivory Coast).

Parasitosis, especially trypanosomiasis (28.88%), is the dominant pathology in the region after the survey. It is followed by a bi-infection safa (foot-and-mouth disease) and bovine nodular skin disease (BNSD), which account for a significant proportion of 20% (Figure 4). Respiratory diseases, especially contagious bovine pleuropneumonia (CBPP), constitute the third most described pathology (13.30%) in the Poro region. This disease manifests itself clinically by dyspnea, contamination due to a heterogeneous assembly of animals and, in terms of lesions, hepatization of the lungs, which is subject to seizure after inspection at the slaughterhouse. On the other hand, a tri-infection (trypanosome, safa and CBPP) was also mentioned (11%) in the farms visited. This is followed by bi-infections of 8.88% (CBPP and trypanosome) and 4.44% respectively of (CBPP and safa) followed by (safa and BNCSD). Dermatosis is a skin disease that can affect the entire body of the animal and has many symptoms (skin spots, redness, sweating, fungus, skin infection, skin discoloration and pimples). A local disease under the name of "Soumaya-fi 6.66%" which means "black fever" was mentioned. Symptomatic anthrax was reported in the department of Sinématiali of 2.22%, caused by ingestion of contaminated food and leads to acute inflammation of the intestinal tract. Symptoms include nausea, flesh turns black, loss of appetite, vomiting and fever followed by abdominal pain, vomiting blood and diarrhea. The symptoms described indicate a disease of unexpected onset that affects animals in good condition (well-fleshed bodies). It causes rapid weight loss of the animal. At the advanced stage of the pathology, mortality linked to the disease is low and there is no relapse despite the treatments applied (vaccination and others) on the farms. Therefore, on the instructions of the park manager, the breeders slaughter the sick animal because it is difficult to cure. General signs and certain diseases such as bellowing, aggressiveness, food deficiency and hyperkeratosis have been reported by the shepherds of the region.

3.4.2. Medical Prevention

At the level of the farms surveyed during the vaccination period, there were few farms that confirmed vaccinations (15.56%). Self-treatments carried out in the farms in the event of illness are (44.88%) (Table 7). On the other hand, some breeders questioned (55.12%) say they use private technicians or MAFR agents (Ministries of Animal and Fisheries Resources) to treat their animals. During the campaign or vaccination period by private veterinarians in the Poro region, some breeders say they received their herd vaccination twice (2) in the year, i.e. 35.56%, others often, i.e. 28.88%, and for some once (1) in the year. The prevalence of the variables varies significantly depending on the farms (P<0.05). Private breeders are the only ones authorized to carry out treatments on animals in the Poro region. However, in the event of a shortage of private technicians, they ask for

help from technicians or agents of MAFR (Ministries of Animal and Fisheries Resources) to carry out the vaccination campaign.

3.4.3. How Cows are Treated

The survey in the forty-five (45) farms visited in the Poro region made it possible to identify the methods of treating cows, 18% do the treatment individually at the level of each cow, 82% in groups and none at the drying off is observed. On the other hand, the duration of treatment of sick cows is 88.89% from 2 to 3 days and 11.11% from 1 to 2 weeks Table 8. However, the use of appropriate antibiotics was never observed in 51.11% of cases, often in 31;11% and applied in 17.78% in the farms; treatment during milking was never observed in 60% of the farms, often in 28.89% of the farms and applied in 11.11% of the farms. The application of brands on animals was observed in 17.78% of farms, often in 48.89% and never in 33.33% of farms.
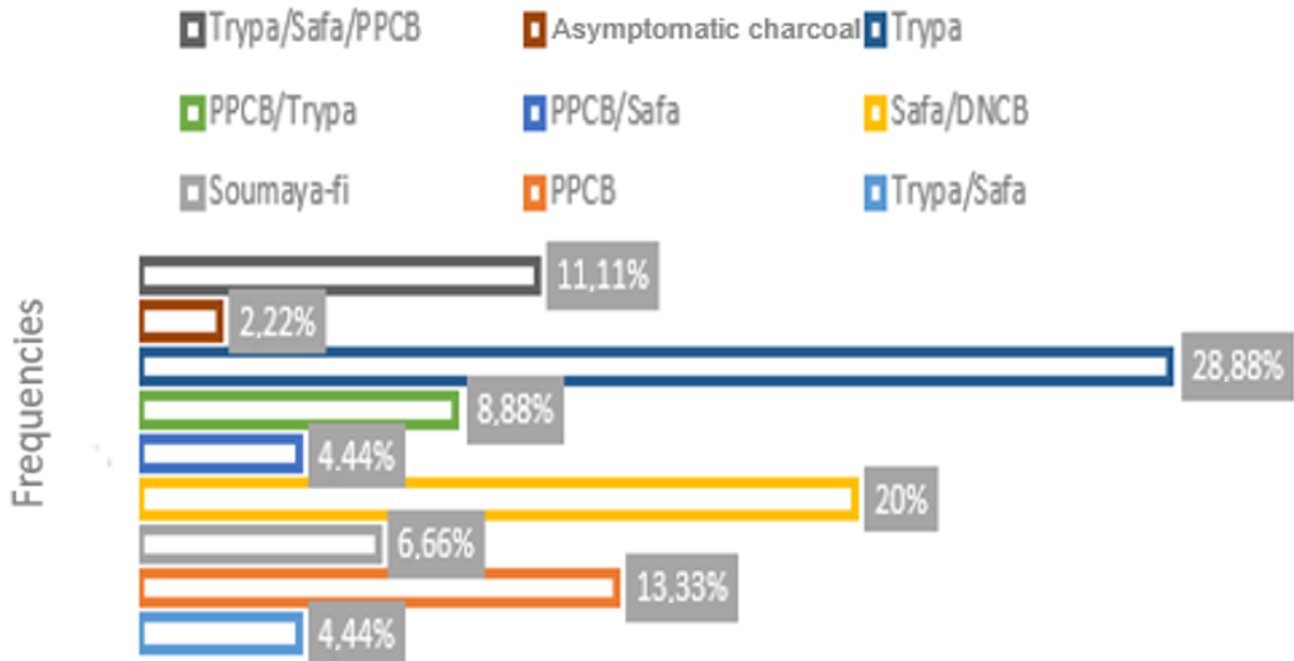

Figure 4. Different types of disease encountered in the exploitation of the Poro region.

Note: Trypa = Trypanosome; CBPP=PPCB = Contagious bovine pleuropneumonia; Safa = Foot and mouth disease; CBNSD=DNCB= Contagious bovine nodular skin disease; Soumaya-fi = Black fever
NB: Safa, soumaya-fi (Are vernacular names).

Table 7. Prevention on farms.

Vaccination	Variables	Staff numbers of farms (N=45)	Prevalence%	95% CI
After the vaccination period	Treatment followed	25	55.55 **a**	[33.3-76.9%]
	Self-medication	20	44.45 **b**	[29.5-58.5%]
During the vaccination period	Often	13	28.88 a	[15-29.3%]
	None	7	15.56 b	[4.6-25.4%]
	2 times a year	16	35.56 a	[21.1- 48.9%]
	1 time a year	9	20 b	[8.3- 31.7%]

Note: NB: a and b prevalences of the same column assigned different letters are significantly different.

Table 8. Treatment of cows on farms by department.

Variables	Features	Number of breeders N=45	%
Duration of treatment	2 to 3 days	40	88.89
	1 to 2 weeks	5	11.11
Use of appropriate antibiotics	Never	23	51.11
	Often	14	31.11
	Application	8	17.78
Treatment of cows during milking	Never	27	60
	Often	13	28.89
	Application	5	11.11
Marks on animals	Never	15	33.33
	Often	22	48.89
	Application	8	17.78

3.5. Mastitis Manifestation

3.5.1. Clinical Mastitis

Among the clinical and epidemiological criteria useful for the diagnosis of clinical mastitis , 78% of the farmers in the sample use the criterion of asymmetry of the quarters (Figure 5) and 84% use udder deformation. The definition of clinical mastitis also includes the notions of change in udder color and modification of the appearance of the milk for 49% and 41% of cases. For the majority of farmers 36% and 34% of the sample, during clinical mastitis, the udder presents a change in udder color, lesion of the teats hence inflammatory risk while this inflammation was not a criterion for 16% of them. For 80% of farmers after survey, estimate that the prevalence of clinical mastitis is greater than 60%.

3.5.2. Subclinical Mastitis

subclinical criteria used for the diagnosis of subclinical mastitis, 91% of the sampled farmers use the criterion of quarter asymmetry, 96% use teat lesion and 89% use udder deformation. The definition of subclinical mastitis contains respectively the notions of change in udder colour, change in milk appearance in 75% and 76% of cases (Figure 6). For a minority of farmers (8% of the sample), during subclinical mastitis, the udder has a persistent imprint on the skin, while no observation was made at the CMT (California mastitis test) test level and skin mobility 0%. Additional examinations can be useful in this case for the diagnosis of mastitis; as the CMT test will be welcome on farms. After investigation, the minority of breeders questioned (20%) believe that the prevalence of subclinical mastitis (inflammations, skin sores, etc.) in dairy farms does not exceed 30%.

3.5.3. Review of the First Drafts

According to the questionnaire results, most of the breeders practice the elimination of the first jets in the farm (100%) in a traditional way (the calf suckles before any milking of the cow), and there is a lack of homogeneity (pus and lump) during milking in the farms visited. However, there is a presence of white color coloration in the milk of 75.56% followed by a liquid viscosity 66.67% and a yellow color in 24.44% followed by a heavy viscosity 33.33% in the farms (Table 9).

However, milk harvesting is carried out by Fulani people who often have family ties with the herdsmen. Indeed, 33.33% sell their milk to the main seller who collars motorcyclists (wholesalers) in each department of the Poro region (Korhogo, Dikodougou, M'bengué and Sinénatiali) (Figure 7). Urban and rural consumers are also served by the herdsmen or resellers, i.e. 44.44%. The quantity of unsold milk (22.22%) is filtered for some, boiled (about 10 to 15 minutes) and processed on site, see diagram (Figure 8).
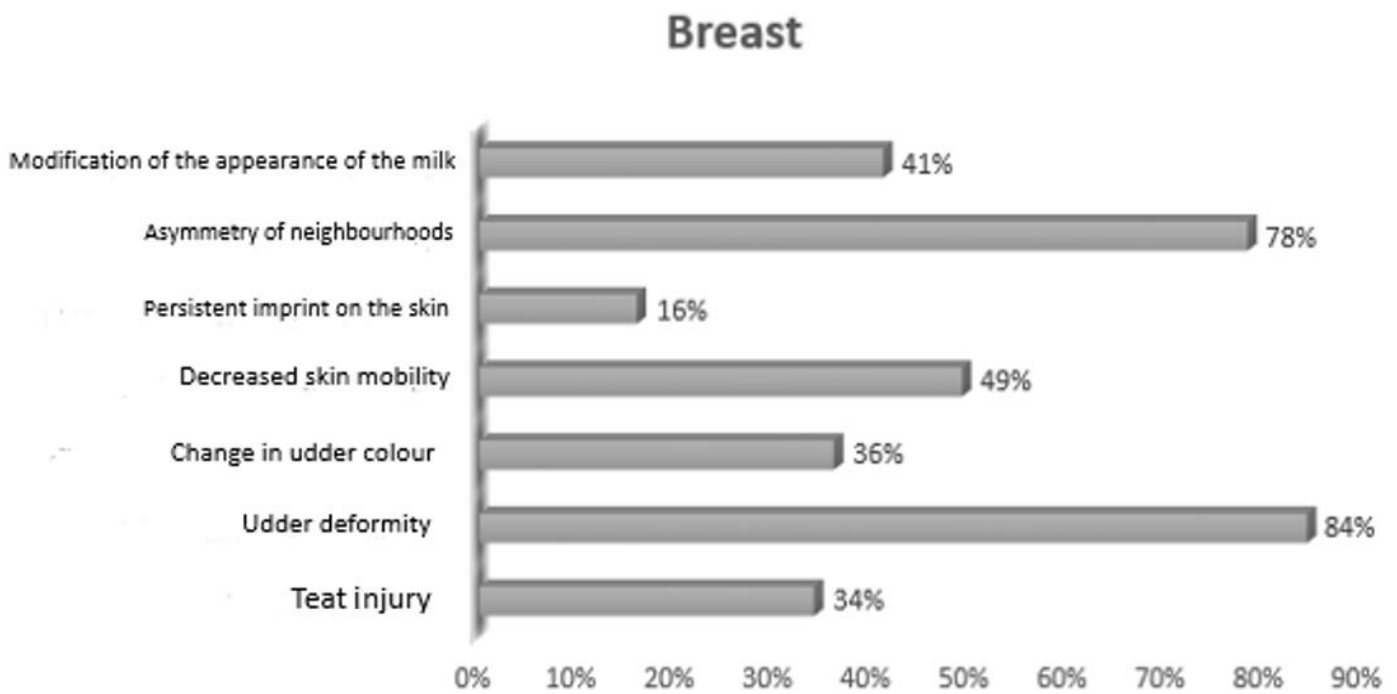

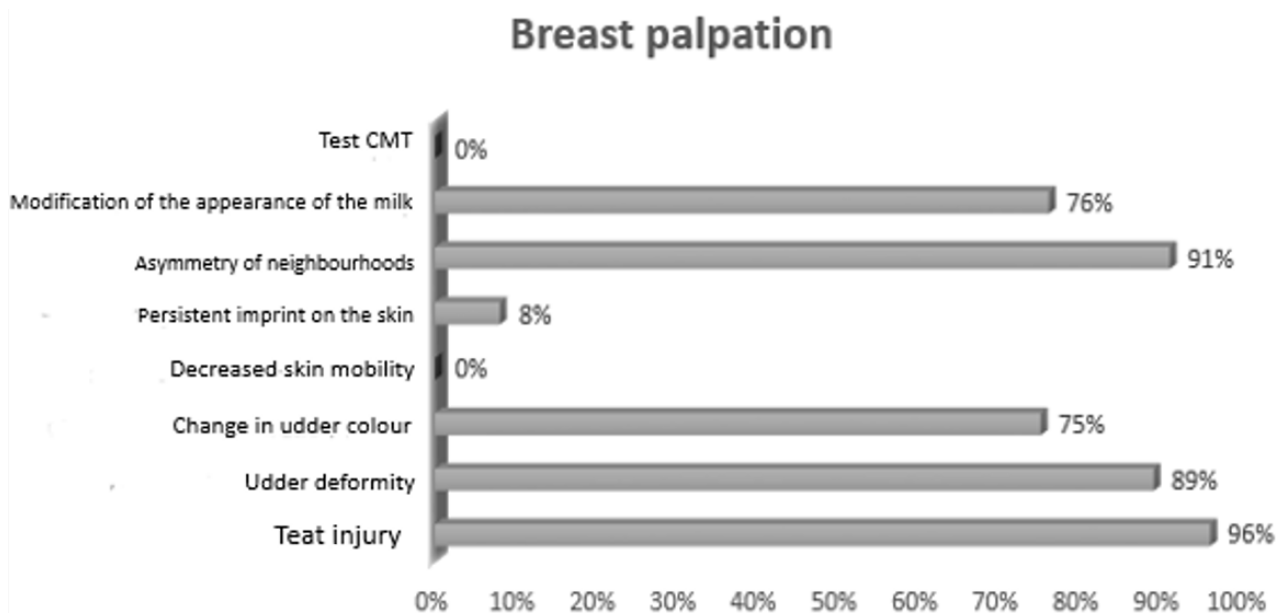**Figure 5.** Signs of clinical mastitis according to breeders.

Figure 6. Signs of subclinical mastitis according to breeders.

Note: CMT (California mastitis test).

Table 9. Analysis of first drafts.

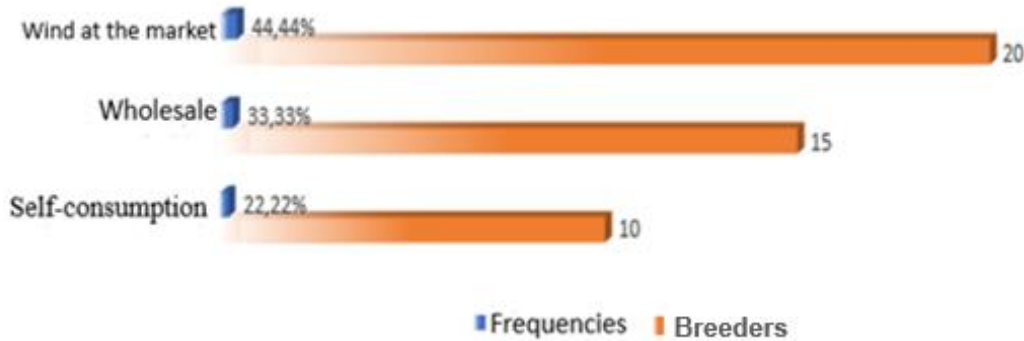| Variables	Features	Staff numbers of farms N= 45	%
Milk color	Yellow	11	24.44
	White	34	75.56
Milk color	Heavy	15	33.33
	Liquid	30	66.67

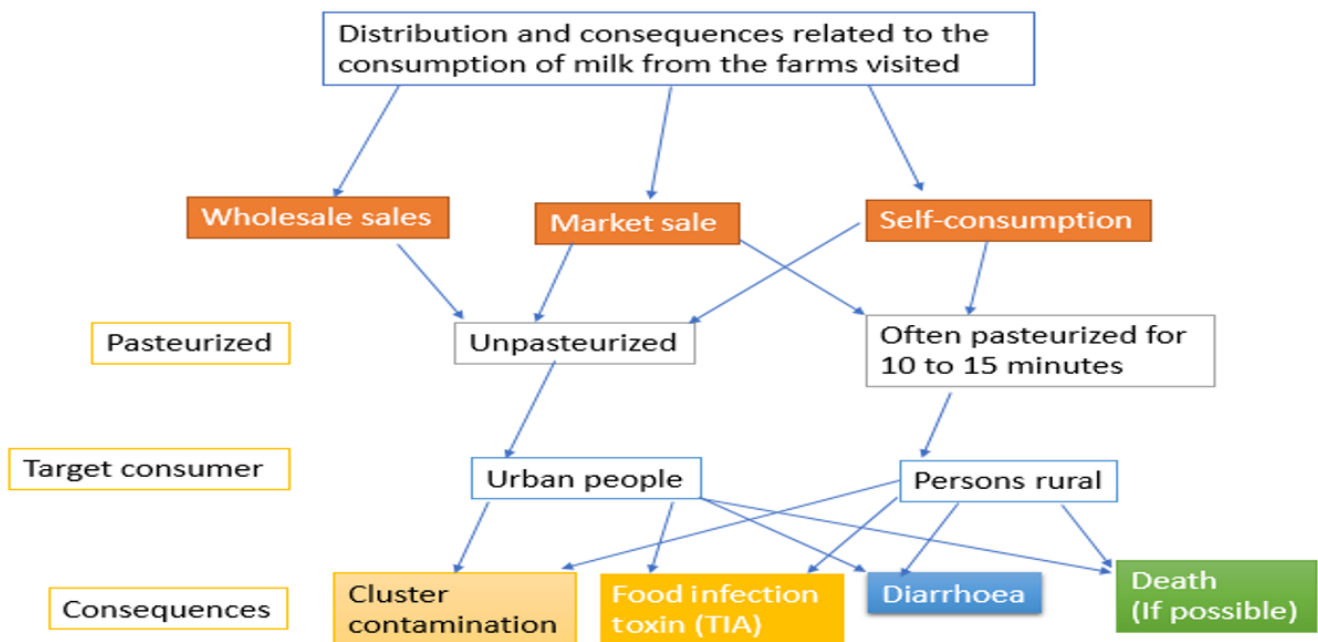**Figure 7.** Distribution of milk in the farms visited.

Figure 8. Distribution diagram and consequences linked to the consumption of local milk from the farms visited.

4. Discussion

The survey conducted in the Poro Region highlighted the conditions of cow's milk production and the assessment of the risk of mammary contamination of these. The study showed that the owners of the farms visited are of Senufo ethnicity and mainly represented in the Poro region by 88.88%. On the other hand, 93.33% of allogeneic (Peuls) is the main ethnic group that runs this field of activity. Indeed, this high frequency of Peuls could be explained by the fact that livestock breeding is the activity that is transmitted from one lineage to another in this ethnic group. However, the major activity of the natives is focused on agriculture. This remark was made by Hamadou, et al. [10] in the peri-urban area of Bobo-Dioulasso in Burkina Faso where livestock farming is dominated by non-natives 87.13% and a minority is made up of natives 2.69%. Agriculture, livestock farming and trade are the activities most practiced by the inhabitants of this area. This could be explained by the fact that its inhabitants have land, but also by the fact that livestock farming is a means of saving agricultural and commercial income, particularly those from the cultivation of corn, cotton, peanuts, etc. This is in correlation with the results of [5] who state that the majority of livestock farmers practice both agriculture and livestock farming. Also, the minority of livestock farmers on the farms visited are not illiterate 26.66% and 15.55% of livestock farmers have a primary level. This could be explained by the youth schooling policy implemented by the Ivorian government; which was not the case a few years ago for this ethnic group. The fact that these breeders found in breeding a main resource. Our results are in the same direction as those of Koffi [11]. These authors observe that during their studies, the majority of the breeders met were schooled. As for the characteristics of the farms visited, night parks are used by the majority of breeders and in a traditional way. The latter use small areas which could be explained by the more or less reduced size of the herds which range from 26 to 200 heads. These results are different from those found by Assani [12] who notes larger areas used by breeders. The high proportion of the Méré breed in the farms of the Poro region could be explained on the one hand by the ability of this local breed to resist trypanosomes which is one of the dominant pathologies in this region. Other breeds, although in the minority, are also observed in the Poro region; zebu and crossbreed breeds are breeds with high milk production observed. These results are consistent with those observed by Kouaho, et al. [9] who state that Zebu are the least numerous in the

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North region. Feeding is the pillar of dairy farming. Thus, in the study, most breeders use natural fodder 75.6 % as their main feed. This could be explained by the fact that in the extensive system, the herds are mainly fed on natural pasture. However, grazing as the only way to feed livestock is one of the pillars of livestock profitability. This feeding method remains consistent with that observed by Marichatou, et al. [13] in extensive production systems. Also, most breeders do not use any feed supplement. This could be explained on the one hand by the insufficiency of feed produced by the industry and the high cost of this feed. On the other hand, since milk production is not an objective for most of its owners, the meadows, in addition to their free access, would only serve to cover the needs of the animals. Nevertheless, the minority of owners using a supplement composed of rice bran, corn, cottonseed cake and crop residues could be considered as the beginning of intensification. In addition, the majority of breeders water their herds in rivers. This could be explained by the fact that, in the traditional system, animals are generally brought to natural parturitions. Thus, during their wanderings, the herd is watered with water from watercourses, including rivers, streams and other natural sources. These results are consistent with the system described by Chayer [14]. Collecting milk in cans is a characteristic specific to all breeders (collectors) in this region. This preservation technique can affect the appearance of fresh milk. During transport, some natural factors can influence the condition of the milk. In particular, heat and turbidity, which can accelerate the milk fermentation process. This collection system is close to that described by Bonfoh, et al. [15] and Corniaux, et al. [16]. However, at the level of milk production, the difference between the quantities of milk produced in the farms would be explained by the breed observed at the herd level. Indeed, the crossbreed breed and the zebu breed have a low number of suckler cows observed in the region with a high production per season. Thus, the average daily production observed after the survey varying from 0.5L/cow to 15L/cow per breed of cows is between that obtained by Coulibaly [17] which is 0.88 L/cow for the same rainy season in Mali. However, our results are similar to those of Bonfoh, et al. [15]. The latter obtained daily quantities varying between 0.5 and 3.5 L / cow and according to the seasons. These results could reflect a better performance of the breeds observed if ever the breeding conditions are taken into account and executed. Then, the low production observed in certain farms and the fluctuation noted by seasons could be explained by the feed ration of the herd, the practice of milking, vaccinations in the farms and the hygiene practice implemented. On the other hand, trypanosomiasis and CBPP are among the dominant pathologies in the region which is consistent with those obtained by Marichatou, et al. [13] and by Coulibaly [17] in Mali and Burkina Faso. This could be explained by the transhumance of animals in these neighboring countries. The lack of private veterinarians and other livestock technical agents leads farmers to resort to vaccination campaigns, carried out by livestock technicians in order to protect their animals. The advance of pathologies, in particular trypanosomiasis, CBPP and foot-and-mouth disease, could affect the productivity of the region. With regard to farmers who take care of their animals themselves, one would be tempted to say that this livestock system consumes very few veterinary drugs. This confirms the results obtained by Vias, et al. [18] in the peri-urban area of Niamey in Niger where the majority of farmers use traditional drugs. In addition, the very insufficient number of private veterinarians, qualified technicians and livestock engineers could explain this observation. A study even in France by Pauline [19] among the clinical and epidemiological criteria used for the diagnosis of subclinical mastitis, 78%, 48% and 43% of veterinarians use the increase in the concentration of somatic cells in milk, the absence of damage to the general condition and modification of the milk. And for a minority 27%, the udder does not present an inflamed appearance. Which confirms our study, among the clinical and epidemiological criteria used for the diagnosis of subclinical mastitis, 91% of the breeders in the sample use the criterion of asymmetry of the quarters, 96% the lesion of the teat and 89% the deformation of the udder. And 75%, 76% of cases, observe a change in udder color, the modification of the appearance of the milk and an absence of inflammation of the udder. On the other hand, this observation was moderately high for clinical mastitis on both sides. Among the clinical and epidemiological criteria useful for the diagnosis of clinical mastitis, 78% of the farmers in the sample use the criterion of asymmetry of the quarters and 84% use the deformation of the udder. The definition of clinical mastitis also includes the notions of change in udder color and modification of the appearance of the milk for 49% and 41% of cases. For the majority of farmers 36% and 34% of the sample, during clinical mastitis, the udder presents a change in the color of the udder, lesion of the teats hence inflammatory risk while this inflammation was not a criterion for 16% of them. Here, the minority of farmers surveyed (20%) consider that the prevalence of subclinical mastitis (inflammations, skin sores, etc.) in dairy farms does not exceed 30%. For 80% of them, the prevalence of clinical mastitis is greater than 60%. This is not consistent with the results of Pauline [19]. On the other hand, the absence of collectors in some surrounding villages and the distance greater than 30 km could, on the one hand, explain the sale of milk to markets and self-consumption. On the other hand, the cost related to transport could be a brake on milk trade in general. What could explain the prevalence of mastitis of 80%, in traditional farms of the Poro region according to the study remains high and close to that conducted in the Maghreb and East Africa where prevalences can reach 89% [20]. Our results are higher than those obtained in local breeds of Niger (Djelli , Azawak , Bororo, Goudali) with a prevalence of 44.2% [21] as well as the prevalence of 44.71% found in Benin in local breeds [22].

5. Conclusion

The methodological approach was based on a survey, with attention paid to the description of the actors and practices in traditional dairy farms. The survey was conducted among 45 breeders comprising 844 cattle distributed in the 4 departments of the region. The data were obtained through interviews based on a single-pass questionnaire. The data analysis made it possible to establish descriptive statistics on the data of the sociological and zootechnical characteristics of the farms, the hygienic and sanitary conditions of the farms, as well as the circuit of collection, distribution and sale of unpasteurized milk. From this analysis, remarks can be made. Agriculture, an important activity constitutes nearly (31.11%) of breeders after that of trade 51.11% and owners who are mostly illiterate. The animals are taken to pasture for the most part, mainly in the mornings and only return at nightfall. Few breeders say they provide a food supplement. The age at first breeding is between 3 to 4 years and 5 to 6 years for some. For milk production, the frequency of milk per season varies significantly depending on the breeds observed; although the quantities remain low in the dry season. The dominant pathologies are respiratory pathologies, namely Contagious Bovine Pleuropneumonia (CBPP) (28.88%), followed by a bi-

infection safa (foot-and-mouth disease) and bovine nodular skin disease (BNSD), 20%. Concerning medical prevention, at the level of the farms surveyed during the vaccination period, there are few farms that confirm vaccinations (15.56%). Self-treatments carried out on farms in the event of illness are (44.88%). On the other hand, some breeders (55.12%) say they use private technicians or MAFR agents in the event of illness. Among the clinical and epidemiological criteria used to diagnose clinical mastitis, 78% of the breeders in the sample use the criterion of asymmetry of the quarters and 84% use udder deformation. And for the subclinical criteria used to diagnose subclinical mastitis, 91% of the breeders in the sample use the criterion of asymmetry of the quarters, 96% use teat lesion. Finally, for the collection and distribution of milk, 33.33% sell their milk to the main seller who collars motorcyclists (wholesalers) in each department of the Poro region, then urban and rural consumers are also served by herdsmen or resellers, i.e. 44.44%. The quantity of unsold milk (22.22%) is filtered for some, boiled (about 10 to 15 minutes) and transformed on site into milk.

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