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Prevalence of Bovine Mastitis in the Western Region of Cameroon

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SUMMARY

Mastitis is the major disease in milking cows causing huge losses to the dairy industry worldwide. It is in view to contribute to the eradication of this pathology that the present study was carried out in cattle farms of the West Region of Cameroon from March 2020 to November 2020. A total of 473 lactating cows of local and improved breeds were screened for mastitis. Screening for clinical and sub-clinical mastitis was based on the observation of clinical signs and on the use of the California Mastitis Test (CMT) respectively. The overall prevalence was 34.88%, among which 9.72% and 25.16% represented clinical and subclinical mastitis respectively. In summary, the factors influencing the occurrence of mastitis were: the divisions surveyed ($p<0.001$), breed type ($p=0.003$), age range ($p<0,001$), farm type ($p=0.05$), soil type ($p<0,001$), cleaning frequency ($p<0.001$), feeding method ($p<0.001$), hygiene of udder ($p=0.05$) and stage of lactation ($p=0.02$). The results obtained allow us to recommend an improvement of the breeding conditions to prevent mastitis, because once mastitis appears in a farm, it becomes very difficult to eradicate it.

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Introduction

Cameroon's cattle population is estimated at 5,770,179 head [1]. However, local milk production remains marginal, barely sufficient for calf feeding and self-consumption by farmers [2]. The profitability of this production depends on the control of feeding and certain pathologies, in particular mastitis [3]. Mastitis is the most important health and economic concern of dairy farms worldwide [4]. They are defined as common udder disorders of infectious, traumatic or toxic origin, characterised by a reduction in milk quality and yield, very often with a deterioration in the animal's general condition, leading to the early culling of the cow [5]. Depending on the clinical signs that may or may not be perceptible, two types of mastitis are frequently encountered in dairy production namely clinical and subclinical mastitis. The consequences of mastitis in cows include a drop in the overall production level of the animals, unfit milk for human and calf consumption, deterioration of milk quality both nutritionally, microbiologically and physicochemically[6]. Mastitis is also a gateway for other opportunistic germs that are harmful to the health of livestock [6]. Economically, mastitis causes direct costs related to veterinary fees, or milk disposal, as well as indirect costs such as reduced fertility, increased risk of culling and sometimes death of the animal [7]. The impact and importance of this disease in dairy farming has motivated numerous studies on its prevalence in Africa. In Senegal, a study of 101 lactating cows in traditional farms in the peri-urban area of Kaolack revealed a prevalence of 11.9% and 10.9% by the Californian Mastitis Test (CMT) and the Somatic Cell Count (SCC) respectively [4]. A study conducted in 2009 in Holeta, Ethiopia on 107 lactating cows reported a prevalence of 71% [9]. To our knowledge, few studies have been conducted on mastitis in Cameroon. The most recent one was carried out in the Adamaoua region in 2018 on 240 local and improved cows, which yielded a prevalence of 68.3%, of which 60% were subclinical mastitis and 8.3% clinical mastitis [10]. Therefore the objective of this work was to determine the prevalence of mastitis and to evaluate the factors associated with its occurrence in cattle farming in the Western Region of Cameroon.

Methodology

Time period and study area

This is a cross sectional descriptive study carried out between March and November 2020 in all the 08 divisions (Figure 1) of the Western Region of Cameroon. The study was carried in the Bamboutos, Haut-Plateaux, Haut-Nkam, Koung-Khi, Menoua, Mifi, Nde and Noun divisions.

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The Western region is the most densely populated province (126 inhabitants/km^2) of Cameroon. As at 2019, its cattle population was estimated at nearly 120,000 head comprising all breeds, sexes and ages combined with a milk production of about 270 tonnes that same year[11].

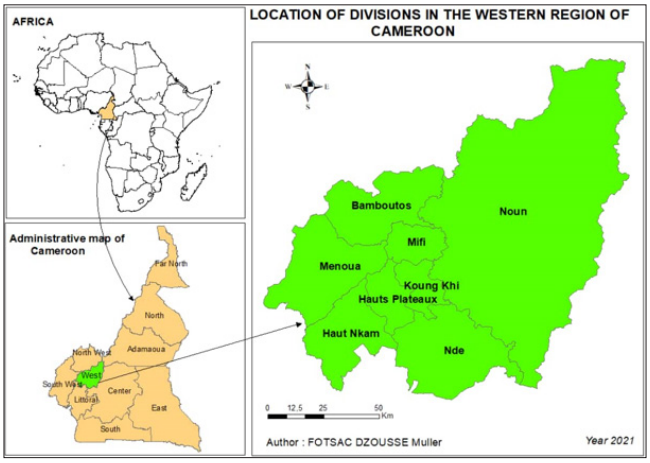

Figure 1: Study area (Western Region of Cameroon)

Study population and sampling

The study population consisted of lactating cows of local and improved breeds.

The minimum size of 333 cows was determined according to the formula: $N = \frac{1{,}96^2 \times p\,(1-p)}{d^2}$ where N is the estimated sample size, d is the absolute precision at 5%, p is the known or attributed prevalence[12]. This prevalence was 68.3%, obtained from the work of Ngungwa et al., in the Adamawa region of Cameroon. Eventually, a total number of 473 lactating cows were sampled[10]. Inaccessible herds were excluded from the study. All other herds and farms registered or not with the Ministry of Livestock, Fisheries and Animal Industries (MINEPIA) were considered for the study.

Diagnosis of mastitis

Clinical mastitis

Clinical mastitis was diagnosed by visual examination and palpation using the method previously described by Quinn et al, and Radostits et al, [13,14]. Briefly, the technique consists of observing the conformation of the different udder quarters, in order to detect any abnormalities in symmetry, volume, colour, skin growths or lesions. Then each udder quarter was palpated individually with the aim of identifying areas that are sensitive to touch. Finally, the milk secretion was examined to assess the colour, smell, consistency, viscosity and homogeneity.

Diagnoses of subclinical mastitis

Subclinical mastitis was diagnosed using the CMT test. Manufacturer's instructions for the CMT Kit – DeLaval was strictly followed as follows [15].After the milk was collected in the CMT plate, the excess milk was poured out and about 3ml of milk from each quarter was kept in the cups of the plate. Subsequently, 3ml of DeLaval reagent was added to each cup and a circular motion was imparted to the plate for a few seconds (15) to mix the milk and reagent. Then the fluidity of the mixture was assessed by tilting the paddle. The results of the CMT test were interpreted on a 5-point scale (negative, 1+, 2+, 3+ or 4+). Positive samples had a score of ≥ 2+. Thus, quarters diagnosed as positive were defined as CMT positive and the cow considered as mastitis carrier. Only animals declared negative on clinical examination were subjected to CMT test.

Statistical analysis

The collected data were analysed using the statistical software SPSS version 25. Chi-square test (X2) at 5% level was used to compare different prevalence [16]. The value of $p \leq 0.05$ was considered statistically significant.

Results And Discussion

Out of a total of 473 cows screened in the Western region of Cameroon, the overall prevalence of mastitis was 34.88% (165/473). The share of clinical mastitis was 9.72% (46/473), against a prevalence of 25.16% (119/473) for subclinical mastitis (table I). This indicates the poor general hygiene of the farms visited. The dominance of subclinical mastitis could be explained by the fact that this mastitis re silent and very often detected late, contrary to clinical mastitis that are visible, detectable and therefore makes its early management possible. This result is two times lower than the overall prevalence obtained by Ngungwa et al. in the Adamawa region of Cameroon. Indeed, these authors found a prevalence of 68.3% after screening 240 local and improved cows, of which 60% represented subclinical mastitis and 8.3% clinical mastitis [10]. Also, the prevalence values obtained in different regions of the Cameroon's Western region varied significantly from one division to another ($p < 0.001$). This could be explained by the uneven distribution of cows screened in these divisions.

Table I: Overall prevalence of mastitis and prevalence per division of the West Region of Cameroon

Type of Mastitis	BT (N=59)		HP (N=86)		HN (N=32)		KK (N=78)		MN (N=68)		Mifi (N=4)		Ndé (N=73)		Noun (N=73)		Total (N=473)		X^2 (p-value)
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	
Clinical	2	3.39	6	6.98	6	18.75	11	14.10	2	2.94	0	0.0	6	8.22	13	17.81	46	9.73	0.01*
Sub-Clinical	14	23.73	19	22.09	6	18.75	15	19.23	17	25.0	0	0.0	18	24.66	30	41.10	119	25.16	0.004*
Total	16	27.12	25	29.07	12	37.5	26	33.33	19	27.94	0	0.0	24	32.88	43	58.91	165	34.88	< 0.001**

N= Number of cows in lactation; n = Number of cows with mastitis; % = Prevalence of mastitis; * = Significant difference at 5% level; ** = Very significant difference at 5% level; BT = Bamboutos ; HP = Hauts Plateaux ; HN = Haut Nkam ; KK = Koung-Khi; MN = Menoua ; X^2 = Chi-square.

Regarding the types of breeds found in the West region herds, a significant difference (p=0.003) was observed between the prevalence of mastitis in both local and improved breeds. Indeed, the prevalence of mastitis in improved cows (62.07%) was much higher than that observed in local breeds (33.11%) (Table II). This could be explained by the fact that almost all the improved cows were high performance dairy cows (Holsteins), which are prone to mastitis compared to the local cows which constituted the majority of our study population [17]. These results are in agreement with that of Hamlaoui, who found in a study conducted in the Willaya of Constantine, that improved breeds more precisely Holstein was more predisposed to develop subclinical mastitis than local breeds [18].

Table II: Prevalence of mastitis by breed type

Type of Mastitis	Locale Breed (N=444)		Improved Breed (N=29)		X^2 (p-value)
	n	%	n	%	
Clinical	44	9.91	2	6.90	0.9
Sub-Clinical	103	23.20	16	55.17	< 0.001**
Total	147	33.11	18	62.07	0.003*

N= Number of cows in lactation; n = Number of cows with mastitis; % = Prevalence of mastitis; * = Significant difference at 5% level; ** = Very significant difference at 5% level; X^2 = Chi-square

In addition to the divisions of the West Cameroon region and the breed type, several other parameters significantly influenced the occurrence of mastitis in cattle farms in the West Cameroon region (Table III). In Other words, the age of the cows, the type of farm, the nature of the soil, the frequency of cleaning of the barn, the feeding method, the cleaning of the udders and the stage of lactation were all statistically significant ($p< 0.05$).

The prevalence of mastitis was higher in cows older than 7 years (54.34%). In fact, according to a study conducted by Poutrel (Poutrel, 1983), the frequency of both udder infections and clinical mastitis increases with age or more precisely, increases with the number of lactations of the animals. Therefore, culling of cows older than 7 years could be a solution to this problem. Also, the prevalence of mastitis was much higher in modern farms (61.54%) than in traditional farms (34.13%). This could be explained firstly, by the uneven distribution between the types of farms under study and secondly, by the totality of the exotic farms which consisted of dairy cows, which are more prone to develop mastitis. The nature of the barn floor, especially cement and plank floors, was strongly associated with mastitis ($p< 0.001$). This could be explained by the fact that on these farms, with cement and plank floors, the breeds found were once again improved dairy breeds with a strong tendency, or more likely to develop mastitis. Moreover, the presence of these improved breeds significantly influenced the occurrence of mastitis with high prevalences in farms with daily cleaning frequency (69.57%), stall feeding (69.57%) and udder washing with warm water (52.94%). These three factors have in common the dominant presence of improved cows. However, the high prevalence in farms with daily cleaning frequency (+/- modern farm) could be corrected by cleaning twice a day to keep the stall air clean and dry. This hygiene will limit the occurrence of environmental mastitis by reducing the occurrence of favourable factors such as dirty udders and damaged teats.

Table III: Factors associated with the occurrence of mastitis in cattle farms of the West Cameroon region

Associated Factors	N (= 473)	n	%	X^2 (p-Value)
Origin / Division				
Bamboutos	59	16	27,12	< 0,001**
Hauts Plateaux	86	25	29,07	
Haut Nkam	32	12	37,5	
Koung-Khi	78	26	33,33	
Menoua	68	19	27,94	
Mifi	4	0	0,0	
Ndé	73	24	32,88	
Noun	73	43	58,91	
Breed				
Local	444	147	33,11	0.003*
Improved	29	18	62,07	
Age range/year				
] 3; 5]	192	53	27,6	< 0.001**
] 5; 7]	235	87	37,02	
>7	46	25	54,34	
Type of farm				
Modern	13	8	61,54	0,05*
Traditional	460	157	34,13	
Soil nature				
Cimented	20	10	50	< 0.001**
Ground	442	149	33,71	
Wood	11	6	54,55	
Frequency of Barn cleaning				

Daily	23	16	69,57	< 0.001**
Monthly	33	13	39,39	
Occasionally	115	53	46,09	
Never	302	83	27,48	
Nutrition mode				
Vain pasture	450	149	33,11	< 0.001**
In stalls	23	16	69,57	
Udder washing				
Yes with warm water	34	18	52,94	0,01*
Yes with cold water	106	41	38,68	
No I don't wash	319	103	32,9	
No response	14	3	21,43	
Lactation stage				
0 to 3 months	1	1	100,0	0,02*
4 to 10 months	232	63	27,16	
>10 months	135	54	40,0	
No Idea	105	47	44,76	

N= Number of cows in lactation; n = Number of cows with mastitis; % = Prevalence of mastitis; * = Significant difference at 5% level; ** = Very significant difference at 5% level; X^2 = Chi-square

Conclusion

The aim of this study was to determine the prevalence of mastitis and the factors influencing its occurrence in cattle farms in the Western Region of Cameroon. Indeed, this disease is the greatest world health and economic concern in dairy farms. Therefore, an accurate knowledge of the epidemiological data on cattle mastitis would help to create a better mastitis control program in Cameroon, where most of the efforts are concentrated on the treatment of clinical cases. Also, according to the results obtained, the prevalence of subclinical mastitis is much higher than that of clinical mastitis, which means that early detection techniques of these mastitis in farms should be considered, using CMT, which is reliable, quick, simple and effective. This is to ensure effective management of sick cows and improve milk production in Cameroon.

Conflicts of Interest

The study was conducted without any conflict of interest.

References

1. FAOSTAT (2019) Production / Live Animals [Online]; Available from URL: http://www.fao.org/faostat/fr/#data/QA [Accessed Mai 13th, 2021].
2. Makek M (2018) For a national fresh milk production program in Cameroon. National Veterinary Order of Cameroon, www.ONVC.org (Accessed Feb. 15th, 2020)
3. Gambo H, Agnem E-C (2001) Screening for subclinical mastitis in lactating Goudali cows in North Cameroon. Rev. Elev. Med. Vet. Pays Trop 54: 5-10.
4. Kalandi M, Sow A, Millogo V, Faye S, Ouédraogo A-G etal. (2017) Prevalence and risk factors of subclinical mastitis in traditional herds in Kaolack, Senegal. J. Appl. Biosci 112 : 10978 10984.
5. Nadjia B, Moulay M, Mebrouk K (2011) Prevalence of Mastitis Infection and Identification of Causing Bacteria in Cattle in the Oran Region West Algeria. Journal of Animal and Veterinary Advances 10: 3002-3005.
6. Millogo V, Sissao M, Ouédraogo A (2018) Nutritional and bacteriological quality of some local dairy products samples of Burkina Faso production chain. Int. J. Biol. Chem. Sci 12: 244-252.
7. Traoré A, Tamboura H H, Bayala B, Rouamba D W, Yaméogo N etal. (2004) Prévalence globale des pathologies majeures liées à la production laitière bovine en système d' élevage intra- urbain à Hamdallaye (Ouagadougou). Biotechnol. Agron. Soc. Environ 8 : 3-8.
8. Nielsen C (2009) Economic Impact of Mastitis in Dairy Cows. Acta Universitatis agriculturae Sueciae. 2009 ; 29 : 81p. [Online]; Available from URL: https://pub.epsilon.slu.se/1968/1/Christel Nielsen_kappa.pdf
9. Mekibib B, Furgasa M, Abunna F, Megersa B Regassa A (2010) Bovine Mastitis: Prevalence, Risk Factors and Major Pathogens in Dairy Farms of Holeta Town, Central Ethiopia. Veterinary World Vol 3:397-403.
10. Ngungwa V, Awah-Ndukum J, Cuteri V, Tanyi Kingsley M, Souaibou A (2018) Prevalence study on bovine mastitis in the Adamawa Region of Cameroon. Large Animal Review 24: 21-29.
11. DREPIA-OUEST (2019) Annual report Regional Delegation of Livestock, Fisheries and Animal Industries (DREPIA) West Cameroon 48p.
12. Thrusfield M (2007) Veterinary Epidemiology, Third Edition. Blackwell Science Ltd, Oxford UK 610.
13. Quinn P J, Markey BK, Carter ME, Donnelly WJ, Leonard FC (2002) Veterinary Microbiology and Microbial Disease. Blackwell Science Ltd, Blackwell Publishing Campany.
14. Radostits OM, Leslie KE, Fetrow J (1994) Mastitis control in dairy herds, Herd Health Food Animal Production Medicine, 2nd ed. W. B. Saunders, Philadelphia.
15. DeLaval (2020) DeLaval california mastitis test CMT, www.delaval.com/en-in/our-solutions/milking/udder-health--hygiene/milk-testing/delaval-california-mastitis-test-cmt/ (Accessed Nov. 12th, 2020).
16. Schwartz D (1993) Statistical methods for physicians and biologists, 4th Ed. Flammarion, Paris, France, 315 p.
17. Shyaka A, Kadja M, Kane Y, Kaboret Y, Bada Alambedji

R (2010) Diagnosis of clinical and subclinical mastitis in intensive dairy cattle. Case of the Wayembam farm (Senegal). Revue Africaine de Santé et de Productions Animales 8: 155-160.

18. Hamlaoui MW (2017) Epidemiology of subclinical mastitis in dairy cows in the Wilaya of Constantine. Master thesis, Université des Frères Mentouri Constantine, Algeria, 124p.
19. Poutrel B (1983) SUSCEPTIBILITY TO MASTITIS: A REVIEW OF COW-RELATED FACTORS'. Annales de Recherches Vétérinaires, 14(1). Retrieved from https://hal.archives-ouvertes.fr/hal-00901404.