2023 MULTIDISCIPLINARY CONFERENCE ON SUSTAINABLE DEVELOPMENT
Timisoara, 25-26 May

PREVALENCE OF BOVINE MASTITIS AMONG DIFFERENT INDEGINOUS COW BREEDS FROM SELECTED HERDS IN NIGERIA

MORU N.H. [1], KABIR J. [1], KWAGA J.K.P. [1], YUSUF F.L. [1], BUCUR I. [2], TIRZIU E.[2]

1. Ahmadu Bello University, Faculty of Veterinary Medicine, 810106, Samara, Zaria, Kaduna State, Nigeria.
2. University of Life Sciences "King Mihai I of Romania" from Timisoara, Faculty of Veterinary Medicine, 300645, Calea Aradului No.119,Timisoara, Romania.

Abstract: Bovine mastitis continues to be a burden in the dairy sector worldwide, despite the many mastitis control programs. Nigeria is not exempt from this problem, though there is still a high potential for exploitation in the dairy sector, as about 60% of the consumed dairy products are imported. Nigeria has the sixth-largest cattle population in Africa, fully understanding its cattle structure and dynamics can help harness its potential. This study aimed to determine the prevalence of bovine mastitis among common breeds of dairy cows in Nigeria. Lactating cows in selected peri-urban dairy farms and pastoral cattle herds were evaluated for mastitis by physical examination and using the California Mastitis Test. Milk samples were collected from cows with mastitis for cultural isolation and phenotypic characterization of *Staphylococcus* species. The prevalence of mastitis among the Friesian x Bunaji (FB), Bunaji (BJ), Gudali (GD), and Azawak cattle breeds was 72%, 56%, 41%, and 0%, respectively. Three percent of the udders of the BJ cows were found to have blind teats. Seventy-three percent of the milk samples had isolates suggestive of *Staphylococcus* species based on cultural isolation on Mannitol salt agar and their biochemical profile. Indigenous breeds of cows are known to be less susceptible to mastitis compared to exotic breeds; this could be explained by their udder structure and low milk production potential, which are part of the risk factors for mastitis. This study shows a high prevalence of mastitis in Bunaji of 56% in comparison to other indigenous cow breeds. This can serve as information to guide the breeding selection of indigenous cows for dairy potential with reduced mastitis risk.
Keywords: Bovine mastitis, dairy, prevalence, indigenous cows

Introduction

Mastitis, which is the inflammation of the parenchyma of the mammary glands, has caused and still causes devastating economic losses among dairy cattle worldwide. Losses reported in different countries vary greatly (18). Different mastitis control structures and programs have been tried for the control of the disease, but it still remains a raging problem in the dairy sector (2,20,21). One of the identified risk factors for mastitis is the cow's breed (1,16). Recent trends in research focus on genetic selection for mastitis resistance in dairy cows using various methods, including indirect methods like lower somatic cell counts (8,19). The impact of bovine mastitis in Nigeria is poorly estimated, though Nigeria has the sixth largest cattle population in Africa, next to Ethiopia, Chad, Sudan, Tanzania, and Kenya (22). Breeds of cattle indigenous to Nigeria vary from Bunaji "white Fulani" (the most dominant with a wide national spread), Gudali (the second largest cattle population in Nigeria), Azawak, Red Bororo, Wadara, Muturu, Keteku, Ndama, and Kuri (7). The three most commonly reared breeds of cows in Nigeria for meat and milk are the Bunaji, Gudali, and Red Bororo (7). The Bunaji and Gudali cow breeds are being explored for dairy potential in Nigeria by crossing them with exotic dairy breeds. This study seeks to show the breed-based prevalence of mastitis using the California Mastitis Test evaluation of the individual cow somatic cell count.

Material and method

Study location

This study was carried out in two states (Kaduna and Kano States) located in the north-western geopolitical region of Nigeria, also known as the north-western Nigeria. The North Western zone is one of the six geopolitical zones in Nigeria (Fig. 1). North-Western Nigeria comprises seven states, namely: Sokoto, Kebbi, Zamfara, Katsina, Kaduna, Kano, and Jigawa States (Fig. 1). The zone lies between longitude 12° 10′ North and latitude 6° 15′ East, occupies a land mass of about 214395 km^2 and has a human population of about 35786944 (2006 national census). Two seasons are experienced in the region: the wet season (April–October) and the dry season (November–March) (14). Agriculture is the main activity carried out in this region.

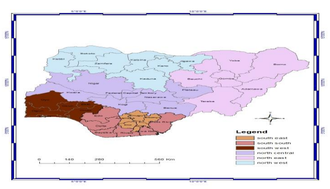

Fig 1. Map of Nigeria indicating the geopolitical zones

Sampling design

A cross sectional study of pastoral and peri-urban dairy farmers was conducted in two states (Kaduna and Kano states) in the North-West zone of Nigeria. Two senatorial zones were randomly selected from each state, and then local government areas in each of the selected senatorial zones were randomly selected. Based on the available records of dairy farms and clusters, at least five dairy farms and clusters with at least ten lactating cows were sampled.

Sample collection and analysis

Milk samples were collected from cows for visual and somatic cell assessment using the strip cup and California mastitis test, respectively. This was done after subjecting the cows' udders to a visual examination for signs of inflammation. Test samples were scored as 0 (negative), indeterminate, +1, +2 and +3. Cows with test scores of +1, +2 and +3 in at least one teat were considered positive for mastitis and selected for milk sample collection for bacteriological analysis.

Milk samples were collected from cows with mastitis and transported to the Bacteriology laboratory in the department of Veterinary Public Health and Preventive Medicine, Ahmadu Bello University, Zaria, where they were cultured on mannitol salt agar and blood agar for bacterial isolation and hemolysis determination. A panel of biochemical tests (catalase, coagulase, DNase, Gram staining and sugar fermentation) were carried out for phenotypic identification of the bacterial pathogen.

Data analysis

Data collected were entered into Microsoft Excel 2008, organized and presented in tables. The association between mastitis and the different breeds of cows was tested using the JMP 13.0 statistical software.

Prevalence of mastitis was calculated as follows:

$$\text{Prevalence} = \frac{\text{Number of positive samples}}{\text{Total samples collected}} \times 100 \ \ (\%)$$

Acknowledgement: The Authors are grateful to the staff of the department of Veterinary Public Health and Preventive Medicine, Ahmadu Bello University, Zaria, Nigeria, for granting us a laboratory bench space.

Results and discussions

Three hundred and forty-eight cow udder and milk samples were visually assessed. No visible signs of inflammation were noticed in any of the udders examined. A visual examination of the udder teats revealed that twelve of the examined cows had between one and two blind teats (3%). Eleven out of the twelve cows with blind teats were of the Bunaji breed and multiparous (parities 5-7, Table 1). This finding is probably the result of an untreated, long-standing infection, either due to poor screening for subclinical mastitis or poor clinical mastitis management, which might have resulted in damage to the milk-producing cells. A similar finding was reported by Sarba and Tola (15), who reported a 5.5% prevalence of blind teats among studied herds in Ethiopia.
One hundred and eighty-four (53%) of the examined cows were shown to have mastitis (clinical and subclinical) from the California Mastitis Test and physical examination results.

Table1
Blind teats among different cow breeds and parity in Kaduna and Kano states, Nigeria

S/N	Breed	Parity
1	FB	3
2	WF	7
3	WF	6
4	WF	7
5	WF	6
6	WF	5
7	WF	6
8	WF	5
90	WF	6
10	WF	7
11	WF	5
12	WF	5

Key. WF white Fulani, FB Friesian x Bunaji

There was a highly significant variation ($p<0.001$) in mastitis infection among the studied cow breeds (Table 2). Friesian x Bunaji had the highest number of episodes of mastitis, followed by the Bunaji breed of cow and the Gudali cows. Breed-specific prevalences of mastitis recorded were 72%, 56%, and 41% for the Friesian x Bunaji, Bunaji, and Gudali cows, respectively (Table 2). Studies on the comparative prevalence of bovine mastitis within indigenous breeds of cows are hard to find in Nigeria. Among the Bunaji breeds, Olufemi (12) reported a lower prevalence (12.3%) of mastitis, though his diagnosis was based on visible abnormal changes in the cow's udder or milk. This method can only identify clinical mastitis, which might explain the lower prevalence observed in his study. Thomas *et al.* (17) reported a higher prevalence of 70%. The diagnostic methods also used in his study were different from those in this study. The breed distribution and parity of the cows with mastitis are shown in Table 2. This finding indicates a high rate of mastitis occurrence among the indigenous cattle breeds, as opposed to the popular belief that mastitis is not a disease of indigenous cattle.

Table 2
Prevalence of mastitis among the different cow breeds in Kaduna and Kano states, Nigeria

Cow breeds	Number of cows tested	Number positive (%)	X^2	P value
Friesianx Bunaji	36	26 (72)	0.0286	0.0001**
Bunaji	253	142(56)		
Gudali	39	16 (41)		
Azawak	20	(0)		
Total	348	184 (53)		

Key: ** Highly significant

The prevalence of subclinical and clinical mastitis among the cows studied is shown in Table 3. There was a significant difference ($p<0.05$) between the clinical and subclinical mastitis prevalence among the studied cows. There was a higher likelihood of subclinical mastitis infection in the cows. This indicates that subclinical mastitis may be more prevalent than clinical mastitis among dairy cows in the study area. Subclinical mastitis has been shown to have a worse economic impact on dairy cows due to decreased milk quality and quantity (4, 13). It has also been linked to reduced reproductive performance in cows (10).

Table 3
Prevalence of sub-clinical and clinical mastitis among dairy cows in Kaduna and Kano states, Nigeria

Disease status	No of cows tested	No positive (Percentage)	95% CI
Sub clinical mastitis	348	169 (46%)	1.080-1.440
Clinical mastitis	348	15 (4%)	0.909-1226

Fifteen of the studied cows tested had clinical mastitis (4%), with visibly abnormal milk ranging from clots or flakes in milk to blood in milk. The Friesian x Bunaji breeds were more affected 8(53%) than other breeds 7(47%) with clinical mastitis (Table 4). Studies by Sarba and Tola (12) in Ethiopia also reported a higher prevalence of mastitis in exotic breeds than local breeds. This may be explained by the findings by researchers that breed (3,6,9,11) and high genetic potential for milk production are risk factors for bovine mastitis (1,5).

One hundred and forty cultural isolates suggestive of *Staphylococcus* species from phenotypic and biochemical analysis were obtained.

Table 4
Clinical mastitis in different breeds and parity of cows in Kaduna and Kano states, Nigeria

S/N	Breed	Parity
1	FB	1
2	FB	2
3	FB	2
4	FB	3
5	FB	6
6	FB	6
7	FB	4
8	FB	4
9	GD	4
10	WF	6
11	WF	5
12	WF	5
13	WF	5
14	WF	5
15	WF	5

Key. WF white Fulani, FB Friesian x Bunaji, GD Gudali

Conclusions

This study showed a prevalence of mastitis of 53% in both indigenous and crossbreeds dairy cows in Kaduna and Kano states. The highest breed-specific prevalence of mastitis was recorded in the crossbred cows, but the Bunaji cow had the highest prevalence of mastitis among the indigenous breeds. More blind teats were encountered in Bunaji than other cow breeds in the study. This registers the importance of mastitis among even the indigenous cow breed. Proper enlightenment campaigns on the importance of bovine mastitis and it associated economic cost implication has to be organized for dairy farmer, including pastoral, peri-urban, and commercial dairy cow owners, if there is a goal to control the disease nationally.