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Research article
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Prevalence and risk factors of bovine mastitis from dairy farms in the north of Algeria

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ABSTRACT: A cross sectional study was conducted to determine the prevalence and risk factors of bovine mastitis from farms in three regions in the north of Algeria. In this observational study, 450 lactating dairy cows from 14 commercial farms were included. Cows with clinical mastitis (CM) were detected by clinical examination of the udder and determination of abnormalities in milk. California mastitis test (CMT) was used for screening subclinical mastitis (SCM). Data related to animals (age, number of parities, breed, daily milk yield, teat shape, lactation stage), to breeding (type of breeding, ventilation, presence of air flow, stocking density rate, manure removal frequency, disinfection after manure removal, presence or absence of litter, litter change frequency, distribution of calving) and to milking (control frequency of the milking machine, hand washing before milking, special clothing worn during milking, disinfection of the milking machine, methods used for cleaning and disinfection of teats, product used for cleaning the udders, staff attention to teat conformation and damage at milking time) were collected. Data analysis was performed using the software program Microsoft Excel 2010 and Statistical Data for Social Science (SPSS).The results showed an overall 59.55% prevalence of mastitis. The subclinical mastitis (37.77%) is more prevalent than in the clinical type (21.77%). Risk factors analysis revealed significant association of mastitis between different groups. Cows in ages of 5-8 years (OR= 4.176 ; P<0.0001 ; 95% CI=2.594-6.724), cows with 3 to 5 lactation periods (OR = 3.549 ; P<0.0001 ; 95% CI = 2.217-5.680), Holstein breed (OR= 1.571 ; P= 0.049 ; 95% CI= 1.001-2.465), having a high milk production (OR= 1.808 ; P=0.015 95% CI=1.116-2.929), with cylindrical teat shape (OR= 5.191 ; P<0.0001 ; 95% CI=3.041-8.861) and within the early-stage of lactation (OR= 6.095 ; <0.0001 ; 95% CI= 3.747-9.914) were significantly at risk of having CM. Also, intensive breeding (OR=8.53 ; 95% CI= 5.18-14.03), high stocking density rate (OR=2.77; 95%CI : 1.7-4.5), manure removal frequency more than once a day (OR= 9.72; 95%CI= 5.843-16.175), presence of litter (OR=15.68 ;95% CI= 7.384-33.329), litter change frequency more than 3 days (OR=4.247 ; 95% CI= 2.44-7.378), control frequency of the milking machine more than a month (OR=2.21 ; 95% CI= 1.395-3.513), owners who do not wear special clothing during milking (OR=3.381 ; 95%CI= 1.81-6.31), absence of disinfection of the milking machine (OR=5.531; 95% CI= 3.076-9.945), owner that use the dishcloths for cleaning of teats (OR=1.813 ; 95%CI=1.114-2.95), the use of water and soap for cleaning the udder (OR=3.134 ; 95% CI=1.977-4.969) and the staff that do not take attention to teat conformation and damage at milking (OR=2.416 , 95%CI= 1.42-4.107) were significantly associated with CM (P <0.0001). Bovine mastisis is prevalent in Algeria, and this is associated with both animal characteristics and environment factors. Better management practices in milking and adequate housing with proper sanitation should be provided.

Keyword: Prevalence; Risk factor; Mastitis; Cattle; Algeria

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INTRODUCTION

The dairy sector is essential for the world's food systems, playing a vital role in agricultural production (Tomanić et al., 2023). Mastitis is one of the most widespread and costly disease in dairy cattle occurring throughout the world (Abebe et al., 2016 ; Kovacević et al., 2023). It is a devastating and complex disease of lactating animals that could be infectious (caused by pathogen infection) or non-infectious (caused by physical, chemical, or traumatic factors) (Abd-El Hamed and Kamel, 2020). It can be caused by some 150 microbial species (Benić et al., 2018). It is primarily attributed to bacterial infections (Cvetnić et al., 2016 ; Cvetnić et al., 2021 ; Tomanić et al., 2024a). Yeasts, although considered relatively rare causative agents, have also been associated with mastitis in dairy cattle (Tomanić et al., 2024a). This disease is of particular concern and it is a global problem (Ruegg et al., 2017; Themistokleous et al., 2020), especially in Africa (Mbindyo et al., 2020), including Algeria, where there is limited research on mastitis. Losses occurring due to mastitis include: costs of medication, reduction of milk yield, decreased milk quality due to changes in milk chemical content, milk contamination due to antibiotic residues, transmission to other animals, reproductive disorders in cows, chronically infected cows culling, and occasional mortalities (Iraguha et al., 2015 ; Abebe et al., 2016). Moreover, mastitis has a serious zoonotic potential associated with the presence of pathogens and their toxins in the human consumed milk (Abebe et al., 2016 ; Cobirka et al., 2020). Clinical and subclinical mastitis (SCM) are the two types of mastitis (Fasseha et al., 2021). The first, which is less prevalent, is characterized by systemic signs in the cow and visible abnormalities in the udder and milk. In contrast, the subclinical is an non-symptomatic form of intramammary inflammation that requires other diagnostic tools (Abdeta and Gemechisa, 2020) like somatic cell counts (SCC) which is a valuable tool for monitoring udder health and the effectiveness of mastitis control programs (Tomanić et al., 2024b). The incidence of clinical mastitis (CM) is associated with many risk factors (Nakov et al., 2014 ; Faris et al., 2021 ; Helmy Youssif et al., 2021). Generally, the most common risk factors for CM in dairy herds can be divided in two groups : individual cow risk factors and risk factors from the environment (Nakov et al., 2014). The incidence and prevalence of CM reported in the literature vary considerably between studies and regions (Nakov et al., 2014 ; Singha et al., 2021) due to differences in definitions of the disease, or the criteria used for including cases (Nakov et al., 2014). Only a few studies on mastitis risk factors in Algeria have been published (Benhamed et al., 2011 ; Bouamra et al., 2017). The current lack of information about risk factors for CM in Algeria herds and the usefulness of this knowledge to designand implement mastitis control programs provided the motivation for this study.

Therefore, the objective of this study was to estimate the prevalence of CM and SCM under Algerian condition and to determine associated risk factors in dairy cows in Boumerdes, Blida and Chlef regions, in the north of Algeria.

MATERIELS AND METHODS

Study area and experimental designe

A cross-sectional survey was carried out in dairy herds located in three regions in the north of Algeria namely, Blida, Boumedes and Chlef during the period from January 2021 to December 2023. A total of 450 dairy cows (150 for each region) from 14 farms (5 farms in Blida and 5 Boumerdes and 4 in Chlef) were examined. The study animals were of different breeds and age. The cows were in different parities and stages of lactation. With regard to management, 299 (66.44%) cows were managed under semi-intensive husbandry practice, 115 (25.55%) intensively, while 36 (8%) were freely kept (extensive system). The intensively managed cattle were kept in doors and received concentrate feeds in addition to hay and crop residues (such as corn stalks, wheat/barley straw and other leftovers from grain threshing). On the other hand, the semi-intensively managed cattle grazed freely on pasture but received supplementary feeds in the morning and evening when they were milked. Milking was done mechanically twice a day.

Detection of clinical mastitis

All dairy cows were subjected to clinical and physical examinations, with special interest towards the udder and teats. Clinical examination of the cows included recording the rectal temperature (TR), determination of the systemic signs of the cow, determination of the local signs of the udder, and estimation of the milk appearance. The udder was examined visually and then through palpation to detect possible fibrosis, cardinal signs of inflammation, visible injury and swelling of the supramammary lymph nodes. Detection of CM depending on the presence of clinical signs on the udder such as hotness, redness, swelling, painful reaction, and

hardness of udder tissues. The milk secretion from each mammary quarter was examined for its colour, odour, consistency and other abnormalities. Milk appearance was defined as normal, if the milk was white and homogeneous ; as mildly to moderately changed, if the milk was slightly discolored or contained small flakes ; and as severely changed, if the milk was strongly discolored, watery, or contained large clots (Hovinen et al., 2008). CM was classified according to the criteria described by Sargeant et al. (1998) and Pinzón-Sánchez and Ruegg (2011) : grade-1 (mild), when only the milk was abnormal ; grade-2 (moderate), when abnormal milk was accompanied by swelling, and/or redness, and/or pain of the mammary gland; and grade-3 (severe), when the cow exhibited systemic signs of illness, such as depression, anorexia, dehydration, or fever, in addition to abnormalities in the milk and udder.

Tests (California Mastitis Test)

The California Mastitis Test (CMT) was conducted on milk samples from the quarters that do not present gross abnormalities using the method described by Schalm and Noorlander (1957). Scores represented four categories : 0 : negative or traces ; 1 : positive (+) ; 2 : positive (++) and 3 : positive (+++>). Schalm test principle is based on the use of a body surface (the teepol 10%) which causes the breakdown of cells and precipitation of DNA and a solution bromocresol purple which acts as a pH indicator. About 2 mL of milk to be tested are mixed with 2 mL of reagent at room temperature. The reaction was numbered from 0-4 based on the level of infection (Gambo and Etchike, 2001 ; Benhamed et al., 2011).

Data collection and identification of risk factors

Data were recorded from each selected farm regarding various risk factors related to animals and farm/surroundings. The questionnaire was administered either to the farm owner, manager, or responsible farm employee through face-to-face interviews and data were collected by performing observations on farm. The information collected included farm biodata and farm management practices such as production system, type of ventilation, presence of air flow, stocking density rate, manure removal frequency, disinfection after manure removal, presence or absence of litter, litter change frequency, calving distribution, disinfection of the milking machin, control frequency of the milking machine, methods used for cleaning and disinfection of teats, product used for cleaning the udders, hand washing before milking, special clothing worn during milking, and staff attention to teat conformation and damage at milking time. Cow factors were breed, age recorded in years, stage of lactation, parity, milk yield recorded in liters and teat shape. The lactation stage is determined as follows : early lactation (14 to 100 days), mid lactation (100 to 200 days) and late lactation (200 to 305 days). All collected risk factors were compared to the prevalence of CM.

Statistical analysis

Data analysis was performed using the software program Microsoft Excel 2010 and Statistical Data for Social Science (SPSS) 26 packages © IBM Copyright, IBM Corporation and its licensors 1989.2019 IBM., USA. Results were expressed as percentages. The univariate analysis was carried out to evaluate each independent variable for its unadjusted association with mastitis. The Associations among the variables were assessed using crude odds ratios (ORs), and 95% confidence intervals (CIs) were calculated, and Chi-square analyses were performed. The statistical significance threshold used for this study was $P < 0.05$.

RESULTS

Prevalence of mastitis

Out of the total 450 cows examined, 98 (21.77%) had CM (Table1). In the clinically infected cows, there were visible abnormalities in general conditiond, the milk, the udder and teats. Of the 352 cows that did not present CM, all quarters of cows (1408) were checked for the presence of gross abnormalities, and it was found that 50 quarters were non-functional, subsequently, CMT was conducted on milk samples from the remaining 1358 quarters ; out of which 580 (42.70%) were positive for SCM. These quarters with positive results come from 170 dairy cows. This means that 170 (37.77%) cows out of 450 have SCM.

Characterization of CM cases by severity

Severity scores were recorded for 98 cases. The distribution of CM cases with mild, moderate, and severe symptoms was 0, 25 (25.51%), and 73 (74.48%) respectively.

Associations of risk factors with the prevalence of CM

Analysis of cows (intrinsic) factors

As seen in table 2, the intrinsic factors such as age, number of gestation, breed, quantity of milk, teat shape and lactation stage had strong correlation

Table 1. Prevalence of mastitis

	Clinical mastitis	Subclinical mastitis (CMT test)	Overall mastitis
Number of cases	98	170	268
Prevalence (%)	21.77	37.77	59.55
CI95%	18 –25.6	33.3 – 42.3	– 64.1

Table 2. Prevalence according to animal-related factors

Variable	N	Presence of mastitis		Absence of mastitis		P	OR	CI95%	P
		N	%	N	%				
Age (years)									
[2-3]	124	19	19.38	105	29.82		0.566	0.326-0.981	0.041
]3-5]	209	30	30.61	179	50.85	<0.0001	0.426	0.264-0.684	<0.0001
]5-8]	117	49	50	68	19.31		4.176	2.594-6.724	<0.0001
Number of parities									
[1-3[	264	34	34.69	230	65.34	<0.0001	0.282	0.176-0.451	<0.0001
[3-5]	186	64	65.3	122	34.65		3.549	2.217-5.680	
Breed									
Holstein	213	55	56.12	158	44.88		1.571	1.001-2.465	0.049
Montbeliard	150	27	27.55	123	34.94	0.016	0.708	0.432-1.161	0.17
Alpine Brune	17	7	7.14	10	2.84		2.631	0.974-7.102	0.048
Simmental	70	9	9.18	61	17.32		0.482	0.230-1.010	0.049
Daily milk yield									
≤15	181	29	29.59	152	43.18	0.015	0.553	0.341-0.896	0.015
>15	269	69	70.4	200	56.81		1.808	1.116-2.929	
Teat shape									
Cylindrical	229	78	79.59	151	42.89	<0.0001	5.191	3.041-8.861	
Funnel	221	20	20.4	201	57.1		0.193	0.113-0.329	
Lactation stage									
Early- stage	113	54	55.1	59	16.76		6.095	3.747-9.914	<0.0001
Mid-stage	232	25	25.51	207	58.8	<0.0001	0.240	0.145-0.396	<0.0001
Late- stage	105	19	19.38	86	24.43		0.744	0.426-1.298	0.296

Early lactation : 14 to 100 days / Mid lactation : 100 to 200 days/ Late lactation : 200 to 305 days

(P<0.05) with the prevalence of CM. Regarding the age, cows in ages of 5–8 years had a higher odds of CM (OR= 4.176 ; P<0.0001 ; 95% CI=2.594-6.724) than cows in ages of 2-3 and 3-5 years old. Cows with 3 to 5 lactation periods were seen to be more affected (OR = 3.549 ; P<0.0001 ; 95% CI = 2.217-5.680) than cows with lower lactation period. The highest prevalence of CM was recorded in the Holstein breed (OR= 1.571 ; P= 0.049 ; 95% CI= 1.001-2.465) than Montbeliard, Alpine Brune and Simmental breeds. It was also revealed that the odds of CM were 1.808 times greater for the cows that have a daily milk yield more than 15 liter opposed to the cows with less than 15 liter (OR= 1.808 ; P=0.015 95% CI=1.116-2.929). In accordance with the teat shape, the cows with cylindrical teat shape had a higher odds of 5.191 times than those with funnel teat shape (OR= 5.191 ; P<0.0001 ; 95% CI=3.041-8.861). Dairy cows within the early-stage showed higher odds of CM (OR= 6.095 ; <0.0001 ;

95% CI= 3.747-9.914) than cows within the mide-stage and the late-stage of lactation.

Analysis of extrinsic risk factors

According to breeding-related factors (Table 3), type of breeding, condensation of animals, manure removal frequency, presence or absence of litter and litter change frequency had significant association (P<0.05) with the prevalence of CM. The odds of CM prevalence is 8.53 times higher (P <0.0001 ; 95% CI= 5.18-14.03) in intensive breeding than semi-intensive and extensive. CM was significanly higher (<0.0001) in breeding with high condensation of animals, the risk of contamination increased by 2.77 (95% CI : 1.7-4.5). In breeding with manure removal frequency is more than a day, CM was 9.72 times greater (95% CI= 5.843-16.175) as compared with a frequency of one day. Presence of litter has

Table 3. Prevalence according to breeding-related factors

Variable		Presence of mastitis		Absence of mastitis		P	OR	CI95%	
		N	%	N	%				
Type of breeding									
Intensive	115	60	61.22	55	15.62		8.53	5.18-14.03	<0.0001
Semi-intensive	299	28	28.57	271	76.98	< 0.0001	0.12	0.07-0.2	<0.0001
Extensive	36	10	10.2	26	7.38		1.42	0.66-3.06	=0.296
Ventilation type									
Static	245	45	45.91	200	56.81	0.055	0.65	0.41-1.02	=0.055
Mechanical	205	53	54.08	152	43.78		1.55	0.99-2.43	
Presence of air flow									
Yes	270	60	61.66	210	59.65	0.779	1.07	0.68-1.69	
No	180	38	38.77	142	40.34		0.94	0.59-1.49	
Stocking density									
High	237	70	71.42	167	47.44	< 0.0001	2.77	1.7-4.5	
Low	213	28	28.57	185	52.55		0.36	0.586-0.222	
Manure removal frequency									
One day	308	28	28.57	280	79.55	< 0.0001	0.102	0.06-0.17	
More than a day	142	70	71.42	72	20.45		9.72	5.843-16.175	
Disinfection after manure removal									
Yes	0	0	0	0	0				
No	450	98	100	352	100				
Presence or absence of litter									
Yes	237	90	91.83	147	41.76		15.68	7.384-33.329	
No	213	8	8.16	205	58.23	< 0.0001	0.063	0.03-0.135	
Litter change frequency									
Less than 3 days	190	18	18.36	172	48.86	< 0.0001	0.235	0.135-0.409	
More than 3 days	260	80	81.63	180	51.13		4.247	2.44-7.378	
Distribution of calving									
Throughout the year	237	50	51.02	180	51.13	=0.983	0.995	0.636-1.557	
Seasonal	213	48	48.97	172	48.86		1.004	0.64-1.572	

also played a crucial role in CM at the current study site, the odds of CM is 15.68 times greater (95% CI= 7.384-33.329) than the breeding that did not present a litter. Also, the odds of CM is 4.247 times greater (95% CI= 2.44-7.378) in farms with litter change frequency more than 3 days than those farms having less than 3 days.

Milking related factors have also been studied (Table 4), indeed, control frequency of the milking machine, special clothing worn during milking, disinfection of the milking machine, methods used for cleaning and disinfection of teats, product used for cleaning the udders and staff attention to teat conformation and damage at milking time were significantly associated with CM. Cows in herds where milking machine was controled more than a month

Table 4. Prevalence according to milking related factors

Variable	N	Presence of mastitis		Absence of mastitis		P	OR	CI95%	P
		N	%	N	%				
Control frequency of the milking machine									
Each month	234	36	36.73	198	56.25	0.0006	0.45	0.28-0.716	
More than a month	216	62	63.26	154	43.75		2.21	1.395-3.513	
Hand washing before milking									
Yes	378	78	79.59	300	85.22	<0.0001	0.676	0.381-1.198	
No	72	20	20.4	52	14.77		1.479	0.832-2.629	
Special clothing worn during milking									
Yes	133	13	13.26	120	34.09	=0.0001	0.295	0.158-0.551	
No	317	85	86.73	232	65.9		3.381	1.81-6.31	
Disinfection of the milking machine									
Absence	56	30	30.61	26	7.38	<0.0001	5.531	3.076-9.945	<0.0001
Bleach	284	60	61.22	224	63.63		0.90	0.569-1.430	=0.66
Others	110	8	8.16	102	28.97		0.217	0.10-0.46	<0.0001
Methods used for cleaning and disinfection of teats									
Dishcloths	274	70	71.42	204	57.95	<0.0001	1.813	1.114-2.95	=0.0156
Hand showers	120	0	0	120	34.09		0		<0.0001
Absence	56	28	28.57	28	7.95		4.628	2.58-8.30	<0.0001
Product used for cleaning the udders									
Water	31	3	3.06	28	7.95	<0.0001	0.365	0.108-1.228	=0.0907
Water and soap	157	55	56.12	102	28.97		3.134	1.977-4.969	<0.0001
Bleach water	262	40	40.81	222	63.06		0.40	0.255-0.638	=0.0001
Staff attention to teat conformation and damage at milking time									
Yes	372	70	71.42	302	85.55	=0.0009	0.41	0.43-0.703	
No	78	28	28.57	50	14.2		2.416	1.42-4.107	

had a 2.21 times higher (95% CI= 1.395-3.513) of developing CM than cows in herds where the control was done each month. The odds of CM prevalence was 3.381 times (95% CI= 1.81-6.31) higher with the owner that did not take special clothing worn during milking. On the other hand, the absence of disinfection of the milking machine was identified as a critical risk factor since the prevalence of CM increased 5.531 times (95% CI= 3.076-9.945). Also, the CM prevalence was 1.813 times greater (95% CI=1.114-2.95) when the owner used the dishcloths methode for cleaning and disinfection of teats than the hand showers. The product used for cleaning the udder also played a role in the appearance of CM because the CM increased 3.134 times (95% CI=1.977-4.969) when the owner used water and soap than bleach water or only water. The odds of CM prevalence is 2.416 times (95% CI= 1.42-4.107) higher in the staff that did not take attention to teat conformation and damage at milking time than those that did.

DISCUSSION

In the present study, the overall prevalence of mastitis is 59.55%. This finding is almost in agreement with the report of 51.8% by Iraguha et al. (2015), 62.6% by Abebe et al. (2016) and 63.02% by Lakew et al. (2019). On the other hand, the report of Fesseha et al. (2021) who reported a prevalence of 73.7% was higher than the present findings. On the other hand, the result of the present study is higher than the report of 21.9% prevalence by Qayyum et al. (2016), 24.5% by Yohannes and Alemu (2018) and 27.89% by Berhe et al. (2019). The CM prevalence in this study was slightly comparable with that of Hundra et al. (2005) and Workineh et al. (2002) who reported a prevalence of 16.11% and 25.1% respectively, but it was far higher than the finding of Lakew et al. (2019) 6.77 %, Yohannes and Alemu (2018) 4.9% and Abebe et al. (2016) 3.4%. While the results of Fesseha et al. (2021) were less higher than our finding with a prevalence of 28.9%. In case of subclinical mastitis, the prevalence in this study was almost similar with the finding **of Abdeta and Gemechisa** (2020) who reported the prevalence of 44.8%. On the other hand, the current results were lower than the report of Lakew et al. (2019) 56.25%, Abebe et al. (2016) 59.2% and HelmiYoussif et al. (2021) 63.88 % and higher than the prevalence of 19.6% and 21.9% recorded by Yohannes and Alemu (2018) and Qayyum et al. (2016) respectively. In Algeria, the subclinical form of mastitis received little attention and efforts have been concentrated on the treatment of clinical cases. Moreover, farmers are not well informed about the silent cases of mastitis. The variation in the prevalence of bovine mastitis in the report of different authors suggest the complexity of the disease, which involves the interaction of many factors (Berhe et al., 2019 ; Fesseha et al. 2021 ; Themistokleous et al., 2023). The data recorded in our study revealed that older cow are more susceptible to infections. This can be related to increased susceptibility of pathogeni organisms in udder relaxed sphincter muscles of teats (Qayyum et al., 2016). Such results were in agreement with Hiitiö et al. (2017), Yohannes and Alemu (2018) and Faris et al. (2021). The risk of CM increased with increasing parity number which agrees with the finding of Berhe et al. (2019), Lakew et al. (2019) and Gantner et al. (2024). This might be due to the increased opportunity of infection with time and the prolonged duration of infection (Lakew et al. 2019). This study also revealed a significant association between breed and the presence of CM. This was in agreement with the previous report by Hiitiö et al. (2017), Berhe et al. (2019) and Fesseha et al. (2021). Breed influence on prevalence of mastitis could be attributed to the difference in certain physiological and anatomical characteristics of the mammary glands (Yohannes and Alemu, 2018). A higher milk yield was identified as a risk factor for CM, which is supported by several previous studies (Abebe et al. 2016 ; Singha et al., 2021). This might be as a result of the chance of injuries that are more likely to occur in bigger size udders and this predisposes the udder for infection since it creates the entrance of pathogens, the stress due to a high milk yield may also disrupt the cow's defense system (Fesseha et al., 2021). In this study, an association was observed between teat shape and CM. This may be explained by the presence of wider teat canals in cylindrical teats with funnel teats, which have been shown to allow more pathogen penetration. According to Guarín et al. (2017), among the risk factors at the quarter level, there is a confirmed correlation between infection incidence and the anatomical position of the quarter, damage to the udder skin, the condition of the teat canal and the distance from the tip of the teat to the floor surface. It was revealed that the prevalence of CM was higher during the early stage of lactation. This might be attributed to the marked sensitivity of the udder to infectious agents and the higher physiological demands after calving (Drackley et al., 2005 ; Sharma et al., 2011 ; Baumgard et al., 2017

; Themistokleous et al., 2023). These results came in agreement with Yohannes and Alemu (2018) and Faris et al. (2021). CM prevalence was higher in intensive systems. The current finding agrees with that of Singha et al. (2021). Intensive farming systems could impose heat stress, possibly impairing the immune function of the cows and resulting in bacterial invasion and multiplication (Singha et al., 2021). In the present study, the presence of CM was significantly influenced by stocking density and manure removal frequency. These results are in accordance with those reported by Abebe et al. (2016) who reported that the higher prevalence of mastitis in breeding with high herd size might be associated with increased exposure of the cows for mastitis pathogens in their environment due to high stocking density, dirty ground, infected utensils, poor ventilation and high humidity. Hiitiö et al. (2017) noted that the risk of the occurrence of mastitis is higher in cows kept in a dirty environment. Also, according to Oliveira et al. (2015), mammary gland infections are associated with herd size. Among the variables associated with milking management, the teat drying process, the lack of performing antisepsis of the teats and inadequate hygiene habits of the milking workers constituted risk factors for mastitis (Krewer et al., 2013). In our survey, most of the milkers have limited knowledge about the means of udder disease transmission. Therefore, adjustment of the hygiene habits of the milking workers, before and during milking, is an essential measure for prevention of intramammary infections. Other preventive measures sach as optimal management of dry cows and their transition to a subsequent lactation should be considered in mastitis control strategies (Maćešić et al., 2022).

CONCLUSION

In conclusion, the present study has shown that mastitis, particularly subclinical type, is a widely prevalent disease in the dairy farms of the three countries in the north of Algeria. Lack of implementation of the routine mastitis prevention and control practices by all of the farms observed and preponderance of the risk factors noted are the main reasons for the observed high prevalence of mastitis. Control and prevention measures should be established in order to prevent new cases and to reduce the prevalence of the disease.

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