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RISK FACTORS INFLUENCING THE PREVALENCE OF SUBCLINICAL MASTITIS IN GOATS

Kalin HRISTOV[1], Parvan PARVANOV[1], Borislav KASHAMOV[2], Roman PEPOVICH[1], Branimir NIKOLOV[1]

[1]Faculty of Veterinary Medicine, 10 Sv. Kliment Ohridski Blvd., University of Forestry, 1000, Sofia, Bulgaria
[2]National Reference Laboratory for milk and milk products, BFSA, 1000 Sofia, Bulgaria

Corresponding author email: kalin_ss@abv.bg

Abstract

The study included 120 randomly selected lactating goats of the Bulgarian breed dairy and local cross. The animals were housed in two licensed farms in Bulgaria, under the same technological systems. Goats are grouped in to treatment groups according to age and number of lactation periods. The study aims to clarify the impact of the number of lactation and age as a factor in the spread of subclinical mastitis. Sterile milk samples have been taken of all the animals for bacteriological status and for the performance of physical and chemical analysis. The results show a clear trend of increasing intramammary infection with age and raise in number of lactation, while caprine animals aged 2-3 years, the affected dairy halves are 20%, while those age dover 8 years affected halves are 56.7 %. Isolated pathogens are mainly from the group of coagulase-negative staphylococci

Key words*: goats, risk factors, mastitis, mammary gland, lactating period*

INTRODUCTION

Successful geographical distribution and increase in the population of goats in the world shows remarkable adaptability of this type of ruminants to different climatic and terrain conditions. This quality of goats can be explained by the characteristics and advantages of the species, including full use of scarce roughage, adaptability to difficult conditions for other animals, unpretentiousness in terms of the type of farming. Today there are more than 300 breeds of goats living in different climatic conditions, from varying mountains with high altitude to desert regions. The inflammation of the mammary gland is a major problem in dairy goats, due to the fact that the development of mastitis, leads to the application of substantial economic loss (Seegers et al., 2003). They arise from the reduction in milk production, premature culling of animals, cost of treatment and the changes occurring in the composition of milk (Leitner et al., 2004 a, b; Kifaro et al., 2009). Beside all milk obtained from goats with mastitis is serious risk in epidemiological terms.

Development and prevalence of mastitis in goats include a wide range of exogenous and endogenous factors, which are age, parity of the doe, stage of lactation, type of housing systems rearing, milking hygiene, breed and others. (East et al., 1989, Contreras et al., 1995, Ndegwa et al., 2000)

MATERIALS AND METHODS

Animals

The study included 120 goats from two licensed farms in Bulgaria. Most of the goats were of the established in Bulgaria, Bulgarian white milky goats, but also local breed of different ages. Conditions and technology of growing in both farms are the same and milking all was manually done . The herds were free of brucellosis, tuberculosis and mycoplasmosis. All the animals were clinically

healthy at entry into the study and giving birth between January and March.

Collection of samples

Collection of individual milk samples from all animals included in the tests was made after the separation of pups. All udder halves of lactating animals were examined using a CMT-Test (Kruuse, Denmark) to detect subclinical mastitis. The CMT reagent reacts with DNA of epithelial and inflammatory cells present in the milk. CMT results were read immediately and were scored for each teat depending on the amount and thickness of gel formed. In this study, CMT scores of '0' and 'trace' were considered as negative or normal while CMT scores of 1+ (weak positive), 2+ (distinct positive) and 3+ (strong positive) were taken as indicators of subclinical mastitis. Teat ends were cleaned with 70% alcohol before sampling. The first streams of foremilk were discarded, and the next 50 ml of milk were collected aseptically from each half-udder into separate sterile vials. Samples were kept at 4 C until bacteriological procedures and SCC testing were performed.

Microbiological testing

Mastitis status of milk samples was determined by diagnostic procedures recommended by the National Mastitis Council (NMC, 1999). Milk samples were spread on blood–agar plates (5% defibrinated bovine blood). The inoculated plates were incubated at 37°C under aerobic condition for 24-48 hours. Identification of the bacterial agents from the pure culture were carried out based on their colony characteristics, Gram and Pfaifer staining reaction, hemolysis pattern, reaction for oxidase and catalase and biochemical test (Polymicrotest - BB-NCIPD, Sofia) in accordance to the International definers Bergey.

Cytological and physico-chemical examination of milk samples

Cytological and physico-chemical study of the samples conducted by method-standard BDS EN ISO 13366-2/IDF 148-2 through Fossomatic (Foss, Denmark) in "National reference laboratory for milk and milk products to RFSD"–Sofia.

RESULTS AND DISCUSSIONS

Most studies on IMI estimated the prevalence by halves and not by animals because the half is anatomically independent unit. In this study, among the 240 udder halves (120 goats) that were tested for the prevalence of subclinical mastitis, 106 udder halves were positive, or 44.2 % (Figure 1).

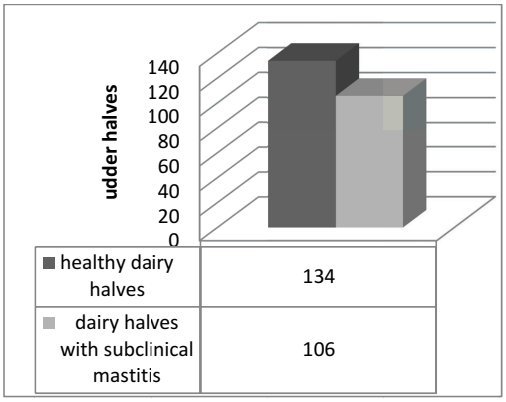


Figure.1 Prevalence of subclinical mastitis in 240 udder halves (120 goats).

Prevalence of subclinical mastitis compared mammary halves in our study group was similar to the findings of some authors (Bozhkova et al., 2000; Mbilu, 2007; Hall and Rycroft, 2007; Islam et al., 2012) providing results within 39 - 44.6%. At the same time, other established lower prevalence of 19 - 31% (McDougall et al., 2002; Min et al., 2007; Kostelić et al., 2009). All this shows the wide range of variation in prevalence of subclinical mastitis in goats, due to the many factors affecting it.

Etiology of subclinical IMI in goats has been established in several studies. In this study most frequently isolated microorganisms were Staphylococcus spp. - 63.5% of all isolates. It is followed by Streptococcus spp. - 9%, E.coli - 7%, Corynebacterium spp. - 5.7%, Enterococcus spp. - 4,3%, Pasteurella spp. - 3.5%. Least common microorganisms were Pseudomonas spp. and Serratia spp. with 2.5% (Table.1).

Table 1. Microorganisms isolated from 240 milk samples from goats

Microorganisms	% isolated
Staphylococcus spp.	**63,5**
Staphylococcus intermedius	
Staphylococcus caseolyticus	
Staphylococcus epidermidis	
Staphylococcus caprae	
Streptococcus spp.	**9,0**
Streptococcus dysglactiae	
Streptococcus uberis	
E.coli	**7,0**
Proteus spp.	**2,0**
Proteus penneri	
Enterococcus spp.	**4,3**
E. faecalis	
Serratia spp.	**2,5**
Serratia marcescens	
Pseudomonas spp.	**2,5**
Pseudomonas putida	
Pasteurella spp.	**3,5**
Pasteurella multocida	
Corynebacterium spp.	**5,7**

The prevalence of bacterial isolates from clinically normal goat milk is influenced by factors such as breed, different hygiene and management practices on the farm, age, stage of lactation, type of milking (Boscos et al., 1996). The microorganisms isolated in this study were similar to those isolated by other scientists (Kalogridou-Vassliadou et al., 1992; Byeng et al., 2007; Marogna et al. 2012). Similar to the present study, most authors have found Staphylococcus spp. as the most frequent organism isolated.

Age of animal was always been an important factor that govern the prevalence of subclinical mastitis in goat (Ali et al., 2010). In the present study, a trend in increase in the rate of prevalence of subclinical mastitis was observed as the age of the animal increased (Table 2). There is a significant relationship between the level of infection and number of lactation ($p < 0.02$), which is confirmed by other authors (Moroni et al., 2005)

Table 2. Prevalence of subclinical mastitis in goats of different age

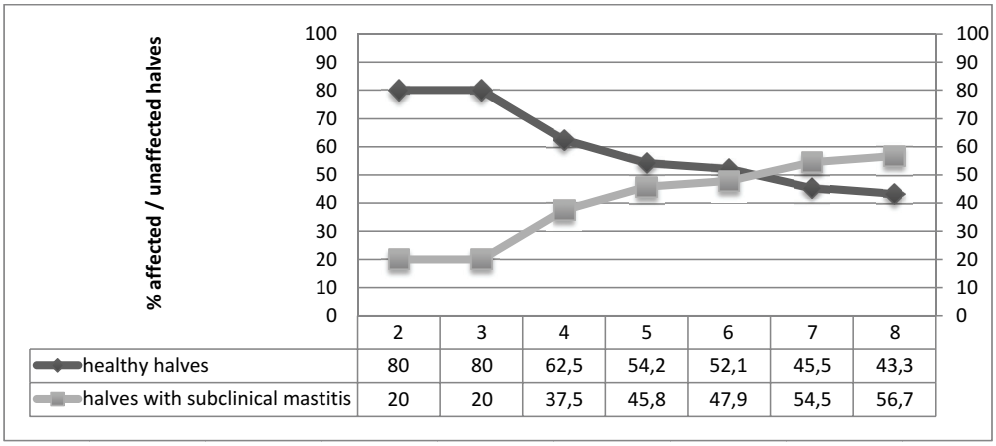
age	number of lactations	dairy halves	healthy halves		infected halves	
		(n)	(n˚)	%	(n¹)	%
2	1	20	16	80	4	20
3	2	20	16	80	4	20
4	3	24	15	62,5	9	37,5
5	4	24	13	54,2	11	45,8
6	5	48	25	52,1	23	47,9
7	6	44	20	45,5	24	54,5
8	7	60	26	43,3	34	56,7
total		240	134	55,8	106	44,2

Subclinical mastitis in young animals up to 3 years is 20%, and with age and number of lactating periods this percent increased to 56.7%. This increased prevalence of subclinical mastitis in older animal might be due to increased length of exposure of older animal to pathogens compared to younger animal. Furthermore, older animals are subjected to stress resulting from the production of milk for a long time and the multiple births. As a result, such animals are easily be come the host of infectious agents due to low immunity.

The results are clearly seen - a gradual increase in subclinical mastitis with age and the number of lactation periods. In animals age up to 6 years, still healthy halves are more than the affected by inflammation (52.1%/47.9%). Over this age trend has reversed and a halves with subclinical mastitis are a above 50% (Fig.2). Therefore, this age may be regarded as a boundary regarding the inflammation of the mammary gland, but of course it's necessary that any other factor affecting the state of health of the gland has to be taken into account and any other factors affecting the state of health of the gland.

Our results established the existence of a correlation between the prevalence of subclinical mastitis with age and number of lactation, are confirmed by previous studies by other authors (Sanchez et al., 1999; Ndegwa et al., 2000; Beheshti et al., 2010). It is explained by the presence of chronic infections in previous lactation which are not cured in the dry period and by the fact that mammary

glands of adult animals are subjected to repeated impact of various predisposing factors for the development of infection. (Moroni et al., 2005)



	2	3	4	5	6	7	8
healthy halves	80	80	62,5	54,2	52,1	45,5	43,3
halves with subclinical mastitis	20	20	37,5	45,8	47,9	54,5	56,7

Figure 2. Level of subclinical mastitis

CONCLUSIONS

Prevalence of subclinical mastitis in our study farms was 44.2%. There is a wide range of microorganisms causing subclinical mastitis, but most frequently isolated are representatives of the Staphylococcus spp. Age and number of lactation periods are associated with the prevalence of subclinical mastitis in goats, and therefore should be taken in to account as factors affecting the status of the mammary gland. As well age increases incidence of subclinical inflammation of the mammary gland in goats.

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