

Advances in Dairy Hygiene and Bovine Health

Dr. Daniel H. Geschwind

UCLA (University of California, Los Angeles), USA.

Abstract

Mastitis is the most frequent and expensive disease in the Animal Production Units (UPAS-Animal Production Units) of dairy cattle, due to its serious consequences on economic losses in the quantity and quality of milk produced. Its cause is directly related to aspects of well-being, health and hygiene and sanitation of the high milk-producing animals. In this work, important aspects to be taken into account for diagnosis, prevention, treatment, antimicrobials and finally aspects of vital importance to be taken into account to prevent bovine mastitis in UPAS of

dairy cattle are described.

Keywords: Milk production; Bovine mastitis; Diagnosis; Prevention; Treatment

Introduction

In dairy cattle, there are two very essential aspects that all livestock who are engaged in the activity of the dairy industry should take into account, milk production and mastitis; the most important activity is the production of milk and mastitis is the most outstanding condition.

Mastitis is defined as the inflammation of the mammary gland characterized by physical and chemical changes in milk and is caused by physical injury, chemical agents and by microorganisms, mainly by several types of bacteria, some fungi and mycoplasmas; whose characteristics are pathological changes in the udder tissue of the cow. The most important changes in milk are discoloration, presence of lumps and increase in the number of inflammatory cells, known as somatic cell counts (CCS); Whose economic repercussions are considerable in the PUVA of dairy cattle [1,2].

Despite current advances in technologies that can be applied to animal reproduction and production, there are still few producers or breeders who have shown concern to improve the overall environmental conditions of their UPAS, without taking into account that these conditions are largely responsible for the health of animals, altering the welfare of the animals and significantly impacting on the presence of reproductive, production and health problems of the mammary gland, significantly increasing production costs in the cattle-raising industry producing milk [1,3,4].

Mastitis has been considered as the most important and costly type of health problem in dairy cattle. It is considered the most common health problem, whose losses account for half of the total health costs in the UPAS [5]. It has been reported that the presence of mastitis is linked to groups of cows with high milk yields, representing large losses of money for producers of cow's milk, whose losses are due to the elimination of milk from treated animals that have this suffering, decrease in dairy production, increase in labour and veterinary services for their treatment; In addition, the productive life of the cows in the UPAS decreases, resulting in an increase in replacement costs [6].

The impact of undesirable mastitis by dairy cattle producers is related to the quantity and quality of dairy production in the UPAS, the quality of milk from cows with mastitis is lower in terms of shorter shelf life of the pasteurized liquid milk and in its performance in the elaboration of cheeses.

Pathogenic bacteria that cause mastitis have been classified as pathogens causing mastitis in adults and children. Among the largest are

Staphylococcus aureus, *Staphylococcus agalactiae*, coliforms, streptococcal enterococci and among the smaller is the *Corynebacterium bovis* causing moderate inflammation of the udder and little effect on the quantity and quality of milk. Mastitis may be present in two forms; Clinical and subclinical. The clinical form is characterized by the presence of increased volume, color (redness) and pain of the mammary gland, whose characteristic is the increase of its temperature and that at times can be accompanied by some signs like lack of appetite, fever and decay. This form of mastitis, its characteristic is that it is always accompanied by changes in the quality of milk, some can be seen with the naked eye and others not. Among those that can be observed with the naked eye are the presence of lumps and lack of coloration; Among which we cannot observe are the increase in CCS, bacterial content, increase of salt and plasmin which is a pasteurizing resistant enzyme and destroys milk protein (casein); As well as lowering the content of lactose and fat, thus reducing the quality of the milk. The subclinical form is characterized by no apparent changes in the udder and milk, but there is a decrease in the amount of milk produced, there are no signs of the disease, but pathogens can be present in the milk produced, causing an alteration in its composition, as a small increase in CCS.

The presence of mastitis in dairy cows is highly variable, with an incidence ranging from 5 to around 50% [7]. However, there are two aspects between dairy production and mastitis of vital importance. The first aspect is related to the fact that the milk yield is associated with the risk of suffering from mastitis and the second one is related to the fact that mastitis affects the yield in milk production, in such a way that it has been indicated that UPAS with more milk yield, more susceptible are to suffer major cases of mastitis.

In addition to economic losses from mastitis, the poor health of the mammary gland in dairy cows increases the risk of having antimicrobial residues, lowers the laboratory satisfaction of dairy farmers and impairs the welfare of cows in UPAS, where the role of veterinarians in the training of bovine milk producers is fundamental, indispensable and indispensable [5]. In Mexico, it has been reported that mastitis in dairy cows causes losses in milk production up to 30%; which means that the average annual cost of treatment for this condition can be up to 1200.0 per cow [8]. In this work, important aspects to be taken into account for diagnosis, prevention, treatment, antimicrobials and finally 10 aspects of vital importance to prevent bovine mastitis are described.

Diagnosis

The clinical determination of mastitis in the UPAS of dairy cattle is based mainly on the preparation, training and experience of the actors in the dairy activity (veterinarians, herdsman and workers). There is a great difference between them [5]. For example, in subclinical cases of bovine mastitis, which are easy to detect for veterinarians, these are not always detected by breeders and workers; However, that they are

responsible for most of the losses caused by mastitis; Representing about 90% of the cases of mastitis in the PUFA of dairy cattle. In the diagnosis of bovine mastitis, the practice of blunting is of vital importance, as well as being of great use for the preparation of the udder in the milking process. However, this practice is not carried out in all UPAS; In the United States (Wisconsin) is carried out in 86%, in 35% in the Netherlands, in 2% in New Zealand and in Mexico no data are available [5,8].

The CCS is of vital importance for the diagnosis of this disease, since in 1995, Le Roux et al. Indicated the presence of mastitis can be present from 250 thousand cells/ml of milk. Therefore, CCS is extensively used for the diagnosis of mastitis in PUFAs worldwide [5]. Another test of mass use is the California test (CMT), whose characteristic is that for its realization in the field is practical, simple and cheap; although not very perfect, especially for the diagnosis of mastitis with a high CCS index; has been used worldwide for many years [5]. The identification of the pathogen causing mastitis in dairy cows, through cultivation, is a safe and definitive tool. This activity helps importantly to orient the activities in the selection of the drug or what to do for the treatment of mastitis in the PUVA of dairy cattle.

Qualification Linear cell	Number Of cells Somatic (x1,000)	Decreased milk production			
		First lactation		Second or more lactation	
		Liters Per day	Liters per 305 days	Liters per day	Liters per 305 days
0	12.5	0	0	0	0
1	25	0	0	0	0
2	50	0	0	0	0
3	100	0.3	100	0.6	200
4	200	0.7	200	1.3	400
5	400	1	305	2	610
6	800	1.3	400	2.3	800
7	1,600	1.6	500	3.3	1,000
8	3,200	2	610	4	1,220
9	6,400	2.3	700	4.6	1,400

Table 1: This indicates that the lower CCS, in the UPAS there are healthy cows, which results in less loss in milk production; however, high CCS above 6×10^6 / ml milk, the losses are higher per cow and lactation [8].

What to do for a good diagnosis:

- To carry out bacteriological monitoring with regularity of each

- Do not use isolated cases of CCS.
- Never overlook clinical signs however slight they may be.
- Be very careful with the sensitivity of the drugs used for the treatment of mastitis, especially in chronic cases.

Activities to perform to obtain a good diagnosis of mastitis in the PUFA of dairy cattle:

- Constant revision of the health status of the udder of all cows.
- Try to use simple, practical and inexpensive diagnostic methods such as CMT routinely.
- Have consecutive CCS data from the same animal.

Importance of using CCS

In CCS can be used in tank milk, in each cow, in group and in individual room; Whose benefit is: to evaluate mastitis programs; Allows the CCS to be carried out quickly in less than one minute, which may be from tank milk or from each individual cow; Allows to assess the health of the udder of cows during drying and during the postpartum period and helps to avoid losing milk quality bonds. The CCS and its consequence on milk production are presented in Table 1.

Prevention

For the prevention of mastitis, it is vitally important to keep the udder health of each and every one of the cows that are in production in the UPA, in which the participation of the veterinarians in the training of the personnel (cattle ranchers and Workers) is of paramount importance; Whose benefit is directly related to the quality of the work during milking and as a consequence with lower cases of mastitis in the UPAS, both clinical and subclinical [5]. In order to carry out this activity of excellent udder health in the UPA cows, it is necessary to establish an excellent plan of activities that includes specific dates and specific responsibilities; Whose evaluation must be at least annually; Since the welfare of cows directly affects the health of the mammary gland, a fundamental aspect for the prevention of mastitis in dairy cows in general and in particulates in high production.

What to do for better prevention of bovine mastitis:

- Avoid at all costs the existence of factors predisposing to the presence of mastitis; whose aspects are related to hygiene and health activities.
- Keep staffs working directly with the cows informed, but mainly the milkers.
- Constantly review the indications that have been provided related to the maintenance of good health and well-being of cows.

What you should not do if you want to prevent bovine mastitis:

- Try to make a diagnosis without visiting the UPA.
- Do not inform each and every one of the details to care during milking, however small.
- Indicate that the most important activities are carried out and, above all, that they should be monitored.

Treatment

The treatment of clinical or subclinical bovine mastitis is of vital importance in PUFAs of dairy cattle; However, it almost always does not solve the problem, and may even worsen the situation for recurrent

cases, especially when antimicrobial therapy is not performed adequately, which can result in severe prevalence and resistance of pathogens. The most important is prevention, where the health and well-being and health of cows play a very important role [5]. In the treatment of bovine mastitis, it should be standardized and specific based on the general health status of cows, such as fever, color and physical appearance of milk (texture); Try to avoid having many types of antimicrobial treatments.

Clinical cases of bovine mastitis should be treated as quickly as possible, especially in acute and subacute acute and acute clinical cases; As well as in recent or chronic ones. In order for the treatment to be successful, the following aspects must be taken into account:

- That the antimicrobial chosen is specific based on the laboratory result by culture or antibiogram.
- That the concentration of antimicrobial administered is adequate.
- That the treatment is not interrupted, until success in the result (elimination of the case).
- Administer supportive therapy, when required and above all administer the specific antimicrobial via intramammary infusion, after emptying or drainage of or affected quarters.

Points to take into account to be successful in the treatment of bovine mastitis [5]:

- Identify the treated cows.
- Develop a simple and easy to interpret calendar of treatments for clinical cases and another for those who present in the drying period.
- Subclinical cases during the lactation period should be treated with great care.

Aspects that should not be carried out to be successful in the treatment of bovine mastitis:

- Never change treatment if the case does not appear within 24 hours after starting it.
- Avoid providing to the UPA calves milk with high CCS rates or from cows treated with antimicrobial.
- Do not carry out the process of milking in a methodical, quiet and not take care of the health and well-being of the cows in the milking parlor.
- Avoid periodic evaluation of the results of the treatments performed in the UPAS.

Currently, there is a wide range of antimicrobials that can be used in the treatment of both clinical and subclinical bovine mastitis, such as benzylpenicillin G (for Streptococci), cloxacillin (penicillin-resistant Staphylococci), ampicillin (Gram positive and gram negative, ineffective against penicillin resistant Staphylococcus), cephalosporin (gram positive and gram negative, ampicillin-like), neomycin (broad spectrum), gentamicin (gram negative), streptomycin and dihydrostreptomycin Chloramphenicol (broad spectrum, especially for Streptococcus and Staphylococcus) [5].

Finally, it is vitally important to indicate the 10 points of the National Mastitis Council to prevent and control the disease in the UPAS of dairy cattle [5,9]:

- Pay attention to the milking technique and preferably use a milking machine.
- Disinfect nipples after milking.

- Treat clinical cases of mastitis in a timely manner.
- Dry all cows with appropriate antimicrobial and recommended for such a case.
- Eliminate cows with chronic cases.
- Elaborate specific objectives to keep the udder healthy of all UPA cows.
- To maintain an environment that favors the well-being of cows, mainly in relation to their hygienic-sanitary health.
- Properly record each and every one of the data related to UPA cows.
- Maintain adequate aspects of biosecurity in the UPA.
- Periodically monitor the health status of the mammary glands of the cows in the UPA.

References

1. Castillo JH (2008) Milk production, fertility and health of the mammary gland in cattle. Plaza and Valdez, Mexico.
2. Cruz EJ (2015) Health of the udder. The Importance of Mastitis Control. *Entorno Ganadero* 71: 32-36.
3. Córdova IA, Guerra LJE, Sánchez AP, Olivares PJ, Mancera VAE (2014) Mastitis and reproductive performance in cows. *Ganadero* 39: 58-63.
4. Córdova IA, Guerrero MJ, Saltijeral OJ, Muñoz MR, Pérez GJF (2003) Environmental stress in animal reproduction. *Production Animal* 191: 49-58.
5. Lam TJGM, Ruegg PL, McDougall (2015) Good veterinary practices on udder health: what to do, what not to do and opportunities. *Entorno Ganadero* 71: 24-31.
6. Sewalem A, Miglior F, Kistemaker GJ, Van Doormaal BJ (2006) Analysis of the relationship between somatic cell score and functional longevity in Canadian dairy cattle. *J Dairy Sci* 89: 3609-3614.
7. Zwald NR, Weigel KA, Chang YM, Welper RD, Clay JS (2006) Genetic analysis of clinical mastitis data from on-farm management software using threshold models. *J Dairy Sci* 89: 330-336.
8. Reyes JJE, Lares BCA, Martínez ACO (s/a) Good management practices and hygiene to obtain quality milk. Fundación Produce, AC Government of the State of Sinaloa, Mexico.
9. Houben EH, Huime RB, Dijkhuizen AA, Kristensen AR (1994) Optimal replacement of mastitic cows determined by a hierarchic Markov Process.