Chapter 6
Mastitis in Dairy Species: Identification, Control, Prevention, and Milk Quality

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EXECUTIVE SUMMARY

The milk composition and quality are related to the animal's health (cow, buffalo, goat, and sheep). The mammary gland disease negatively impacts agricultural economies by reducing milk production and quality, treatment costs, discarded milk, and reduced longevity of animals. Therefore, the chapter reports how and which anatomical, physiological, and behavioral differences inherent to each species can influence the occurrence, treatment, and prevention of mastitis. Thus, early detection and antibiotic resistance are essential factors to exploit new detection methods and more natural remedies associated with reducing antimicrobial therapies such as

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antioxidants, nanoparticles, or essential oils base-plant. Furthermore, healthy animal selection and being genetically resistant to mastitis associated with reasonable hygienic procedures, training programs, and periodic equipment maintenance are crucial steps to ensure the supply of good quality milk and dairy products without risks to the population. In addition, these measures must respect the specificities of each milk-producing species.

INTRODUCTION

The constant growth of dairy products consumption world-wide, turn the dairy sector into an essential choice to supply the nutritional demands of the population and justifies the intensification of milk production, with emphasis on bovine (cows and buffalos), goats, and sheep milk. The nutritional characteristics of milk and dairy products largely depend on the herd's health, which directly reflects on the quality of the milk produced. Thus, the efficiency in detecting diseases in the dairy herd becomes crucial to minimize economic losses, while ensuring milk and dairy products quality, and preventing risks to consumers health (Puppel et al., 2020). Mastitis, an inflammation of the mammary gland, is a primary disease of dairy herds. Mastitis promotes adverse effects on agricultural economies, mainly associated with reduced milk production, poor milk quality, treatment costs, discarded milk, and reduced longevity of animals (Kim et al., 2019). In this scenario, significant research is carried out to identify the main etiological agents involved in the disease, such as Staphylococcus aureus and Staphylococcus spp. (Silva et al., 2022; Merz et al., 2016) Streptococcus uberis, Streptococcus dysgalactiae, Corynebacterium bovis, Escherichia. Coli and others (Vakkamäki et al., 2017).

Clinical and Recently subclinical mastitis have become much more prevalent than clinical mastitis in herds while it is difficult to detect (Krishnamoorthy et al., 2021). Consequently, early detection and diagnosis of mastitis allows producers to provide quick remediation and control, like timely medical treatment of animals, avoiding severe damage. The diagnostic methods can be subdivided into direct and indirect tests, that are considered faster and cheaper. Diagnostic methods can be done during the initial stages of milking, such as California Mastitis Test (CMT), Wisconsin Mastitis Test (WMT), and black bottom mug test, or they can be more accurate using Somatic Cell Count (SCC), and detection of biomarkers such as lactate dehydrogenase, lactose, and proteins associated with inflammation (Antanaitis et al., 2021; Boora et al., 2021; Dore et al., 2016; Holko et al., 2019; Gómez-Gascón et al., 2022). Bacterial culture, Polymerase Chain Reaction (PCR), and Matrix Associated Laser Desorption-Ionization - Time of Flight (MALDI-TOF) are direct