

Chapter 53

Mastitis Healing with Homeopathy; To What End?

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ABSTRACT

Mastitis remains a major challenge to dairy producers because of its effects on animal health and productivity. It occurs in 15-20% of dairy cows annually and leads to a decrease in milk production and an increase in economic cost. Past medical therapies include the use of antibiotics but due to the growing cases of AMR, trends are shifting towards homeopathy. This chapter outlines the fundamentals of homeopathy with an emphasis on its holistic approach and its use in the management of mastitis. The effectiveness of homeopathic treatments is analyzed using various studies in contrast to the traditional antibiotic medicines. Some of the studies show that homeopathy is a viable approach, especially when used alongside antibiotics, therefore reducing the occurrence of AMR due to the decreased usage of antibiotics. However, it is also emphasized that in different studies, the efficacy of homeopathy is not consistent and its effectiveness is even lower than that of a placebo. These variations may be due to inconsistent factors such as research design, a lack of established protocols, and the personalized nature of homeopathic therapy. Lastly, it states that homeopathy may have some potential as an alternative therapy when treating mastitis but it cannot completely replace antibiotics. Future studies are recommended using well-designed cross-sectional randomized controlled trials (RCTs) to measure the effectiveness of homeopathy in real farming conditions. Mastitis management cannot only rely on a regular approach but should incorporate both conventional and complementary medicine to support animal health and farm profitability. The results indicate the need for a patient-oriented approach and the need for continuing education and study in veterinary homeopathy.

KEYWORDS

Mastitis, Homeopathy, Complementary Therapy, Placebo, Antibiotics

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INTRODUCTION

Mastitis is a prevalent health problem in dairy herds that impacts production, animal health, welfare, and the global economy (Ali et al., 2021). It is estimated that between 15 and 20% of dairy cows have mastitis annually, and this is strongly correlated with lower milk output (Neculai-Valeanu et al., 2021). This condition is multifactorial with several causes, including infections, udder defense systems, and environmental variables. It is described as inflammation of the mammary gland brought on by a variety of bacterial strains, fungi, including *Candida* spp., and algae, including *Prototheca* (Huilca-lbarra et al., 2022; Krömker & Leimbach, 2017). Scientific literature data reveal that mastitis is associated with more than 140 microorganisms; the leading bacterial pathogens that cause mastitis are *Staphylococcus aureus*, *Streptococcus agalactiae*, *Escherichia coli*, and *Streptococcus uberis* (Tomanić et al., 2023). Depending on the severity of clinical signs, bovine mastitis can be subclinical or clinical mastitis with variations in severity from mild to moderate and severe. Clinical mastitis affects milk production directly and prominently and is easy to diagnose due to the changes in milk and the general clinical symptoms exhibited by the animal (Pedersen et al., 2021). In contrast, subclinical mastitis (SCM) is hard to diagnose since the cow seems normal, and the udder, as well as milk, appear normal. However, an increased number of somatic cells (>100,000 cells/ml) and the presence of the causative agent can be used to detect SCM. SCM is more prevalent and it results in higher productivity losses accordingly (Tezera & Aman Ali, 2021).

Antibiotic therapy is the primary treatment for bovine mastitis. However, its efficacy is decreasing because of the increasing drug resistance in bacteria, and is regarded as a significant global health issue (Pascu et al., 2022). Antimicrobial

resistance (AMR) is thought to be the cause of approximately 30,000 fatalities annually in Europe and 700,000 deaths worldwide, with the potential to cause millions of deaths (Mestrovic et al., 2022). This indicates the rapid global spread of AMR. Therefore, there is a need to promote the integration of a multisectoral One Health approach in addressing this challenging issue. Complementary medicine, including homeopathy, is encouraged in organic and biodynamic farming as the use of antibiotics is limited by law (Zeise & Fritz, 2019). However, research studies have inconsistent findings and limited references concerning mastitis.

The purpose of this book chapter is to provide a critical analysis to evaluate the role of homeopathic remedies in controlling and treating mastitis. Furthermore, this chapter also explores the efficacy studies of homeopathic drugs in comparison to conventional treatments and discusses the potential benefits and limitations of incorporating homeopathy in bovine healthcare practices. Finally, the chapter seeks to provide a viewpoint on whether homeopathy is a viable alternative or complementary treatment for bovine mastitis.

Understanding Basics of Bovine Mastitis

Mastitis affects dairy animals worldwide, including sheep, goats, camels, and cows. It can be sporadic or pandemic, which causes significant financial losses for the dairy sector. Mastitis is one of the most serious bovine illnesses in terms of both animal welfare and economic effects. This has a negative impact on the profitability of farmers, resulting in significant output losses in the global dairy sector (Aghamohammadi et al., 2018; Das et al., 2018). A broad range of pathogens can cause mastitis, which can be epidemiologically divided into contagious and environmental types (Sharun et al., 2021). Contagious bacteria, such as *Streptococcus agalactiae* (*S. agalactiae*), *Streptococcus dysgalactiae* (*S. dysgalactiae*), *Staphylococcus aureus* (*S. aureus*), and *Mycoplasma* spp., are often transferred from an infected cow to a healthy cow during milking. The hands, towels, and/or milking equipment serve as bacterial reservoirs (Stanek et al., 2024). Environmental mastitis is caused by bacteria such as *Escherichia coli*, *Klebsiella pneumoniae*, and *Streptococcus uberis* found in the cow's surroundings, including bedding, dirt, dung, excrement, and stagnant water (Pal et al., 2019). The teat canal serves as a physical barrier and source of antibacterial compounds, making it the first line of defense against pathogens. The teat canal is lined by sphincter muscles and a waxy substance i.e., keratin that prevents infections from entering (Rainard, 2024). As parturition approaches, intramammary pressure increases due to fluid accumulation. Thus, the teat canal dilates and leaks secretions, making the gland susceptible to infections. In lactation stage milking also results in keratin flushing and teat canal distention (Pal et al., 2019). The udder's humoral and cellular defensive systems must be bypassed by bacteria once they have entered the teat. They begin to proliferate in the mammary gland and infection develops due to weakened immune system. On significant alveoli damage, udder swelling and reddening can be visible. Milk undergoes several changes, such as increased conductivity, pH, water content, visible clots/flakes, and blood (Choudhary et al., 2024).

Mastitis causes economic losses due to reduced milk output, quality, and milk value, higher labor and treatment expenses, and shorter productive lives for afflicted cows. Globally, Mastitis causes around USD 33 Billion of economic loss (Pal, 2018). In Pakistan, the overall prevalence of mastitis ranges from 42-70%, and subclinical mastitis prevalence ranges from 29-57% (Shahzad et al., 2024). According to a study conducted in Pakistan by Fareed et al., mastitis is responsible for 17% of all animal disease-related economic losses. Early diagnosis of infection is crucial to effectively control mastitis. This includes understanding the etiology, developing sensitive screening tests, implementing sound management techniques, and avoiding the spread to uninfected animals (Chakraborty et al., 2019; Gurjar et al., 2012). The following factors are necessary for the successful treatment of clinical mastitis: the identification of the causative agent, the stage of lactation, the history of prior infection, parity, and other systemic disorders (Ruegg, 2017). Mastitis can be treated with traditional and cutting-edge therapeutic approaches including antimicrobial therapy, immunization, nanoparticle-based treatment, herbal therapy, and bacteriocins (Gomes & Henriques, 2016; Pinheiro Machado et al., 2019). The two most often utilized approaches for treating mastitis are immunization and antibiotic therapy. Excessive antibiotic usage and biofilm-associated resistance in mastitis have resulted in reduced responsiveness to antibiotic therapy (Panchal et al., 2024). Vaccination against bovine mastitis is inefficient due to the involvement of several bacteria. However, *S. aureus*, *S. uberis*, and *E. coli* were identified as key targets for vaccine development (Ashraf, 2020). Organic farmers in the USA use alternative therapies like as homeopathy, botanicals, vitamin supplements, and whey-based products to treat clinical mastitis. However, organic certification requirements such as no use of antimicrobials or hormones, organic feeds, and stress-free husbandry practices have resulted into limited alternatives for mastitis control in organic farms (Sharun et al., 2021).

Homeopathy as an Alternative Treatment

Homeopathy's use in food-producing animals is supported by data, despite limited scientific research on its efficacy (Keller & Sundrum, 2018). It is becoming more and more popular as an alternative treatment option for AMR, especially on organic farms (Doehring & Sundrum, 2016; Keller & Sundrum, 2018). Homeopathy is a holistic approach to immune system stimulation which is the foundation of this practice. One theory proposes that homeopathy remedies induce therapeutic effects by balancing or improving the energy of the patient. In addition to pathogen agents and clinical symptoms, homeopathy considers an animal's behavior, constitution, and surroundings (Løken, 2001).

Principles of Homeopathy

Three principles developed by German physician Samuel Hahnemann which are the foundation of homeopathy: the similia principle, drug testing with healthy persons, and dosage dilution (Aversa et al., 2016). Hahnemann observed during drug testing that the simile has the ability to start a healing process that results in symptoms in healthy individuals that are similar to the patient's symptoms (Similia similibus curentur or like cures like). Like cures like implies that a substance that can produce symptoms in a healthy person can relieve similar symptoms of an ill person (Tedesco & Cicchetti, 2001). This is a principle inherent to homeopathy, in accordance to which remedies are chosen. Traditionally, it started with Hippocrates and is a key component of homeopathy principles that defines a treatment strategy in the field of alternative medicine (Ling, 2021).

Homeopathy is a treatment approach based on the relationship between symptoms and remedies. Rather than considering the pathogen or cause of the disease, the remedy is typically selected based only on the clinical signs, traits, and behavior of the patient (Ling, 2020). A comprehensive anamnesis and an analysis of the patient's clinical signs and characteristics—such as body condition, mood, and modalities like behavior and symptom changes in response to environmental stimuli or outside factors that form the "symptom picture"—are necessary before beginning a homeopathic treatment (Weiermayer et al., 2022). A homeopathic materia medica is used to match it to a "remedy picture," which results in the "individualization" process of choosing the most likely effective homeopathic remedy including its dilutions and frequency of administration (Berna & Bagot, 2024). Table 1 depicts some of the homeopathic remedies used to treat mastitis.

Homeopathic drugs are potentiated medications derived from plants and minerals after drug trials on healthy people. Homeopathic drugs are rarely tested on animals, so these findings are transferred to veterinary medicine (Ekert, 2013). The active ingredient is diluted and shaken or triturated with a carrier substance to prepare homeopathic remedies. The homeopathic understanding of the drug is that its healing power is released through mechanical processing and becomes stronger with each step of potentiation (Esmaeili, 2022). The majority of the medicine is made up of an extract or solution that has been serially diluted, say, 1:10 or 1:100 from 10 to 100 (10^{10-100} , 100^{10-100}). Stronger effects generally result from higher dilution. To improve the effectiveness of homeopathic remedies, each dilution step should be followed by vigorous shaking, known as "succussion" (Zeise & Fritz, 2019).

Table 1: Functions of Homeopathic Drugs Used to Treat Mastitis

Functions of some major homeopathic drugs used to treat mastitis Pocket Manual of Homeopathic Materia Medica (Parsani et al., 2023; William, 1981)	
<i>Viz. Sulphur 200c, Causticum 30c, Clematis flour</i>	Particularly helpful in treating stiffness, soreness, inflammation, redness in the teat and udder, and milk clots. It also has an antiseptic action and relaxes tissues.
<i>200c, Euphorbium 200c and Laurocerasus 200c</i>	
<i>Belladonna 30c, Carbo vegetabilis 200c, Hepar sulfuris, and Bryonia alba</i>	Works on every area of the neurological system, causing active congestion, lowering hemorrhage from the lactogenic surface, and eventually curing mastitis
<i>Chamomilla 30c, Phytolacca 30c Arsenicum album 30c, Calcarea sulphurica 30c, Silica marina 200c,</i>	Traditionally a treatment for glandular swelling, it works to reduce inflammation and inflammation-induced swelling. It heals mastitis and has a potent impact on fibrous, mucous, and lactogenic tissues.

Efficacy Studies of Homeopathy Remedies for Mastitis

In medical fields, efficacy refers to measuring the desired effect of a treatment or a drug compared to no intervention or placebo in a randomized controlled trial to reduce bias from surrounding conditions. While the effectiveness of treatment refers to its use on farm or in real conditions (European Medicine Agency 2022). Homeopathy is one of the most widely used substitutes for antibiotic treatments when it comes to treating bovine mastitis (Hellec et al., 2021). The use of homeopathic remedies has many presumptive benefits in addition to lowering the use of antibiotics, such as low costs, no withdrawal period, availability over-the-counter, good customer reputation, and no role in the development of antibiotic resistance. Its unclear mechanism of action and uncertain effectiveness beyond a placebo effect, however, make homeopathy a contentious treatment option (Defiltro et al., 2020; Lees et al., 2017). Medicinal products must have proven therapeutic efficacy to ensure proper treatment for diseased animals. Randomized control trials (RCT) are considered to be gold standard tests to determine the therapeutic efficacy of homeopathic drugs (Kabisch et al., 2011). In RCT, participants are randomly assigned to one of two groups: experimental (receiving the new drug) or control (receiving a placebo).

Efficacy Studies of Homeopathy Treatment in Comparison to Allopathy and Placebo

Homeopathic remedies were used to treat various diseases. However, mastitis accounted for 60% of treatments in studies involving cattle from 1981 to 2014 (Doehring & Sundrum, 2016). A review by Doehring and Sundrum revealed heterogeneous results on the efficacy of homeopathic remedies to treat bovine mastitis. On the basis of diagnostic tests including direct detection of pathogen, California mastitis test, body parameters, and observation of clinical signs; 9 out of 20 trials on udder health and mastitis showed efficacy of homeopathy in comparison to allopathy and placebo (Doehring & Sundrum, 2016). These studies are not generalized rather than considered as single case studies because of lack of repeated trials in a comparable manner. There were twelve studies on the effectiveness of homeopathy for the treatment of mastitis that were published between 1989 and 2018 (Doehring & Sundrum, 2022). All the studies were analyzed on the

specific requirement of RCT which included, randomization, control groups, individualization, blinding, exclusion, inclusion criteria, and diagnostic measures, where only 4 studies proved to be efficacious given in Table 2. Homeopathy cannot be promoted on farms due to lack of repeatable efficacy, even under controlled study conditions involving expertise and individualized treatment procedures (Mathie & Clausen, 2014).

Table 2: The Studies that Proved Efficacious in RCT from 1989 to 2018

Author	Study Design	Homeopathic Preparation	Active Ingredient	Diagnostic measure	Effect of Homeopathy
(Aubry et al., 2013)	Observational study on early subclinical mastitis treatment	Dolisovet® ointment intramammary use	10g (<i>Belladonna</i> for 1dH, <i>Calendula MT</i> , <i>Dulcamara</i> 1 cH <i>Echinacea</i> 1 dH,	California Mastitis Test of (CMT) Body Parameters	Significant reduction of electrical conductivity and milk yield increased after 4-7 days
(Kiarazm et al., 2011)	RCT subclinical mastitis treatment	Nosodes or Homeopathic vaccine Administered 5ml daily	Solution containing <i>Staphylococcus aureus</i> and <i>Streptococcus dysgalactia</i> unknown dilution orally	Direct pathogen in detection and CMT	Decreased bacterial detection and somatic cell count (SCC) in homeopathic treatment than placebo
(Werner et al., 2010)	RCT, Individualized mastitis treatment	Individualized homeopathic remedy identified on the principle of similium, Administered orally in sugar globule	<i>Phytolacca decandra</i> , <i>Hepar sulfuris</i> , <i>Bryonia alba</i> , <i>Mercurius solubilis</i> , <i>Pulsatilla pratensis</i> , and <i>Apis mellifica</i> all with D6 and D12 potencies	Direct pathogen detection and Clinical Signs	Effective over placebo group but no difference to antibiotic treatment
(Klocke et al., 2010)	RCT, Mastitis prevention drying off	Individualized homeopathic remedy identified Administered orally in sugar globule	<i>Mercurius solubilis</i> , <i>Sulfur</i> , <i>Silica</i> , <i>Lachesis mutus</i> , <i>Pulsatilla pratensis</i> , <i>Calcium phosphoricum</i> , <i>Sepia</i> , <i>Calcium carbonicum</i> all at 10 ⁶ dilution	Direct pathogen detection, CMT, and Clinical Signs	Lowered SCC and normal milk secretion

Efficacy Studies of Individualized Homeopathy in Comparison to Antibiotics

In another RCT, effectiveness of individualized homeopathy in comparison to antibiotics was determined at various levels including; bacteriological cure level and cytological cure level. 21 homeopathic remedies were chosen to treat animals with mastitis. Even though the study was meticulously planned to ensure that homeopathy was used correctly in the current RCT, the homeopathic treatment approach was noticeably less effective than the antibiotic treatment approach in curing clinical mastitis (Keller & Sundrum, 2018). Homeopathic healing effectiveness ranged from 45%, whereas antibiotics obtained an efficiency of 53% in 32 studies evaluated from 2012 to 2016 (Zeise & Fritz, 2019). There could be several causes for this. One common argument made in clinical studies about the effectiveness of homeopathy is the absence of an individualized homeopathic treatment, or repetorisation (Bez et al., 2024). The quantity, type, and strength of the treatment administered to each animal during the milking procedure in the milking parlor were the same. Some authors suggest using high potencies for acute diseases, while others use both low and high potencies (MacLeod, 2006).

Efficacy Studies of Homeopathy Preparations without Control Group

Another study focused on determining effectiveness of homeopathic preparation alone and in combination with other drug regimens to treat teat fibrosis in buffalos and dairy cattle in field conditions. Good clinical response with 50% reduction in teat fibrosis appeared in studies that used homeopathic preparation (*calacaria flour* 200C, *silicea* 200C, *Carbo-animals* 30C, *Phytolacca-Dioca* 200C, Alcohol content 91.4% and Phosphorous 30C) in combination with potassium iodide and serratiopeptidase after 6 days of treatment (Yadav et al., 2018). Furthermore, clinical effectiveness of homeopathic combination including *calacaria flour* 200C, *silicea* 200C, *Phytolacca-Dioca* 200C, *Ipecacuanha* 30C, *Belladonna* 30C, *Arnica* 30C, *Conium* 30C, and *Bryonia* 30C resulted in 96.72% effectiveness in non-fibrosed mastitis in riverine buffalo (Varshney & Naresh, 2004). Though the study proved the usefulness of homeopathic treatment but due to lack of a control group and small size (44 buffalos); homeopathic treatment can't be recognized as a generalized treatment (Varshney & Naresh, 2004).

In a case study, 6 cows of Rahi breed suffering from mastitis were treated with MESTEAT liquid containing *Belladonna*, *Mercurius Solubilis*, *Phytolacca*, *Chamomila*, and *Silicea*; given for about 2 months. This resulted into negative CMT and full recovery (Johri & Baberwal, 2024). Nevertheless, homeopathic therapy with *Silicea* 12C, *Belladonna* 12C, *Hepar Sulphur* 12C, *Phytolacca decandra* 12C, and *Phosphorus*12C in the feed of the lactating cows diagnosed to have subclinical mastitis

shown to have no recovery in comparison to placebo or untreated group (Zafalon et al., 2023). In another case, biologically active substance of plant origin in homeopathic preparation (Icthyol® ointment) rubbed twice a day on udder and it showed a negative diagnostic test 2 days earlier than the control group and physiotherapy treated group. The drug has antimicrobial, anti-inflammatory, and immune modulating effects and it increased the gamma-globulins level in serum of sick animals (Kukejeva et al., 2023).

Efficacy Studies of Homeopathy Preparation along with Antibiotics

Field trial-based research on effectiveness of homeopathic complex along with antibiotics on cattle suffering from clinical mastitis provided 90% recovery rate after 6 days of treatment. While 50% recovery rate reported for only antibiotic treated control group. The homeopathic preparation that was used in this trial included following active ingredients; *Belladonna* 200, *Hepersulph* 200, *Silica* 200, *Calc flour* 200, *Conium* 200, and *Calc Carb* Q.S (as needed) (Chandel et al., 2009). A randomized controlled trial with triple blinding was planned to evaluate the effectiveness of homeopathic treatment for clinical mastitis in cows. A total of 162 dairy cows suffering from acute mastitis were randomized to receive either homeopathy (n = 70) or a placebo (n = 92). Allopathic treatments including antibiotics, anti-inflammatory drugs, and udder inflammation creams were also used in both groups to maintain animal welfare. Based on clinical symptoms, the homeopathic remedy was chosen; however, it was typically a combination of nosodes containing 200c potencies of *Streptococcinum*, *Staphylococcinum*, *Escherichia coli*, and *Pyrogenium*. These preparations undergo dilutions such that the pathogen does not remain infective but can induce humoral immunity (Kayne, 2021). The homeopathic group's cows received treatment at least once a day for 5 days. In the placebo group lactose globules were administered. The recorded data on observation of clinical signs, somatic cell count, and recovery time did not showed any additional effect of homeopathy over the placebo group (Ebert et al., 2017). Another study aimed to treat bovine clinical mastitis with homeopathic remedies Masta-forte+Actino Cure along with antibiotic therapy. A total of 160 animals suffering from clinical bovine mastitis were used for study. All the animals were diagnosed with clinical mastitis on the basis of clinical signs including udder redness, edematous, fibrosis, white flakes and blood in milk, and watery milk consistency (Steenefeld et al., 2010). All the animals were treated in two groups one with homeopathic medicine (2 ml. Masta-Forte+2 ml Actino Cure) orally twice a day for 20 days along with antibiotic therapy and the second group was only treated with antibiotic therapy. Among group one animals' recovery rate was 90.00% whereas group 2 recovery rate was 65.00% (Parsani et al., 2023). A 99.5% cure rate was achieved with homeopathy and antibiotics combined. This study indicates that homeopathic remedies cannot overrule allopathic treatments but when used in combination with fewer antibiotics, the mastitis cure rate and recovery duration improved indicating homeopathy can be used as a managerial approach rather than an alternative therapy.

Conclusion and Future Perspectives

Homeopathic remedies were found to be significantly more effective over a placebo and antibiotics treated group in various studies. In some trials, homeopathy has demonstrated that it may have a greater impact than to the placebo. The argument that homeopathy is just a placebo effect could be disproved by these studies' findings. It may be concluded that the preventative and therapeutic use of homeopathy in the chosen experiment had an impact, but the pathogen, research circumstances, and the chosen homeopathic medicine all affected the degree of cure of mastitis. Moreover, antibiotics use might be cut by as much as 75% when homeopathy and antibiotics were used together. This was accomplished by employing homeopathy, or if necessary, a mix of homeopathy and antibiotics. The phenomenon suggested that homeopathy might have a long-term impact that could support the maintenance of animals' health.

Homeopathy doesn't seem to be a universally applicable therapeutic option for mastitis. Rather, dairy practices should adopt effective preventative strategies and target-oriented therapy protocols based on bacteriological culture. Therefore, the use of individualized homeopathy is only advised in certain circumstances, such as treating mastitis caused by certain mastitis bacteria in conjunction with antibiotics (complementary therapy), scheduling timely follow-up visits, allocating adequate time for a homeopathic clinical examination, and having a working knowledge of homeopathic principles. Future research directions should be focused on Randomized control trials to prove and validate its efficacy in diverse farm practice circumstances (Bez et al., 2024). Homeopathy can be used as a complementary treatment rather than as an alternative to antibiotics.

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