Research on the use of Thyme as a Prophylactic Alternative in Gastrointestinal Disorders in Cattle

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Abstract

Thyme is a plant from the Mediterranean region, which belongs to the family *Lamiaceae,* used over time in the treatment of respiratory ailments, digestive ailments, and other diseases. This study presents the prophylactic and therapeutic properties of thyme extract in relation to certain gastrointestinal disorders in cattle. Early-life intestinal disorders in cattle are linked to a number of long-term effects, including a reduction in the severity of both pathogenic and non-pathogenic diarrhoea, a slowdown in growth, and a decrease in milk production during the first lactation, all of which result in significant financial losses. Because of its high concentration of thymol and carvacrol, which have exceptional antibacterial, antioxidant, and anti-inflammatory properties, thyme is used in both conventional medicine and phytopharmaceutical preparations. Therefore, the purpose of this review is to provide current information on the role of thyme in the homeopathic treatment of gastrointestinal disorders in dairy cattle.

Keywords: cattle, gastrointestinal disorders, prophylactic alternative, thyme

1. Introduction

There is a global trend toward identifying natural and sustainable animal growth and production alternatives. Due to the large number of antimicrobials used each year in the livestock industry and cross-resistance between pathogens, alternative treatments have been investigated for many years. Since early-life intestinal problems in cattle profoundly affect the productivity and health of the animals, they pose a serious challenge to the livestock industry.

According to Cho and Yoon in 2014, these conditions are frequently linked to infectious and non-pathogenic diarrhoea causes, which can have serious long-term effects [1].

Reduction in milk production during the first lactation is associated with digestive problems from the colostral period. Early-life gastrointestinal issues in cattle frequently result in decreased mammary gland development and metabolic inefficiencies, which have a direct impact on the cattle's capacity to produce [2]. This decrease in milk production reflects the wider physiological effects of early-life health issues in addition to affecting the profitability of dairy farms [3].

Due to higher veterinary expenses, lower market weights, and decreased milk output, producers suffer financial losses as a result of delayed growth and decreased milk production [4]. Additionally, there is a higher chance of morbidity and mortality for animals that suffer from severe intestinal abnormalities early in life since they are more vulnerable to other health issues [5].

Given these profound effects, maintaining herd health and guaranteeing the financial sustainability of cattle operations depend heavily on efficient management and preventative techniques for early-life intestinal diseases [6].

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2. Results and discussions

Prophylactic applications in bovine diarrhoea

Bacterial, viral, and protozoal diseases are the most prevalent causes of diarrhoea in young cattle. Thyme extract has been studied as a natural alternative to antibiotics and synthetic medications for preventing and treating diarrhoea.

Mechanism of Action

1. Thyme has an antimicrobial effect that decreases harmful bacteria in the gut, promoting microbial balance and preventing diarrhoea;
2. Thymol and carvacrol lower intestinal inflammation, promoting gut integrity.
3. Thyme improves immune system function by increasing white blood cell activity, which helps avoid infections.
4. Thyme regulates gut microbiota by promoting healthy bacteria like *lactobacillus and bifidobacterium* and suppressing dangerous pathogens. Figure 1 presents the properties and benefits of thyme in raising young cattle:

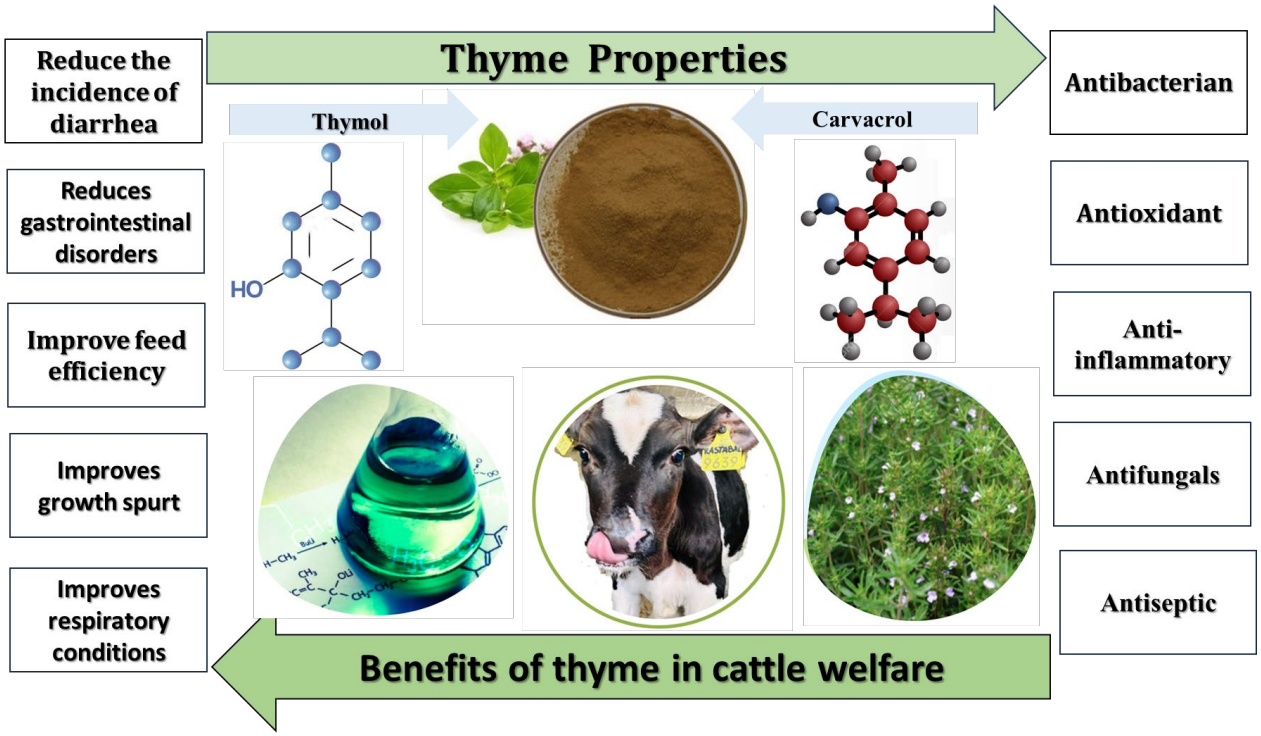

Figure 1. Properties and benefits of thyme in raising young cattle

Anti-inflammatory and antimicrobial properties

In 2022, Kharazmi and colleagues studied the effects of adding thyme extract to the diet of weaned calves diagnosed with diarrhoea. Over four weeks, the researchers gave different quantities of thyme extract. Comparing the treated group to a control group, the results showed a significant decrease in the frequency and intensity of diarrhoea episodes. Additionally, improvements were noted in general health indicators, including hunger and weight growth [7].

Baqir and collaborators assessed the impact of thyme extract on the gut microbiota of young calves. The study involved a group of calves receiving thyme extract as a dietary supplement and a control group without.

Findings demonstrated that thyme extract promoted beneficial gut bacteria while suppressing pathogenic strains. As a result, a marked decrease in the incidence of diarrhoea was noted in the treatment group, indicating the potential of thyme to enhance gut health and resilience against gastrointestinal disturbances [8].

Another study followed the effects of thyme extract on performance parameters and gastrointestinal health in dairy heifers. These were supplemented with thyme extract to evaluate its

effect on growth, feed efficiency, and incidence of diarrhoea.

The study reported that the group receiving thyme supplementation had improved growth rates, better feed conversion ratios, and a significantly lower incidence of diarrhoea compared to those not receiving the extract [9].

Antifungal properties of thyme extracts

Thymol and carvacrol, two active compounds found in thyme, are powerful antifungals. These bioactive substances inhibit the growth of fungal pathogens such as Candida, Aspergillus, and Fusarium, which can cause secondary infections in calves with diarrhoea. They disrupt fungal cell membranes by interfering with ergosterol, a key component of fungal cell membranes, resulting in cell leakage and death. Thymol and carvacrol have broad-spectrum antimicrobial properties that reduce fungal load in the digestive system.

Recent studies have found that thyme extracts can reduce the formation of intestinal fungus, which can exacerbate gastrointestinal disorders in calves.

Sakhare and collaborators in 2021 investigated the antifungal properties of thyme essential oil against various fungal pathogens commonly found in bovine gastrointestinal tracts.

The researchers found that thyme oil exhibited significant antifungal activity against Candida and Aspergillus species, both of which can contribute to gastrointestinal disturbances. The findings suggest that incorporating thyme extracts into the diet of calves could serve not only to manage intestinal fungal infections but also to prevent associated diarrhoea [10].

The studies carried out by Mohammed and collaborators followed how thyme extract might prevent diarrheal episodes in newborn calves. Two weeks before the start of the rainy season, when diarrhoea rates usually increased, calves were split into two groups; one group got thyme extract, while the other group did not. Due to improved immune responses and a decrease in opportunistic fungal infections, the results showed that the group that received thyme extracts had a noticeably lower incidence of diarrhoea [11].

A study by López and collaborators evaluated the dual effects of thyme extract both as an antifungal and a prophylactic treatment in calves with a history of recurrent diarrhoea. Calves were fed a thyme-enriched diet over 30 days.

The researchers observed that thyme extract not only reduced the bacterial load but also inhibited fungal growth in the gastrointestinal tract. The treatment group showed a remarkable decrease in diarrhoea episodes, demonstrating thyme's potential as a comprehensive preventive measure [12].

A study by Kumar and collaborators in 2024 included calves that were given a mixture of thyme extract and probiotics as part of a trial that focused on the preventative usage of thyme extract. According to the findings, the combination was very successful in lowering the prevalence of diarrhoea brought on by both bacterial and fungal diseases.

Thyme extract helped to keep the intestinal environment healthy, which inhibited the formation of harmful fungi and reduced the frequency of diarrheal episodes [13].

Antiseptic properties of thyme extract

Research on the antibacterial qualities of thyme (*Thymus vulgaris*) and its application in cattle gastrointestinal illnesses has produced promising results. Recent research has focused on the antibacterial activity of thyme's essential oils, particularly thymol and carvacrol, and their ability to treat pathogenic bacteria in the gastrointestinal tract.

In 2021, Hassan and collaborators investigated the efficiency of thyme oil against Salmonella enterica strains usually identified in cattle digestive systems. They discovered that thyme oil, taken as a dietary supplement, dramatically reduced harmful bacteria colonization and improved overall gut health in experimental groups.

This study demonstrated the potential of thymol and carvacrol to break bacterial membranes, resulting in reduced infection rates and enhanced nutrient absorption in treated cattle [14].

Zhang and collaborators conducted a 2023 trial to examine the role of thyme extract in reducing bovine enterotoxigenic E. coli infections. The trial included 200 calves, separated into control and treatment groups.

The results showed that the treatment group had a decreased incidence of diarrhoea and gained weight faster than the control group.

The authors attributed these advantages to thyme's antibacterial and anti-inflammatory characteristics, which aid in gut integrity and microbiota modulation [15].

Conclusions

Adding thyme to cattle feed helps improve digestion, reduce disease, and improve gut health in general. Thyme, with its high concentrations of thymol and carvacrol, has antibacterial, antioxidant, antiseptic, anti-inflammatory, and antifungal properties.

Trials point to the potential benefits of thyme extracts in treating young cows' diarrhoea. Thyme can contribute to young cattle's general growth and performance, lessen the intensity and frequency of diarrhoea, and enhance gut health.

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