UNIVERSITY OF LIFE SCIENCES
"KING MIHAI I" FROM Timisoara
Multidisciplinary Conference on Sustainable Development
15 – 16 May 2025

2025 MULTIDISCIPLINARY CONFERENCE ON SUSTAINABLE DEVELOPMENT

EFFECTS OF PLANT EXTRACTS OBTAINED VIA ULTRASOUND-ASSISTED EXTRACTION ON PREVENTING NEONATAL DIARRHEA IN CALVES

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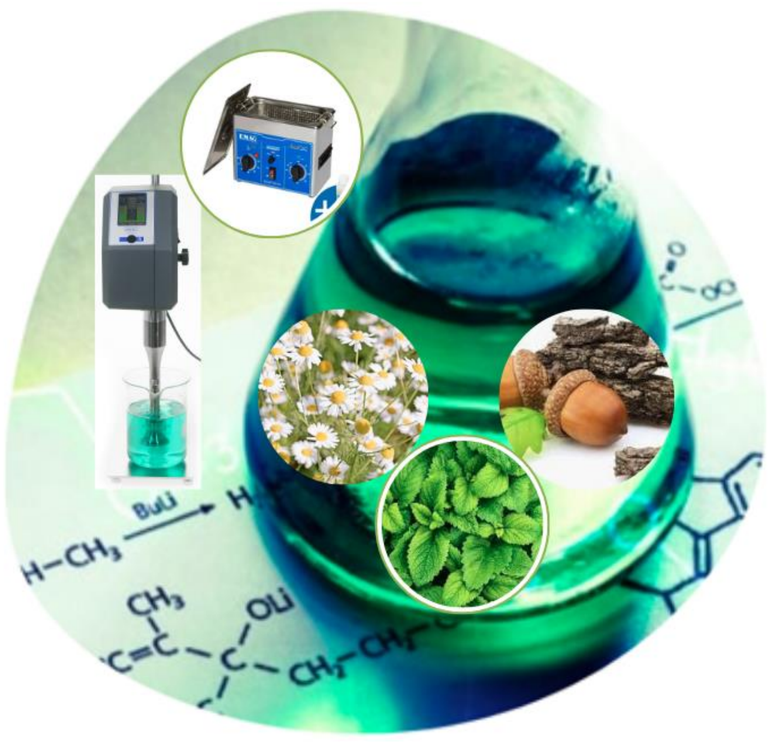
Abstract: *In cattle farming, neonatal diarrhea in calves is a major challenge that frequently leads to significant morbidity and financial losses. Ultrasound-assisted extraction-derived plant extracts have become increasingly well-liked in recent years as a safe and efficient way to extract bioactive ingredients and their use in preventing diarrhea in calves. This approach improves the extraction efficiency of phytochemicals such as polyphenols, flavonoids, and tannins, which have antibacterial, anti-inflammatory, and gut-protective activities. Studies have investigated the effectiveness of herbal extracts such as chamomile, mint, and oak bark obtained through ultrasound in reducing the incidence of diarrhea in calves.*

Introduction

- In recent years, due to increasing concerns about antibiotic resistance and drug residues in animal products, there has been growing interest in phytotherapy – the use of plant-based remedies – as alternative or supportive treatments.
- Aqueous extracts of chamomile (*Matricaria chamomilla*), peppermint (*Mentha piperita*), and oak bark (*Quercus robur)* are among the most promising natural remedies. They have been shown to have anti-inflammatory, antibacterial, astringent, and antispasmodic qualities.
- Aqueous extraction methods have long been used, but ultrasound-assisted aqueous extraction (UAE) significantly improves the efficiency and quality of extracted phytochemicals.
- Ultrasound waves enhance water as a safe, non-toxic solvent, disrupting plant tissues and releasing bioactive molecules (*Chemat et al., 2017*).



Results and discussions

- Studies have demonstrated that UAE can produce a larger yield of bioactive chemicals in less time than standard extraction procedures, such as maceration and Soxhlet extraction (*Demesa, et al., 2024).*
- Results obtained by *El-Kholany et al. in 2017* showed that the digestibility coefficients of all nutrients and feeding values were improved with increasing the level of chamomile (0, 5 and 10g / 100 kg BW/ day) in the ration of calves.
- Extracts from Quercus (oak) species are a valuable source of bioactive compounds, especially polyphenols and tannins, which confer multiple pharmacological properties, especially antioxidant, antimicrobial effects (*Burlacu et al., 2020*).
- *Raj Ritu et al. in 2020* supplemented 4% of the feed concentrate with mint in weaned calves, thus concluding that mint stimulates appetite and improves feed acceptability, without the need for combination with other supplements.

Plants	Key Bioactive Compounds Extracted via UAE	Biological Properties of the Extract	Effects on Neonatal Diarrhea in Calves
Chamomile (*Matricaria chamomilla*)	Apigenin, Bisabolol, Flavonoids	Anti-inflammatory Antispasmodic Antibacterial	Reduces intestinal inflammation Relieves gastrointestinal spasms Decreases severity and duration of diarrhea
Mint (*Mentha piperita*)	Menthol, Rosmarinic acid, Polyphenols	Antibacterial Antispasmodic Antioxidant	Inhibits enteric pathogens Reduces intestinal hypermotility Shortens the course of diarrhea episodes
Oak bark (*Quercus robur*)	Condensed tannins, Polyphenols	Astringent Antimicrobial Intestinal mucosa protector	Forms a protective layer on intestinal mucosa Reduces excessive fluid secretion Lowers diarrhea incidence and supports gut recovery

Conclusions

- Ultrasound-assisted aqueous extraction is a sustainable and effective approach for producing plant extracts that can reduce newborn diarrhea in calves.
- Herbal extracts from chamomile, mint, and oak bark show antibacterial, anti-inflammatory, and gut-protective properties, making them a natural alternative to antibiotic-based prophylaxis.
- Ultrasound-assisted aqueous extraction can remain a reliable and sustainable method for producing high-quality natural extracts, increasing nutritional value.