

FUNCTIONAL SUPPLEMENTS TO IMPROVE RUMEN HEALTH IN SHEEP

Ioan PETROMAN ¹, Ioan ȚIBRU ¹, Ana-Gina ARMAȘ ¹, Daniela VĂLUȘESCU ¹,
 Iulia MUNTEANU ¹, Loredana VĂDUVA ^{2*}

¹ Development Research Station for Raising Sheep and Goats, S.C.D.C.O.C. Caransebeș

² University of Life Sciences "King Mihai I", Faculty of Management and Rural Tourism, Timisoara

*Corresponding author's e-mail: loredana_heber@yahoo.com

Abstract: This paper addresses the role of functional supplements—specifically probiotics, prebiotics, and essential oils—in improving rumen health in sheep, while also proposing a practical supplementation framework adapted to the climatic conditions and feeding systems characteristic of Romania. The study is structured around two main components: a conceptual overview of functional supplements and their biological roles, followed by their practical application within sheep production systems. The first section outlines the definition, classification, and mechanisms of action of key functional additives. Probiotics are discussed in terms of their ability to stabilize rumen microbiota and enhance fermentation efficiency, while prebiotics are presented as substrates that selectively stimulate beneficial microbial populations. Essential oils, derived from plant sources, are examined for their antimicrobial and modulatory effects on rumen fermentation, with potential to reduce methane emissions and improve nutrient utilization. Collectively, these supplements contribute to better digestion, improved feed conversion, and enhanced animal health. The second part of the paper integrates these functional supplements into a comprehensive rumen health management plan tailored to local farming conditions. The authors provide practical recommendations regarding optimal timing, appropriate supplement types, dosage forms, and precautions for use. This framework is further refined through the inclusion of a seasonal supplementation plan adapted to climatic variations in Romania, as well as a model weekly routine suitable for a typical sheep flock. By combining scientific evidence with field-oriented guidance, the paper offers a balanced approach to improving rumen function and overall productivity in sheep farming systems.

• Introduction

The role of natural additives in food and feed – such as probiotics, prebiotics, essential oils, etc. – has steadily increased in the last decade. The proof: the large number of studies in the. Improving rumen health in sheep with probiotics, prebiotics, and essential oils – supplement classes that work through different mechanisms, but can complement each other when used thoughtfully – is a well-supported strategy for enhancing digestion, productivity, and resilience against disorders like acidosis (Figures 1 and 2).

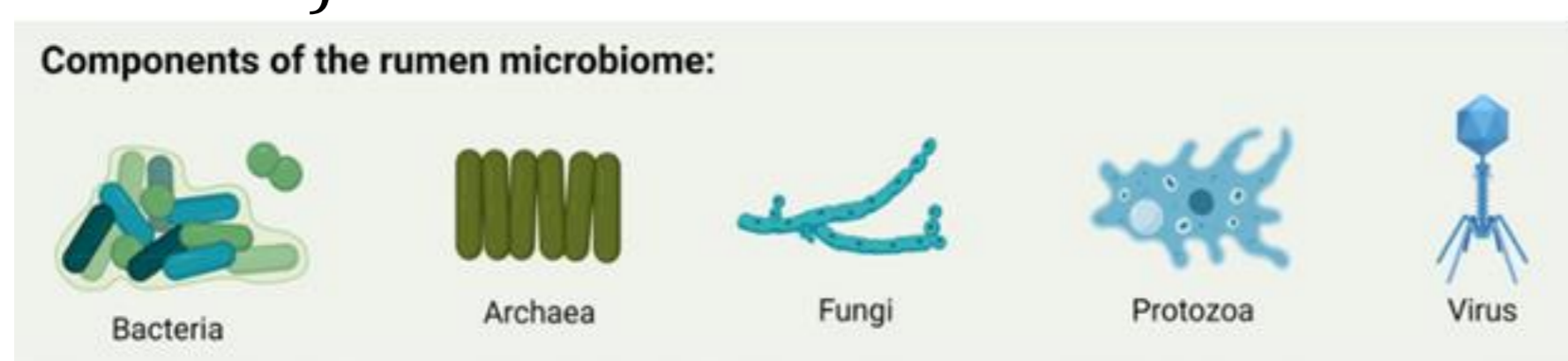


Figure 1. Components of rumen microbiome

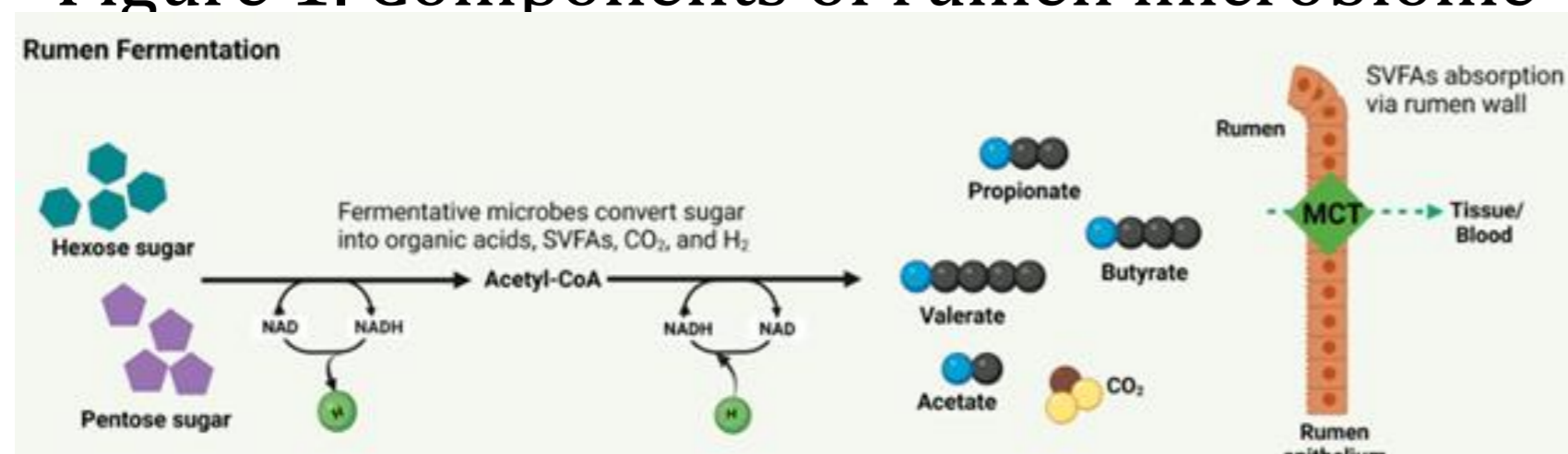


Figure 2. Rumen fermentation

A practical supplementation plan for sheep farming in Romania works best when fitting the country's increasing frequency of droughts and heatwaves, low-input grazing systems, and seasonal pasture quality. Romanian sheep farms often struggle with unoptimized diets and variable pasture quality, which increases health risks and lowers feeding efficiency. Therefore, structured plans can help improve resilience and stabilise rumen function.

• Material and method

The authors of this paper have used articles from the last six years on the topic of functional supplements – probiotics, prebiotics, essential oils – to improve rumen health in sheep, in an attempt to capture the most important trends in this field and to design a practical supplementation plan tailored to sheep in Romania's climate and feeding systems. The research method chose is the bibliographic one.

• Results and discussion

A. General Overview

Three classes of supplements work and complement each other through different mechanisms to improve rumen health in sheep – probiotics, prebiotics, and essential oils. These supplements are essential in enhancing digestion, productivity, and resilience against disorders.

A.1. Probiotics

Probiotics – live microbes that stabilize the rumen – introduce beneficial microorganisms that help balance rumen flora, improve fiber digestion, and reduce risks (e.g. acidosis, bloating). They support the microbial ecosystem that drives fermentation and nutrient absorption. Research highlights their role in improving overall rumen function and productivity in sheep. Studies comparing probiotics alone vs. combinations show measurable improvements in rumen fluid parameters and recovery from experimentally induced acidosis.

A.2. Prebiotics

Prebiotics – who feed the good microbes – are non-digestible feed components (e.g. oligosaccharides) that selectively stimulate beneficial rumen microbes, that do not introduce new organisms, and that enhance the growth and activity of existing ones. Research shows that combining probiotics with prebiotics can improve therapeutic outcomes in ruminal acidosis more effectively than probiotics alone.

A.3. Essential Oils

Essential oils – natural modulators of fermentation – act as natural antimicrobial agents that selectively inhibit harmful microbes while supporting beneficial fermentation pathways. They are increasingly explored as alternatives to antibiotic growth promoters.

• Conclusions

Using probiotics, prebiotics, and essential oils in combination can create a synergistic effect, an integrated approach that can improve rumen pH stability, fiber digestion, nutrient absorption, and resilience against digestive disorders because essential oils modulate fermentation and suppress harmful bacteria, prebiotics feed and strengthen beneficial microbes, and probiotics repopulate and stabilize the rumen.