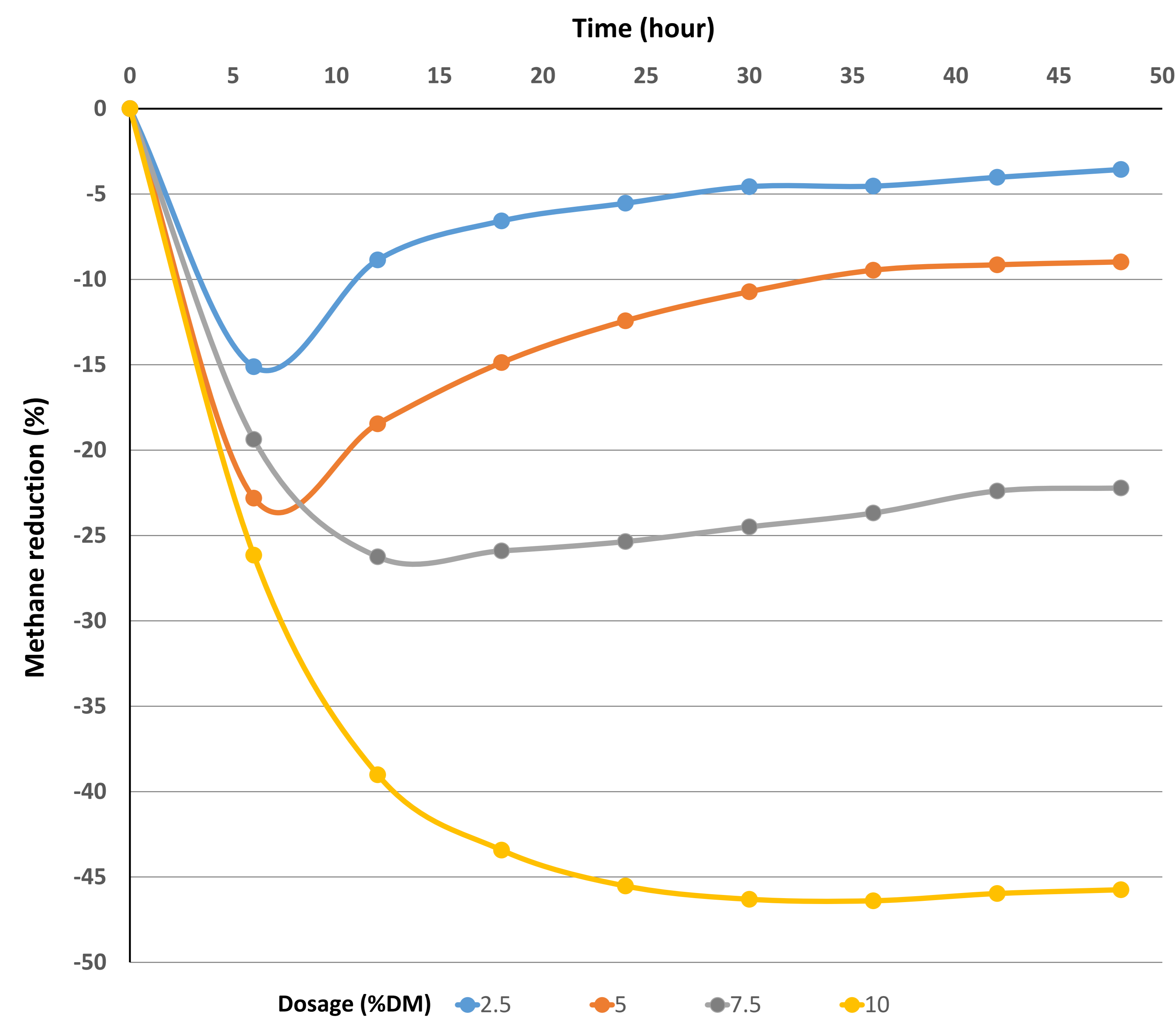


RUMEN BATCH FERMENTATION SYSTEMS TO MEASURE METHANE YIELD

Applications of a fully automated in vitro system for the evaluation of antimethanogenic strategies

KEYWORDS: Livestock, ruminants, methane, *in vitro* techniques, sustainability.



Effect of NaNO₃ dosage on methane production. The figure reports the methane reduction as a percentage of the relative controls for the different nitrate inclusion levels achieved at different fermentation times.

AIMS

Considering the global challenges of next future, strategies to reduce the global impact of the livestock sector are fundamental to improving its sustainability. Special attention is given to methane derived from the enteric fermentation process of ruminants which accounts for 17% of global methane generated by the agricultural sector. The development of an *in vitro* equipment to study methanogenesis in ruminants represents a useful tool to meet future needs.

APPLICATIONS

Throughout the application of our batch *in vitro* system that allows a continuous measure of methane generated during the fermentative process, it is possible to better understand the biological processes behind methanogenesis and to investigate potential strategies for its mitigation. Moreover, *in vitro* techniques represent a rapid, simpler, and less expensive alternative to *in vivo* trials promoting an improvement in animal welfare.

RESULTS:

The outcomes achieved confirm the potential of *in vitro* techniques to study the rumen environment and its process. The equipment tested allows the continuous measurements of methane during the whole fermentation instead of an end-point measurement promoting a precise study of its kinetics and thus improving the overall accuracy of the total methane assessment. This characteristic enhances the ability to investigate the effectiveness of substances used as feed additives to reduce methane production. In particular, thanks to the methane continuous measurements was demonstrated that the antimethanogenic capacity of nitrates results be both time and dose-dependent. Without this approach, the efficacy of lower nitrate dosage was underestimated.

