

Does *Saccharomyces cerevisiae* postbiotic affect hay in vitro digestibility? A comparison between inclusion in the rumen fluid inoculum and dietary supplementation in the donor Chianina bullocks.

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INTRODUCTION

In recent years, interest in the development of postbiotics derived from microbial inactivated cells and their fermentation medium has been growing due to their ease of production, storage, and stability. The use of in vitro ruminal fermentation is a valid technique for evaluating feed and supplements in ruminant diets. In vitro 48-hour fermentations were performed in an Ankom-Daisy II incubator (Fig. 1), following 2 different approaches (experiment 1 and 2), to evaluate the effect of a postbiotic based on *Saccharomyces cerevisiae* (Doxal Italia S.p.A.) on the rumen microbiota's ability to degrade *Medicago sativa* hay.

MATERIALS AND METHODS

Two experiments assessed the effects of *S. cerevisiae* postbiotics on in vitro fermentation using a Daisy II incubator (Fig. 1).

- Experiment 1:** three replicates with 0 (CNTR), 5 (DOSE 1), or 10 mL (DOSE2) of postbiotic directly added to ruminal fluid, obtained from three Chianina males (Fig. 3) at slaughtering and incubated at 39 ± 0.5 °C for 48 hours.
- Experiment 2:** rumen fluid obtained by oesophageal probe (Fig. 2) from 10 Chianina males (5 treated, 5 control) and collected at days 0, 30, 60 post treatment. Treated animals received 2% postbiotic in feed. Samples incubated as in Experiment 1.

The pH was measured at 0, 24, and 48 h (Fig. 4). In vitro dry matter digestibility (IVDMD) and in vitro neutral detergent fiber digestibility (IVNDFD) were assessed at the end of the incubation period (48 h).

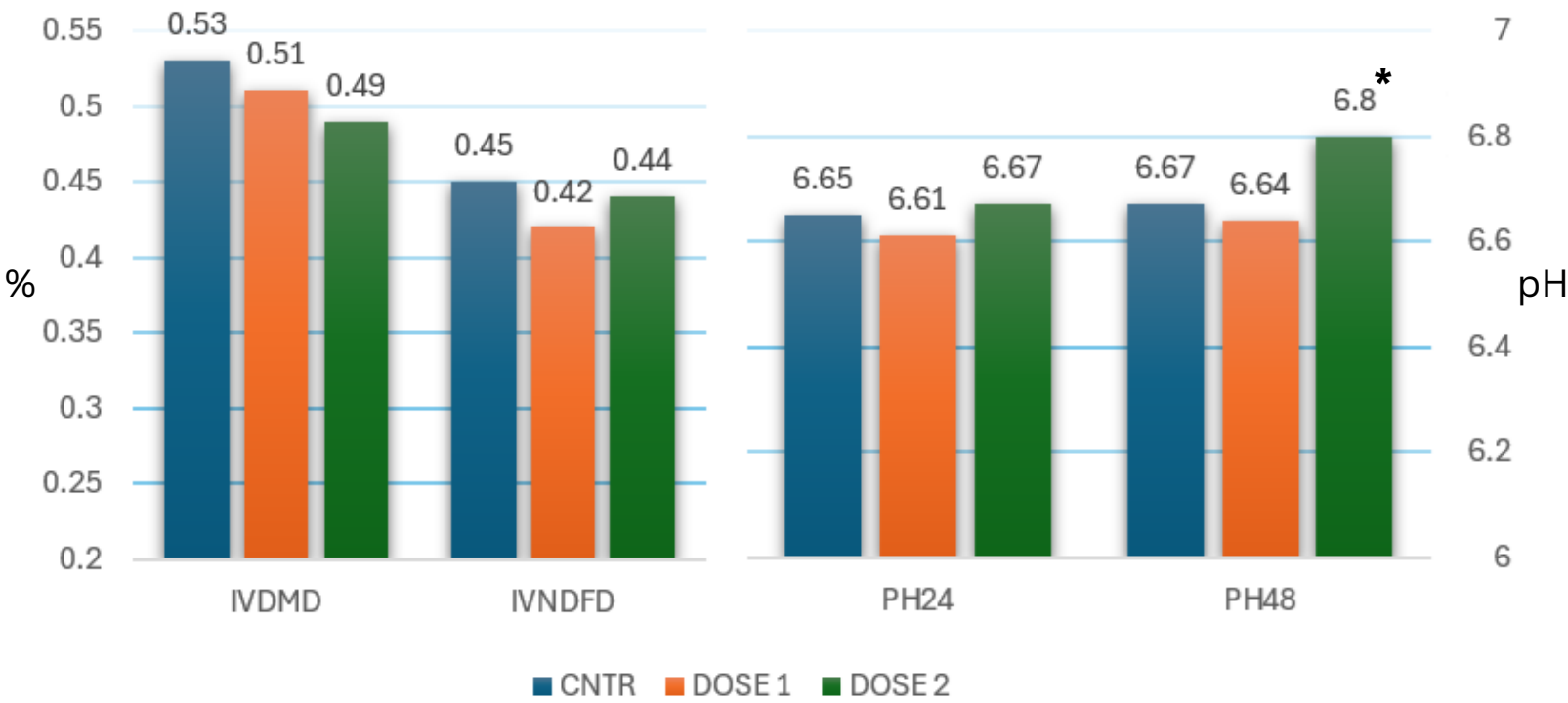


Figure 5. Effects of different doses (0, 5 and 10 mL) of *S. cerevisiae* postbiotic, added at the beginning of fermentation, on IVDMD, IVNDFD, and pH at 24 and 48 h of fermentation (PH24, PH48).

RESULTS AND CONCLUSIONS

- No significant differences ($P > 0.05$) in IVDMD, IVNDFD, at 24 hours (PH24) between treated and control samples were detected in both experiments (Figure 5 and Table 1).
- In Experiment 1, *S. cerevisiae* postbiotic at the higher dose increased ($P < 0.05$) pH at 48 h (Figure 5). Experiment 2 did not confirm the pH effects observed in Experiment 1 (Table 1).
- In conclusion, *S. cerevisiae* postbiotic influences pH when directly inoculated in the fermentation medium, but it does not seem to have a significant and permanent effect on the ruminal microbial composition of the donor animal. Further in vitro and in vivo metagenomics studies (in progress) are needed to clarify the postbiotic's effects on the rumen ecosystem.



Fig. 1 ANKOM Daisy Incubator II System.



Fig. 2 Ruminal fluid sampling with oesophageal probe.



Fig. 3 Twenty-two month old male Chianina breed.



Fig. 4 Daisy II jar with sample bags, ruminal fluid and buffer. pH measurement during fermentation.

	CNTR DAY 0	CNTR DAY 30	CNTR DAY 60	TRTD DAY 0	TRTD DAY 30	TRTD DAY 60	S.E. M	P value
IVDMD	0.50	0.46	0.47	0.50	0.46	0.50	0.02	NS
IVNDFD	0.38	0.34	0.36	0.35	0.36	0.32	0.03	NS
PH24	6.73	6.78	6.84	6.71	6.79	6.81	0.05	NS
PH48	6.71	6.75	6.8	6.70	6.74	6.81	0.04	NS

Table 1. Effects of *S. cerevisiae* postbiotic on IVDMD), IVNDFD, and pH at 24 and 48 h of fermentation (PH24, PH48). Rumen fluid obtained from control (CNTR) and treated (TRTD) animals at 0, 30 and 60 days of treatment.