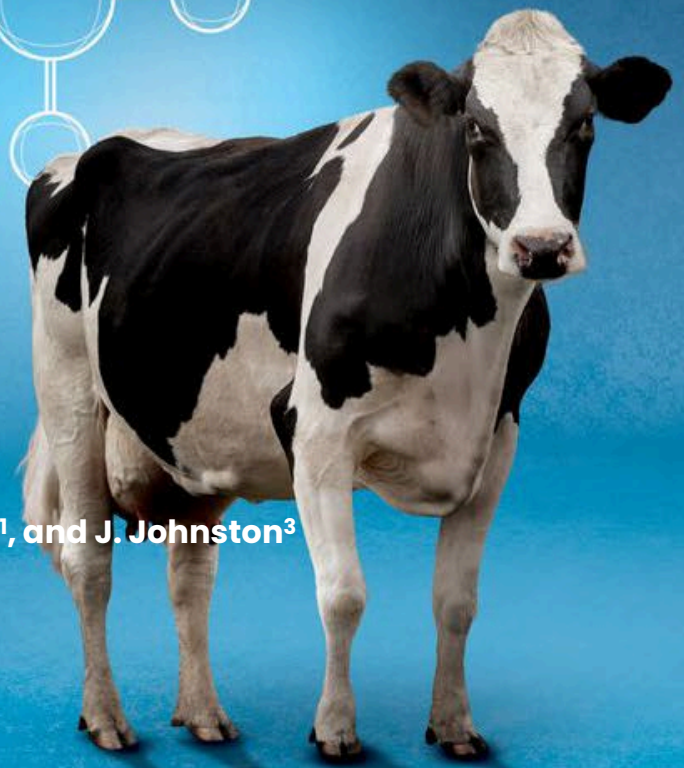
Effects of HTM source on 48 hour in-vitro fermentation and CH_4



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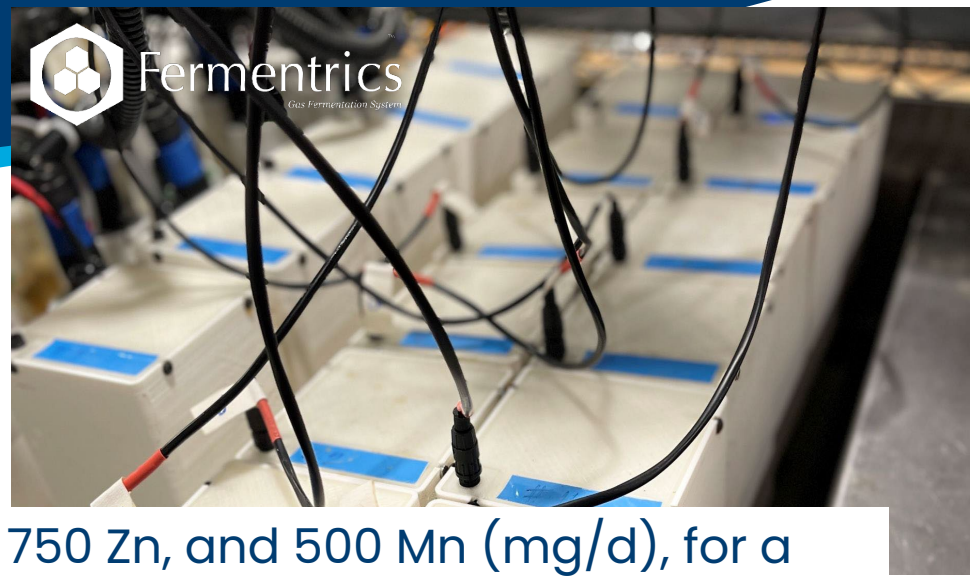
Study Objective:



Objective: to evaluate copper (Cu), zinc (Zn), and manganese (Mn) mixtures from various sources on 48 hour in-vitro fermentation.

- Supplemental trace minerals (STM) calculated to be 125 Cu, 750 Zn, and 500 Mn (mg/d), for a lactating dairy cow consuming 25 kg DM with a 120 L rumen volume and scaled to fit a 250 mL vessel.
- Due to restrictions on sampling number per run, treatments were split into two runs with 6 replicates per treatment, as such treatments are reported as deviations from the control.

Run 1 evaluated:

- Control (no additional trace mineral)
- Sulfate (**SO4**, 1.04 Cu, 4.40 Zn, 5.04 Mn)
- Selko® IntelliBond® (**IB**, 0.48 Cu, 2.84 Zn, 3.55 Mn)
- Nutrilock® Chemlock (**NC**, 0.45 Cu, 2.69 Zn, 3.55 Mn)
- Phibro Vistore™ (**PV**, 0.45 Cu, 2.65 Zn, 2.89 Mn)

Run 2 evaluated:

Control (no additional trace mineral)

SAM Nutrition (**SN**, 0.45 Cu, 2.69 Zn, 3.19 Mn)

Orffa Excential Smart (**OE**, 0.48 mg Cu, 2.79 mg Zn, 3.13 mg Mn)

Ecotrace Glycinate (**EG**, 4.34 mg Cu, 23.15 mg Zn, 27.17 mg Mn)

Materials & Methods:

- **Samples**
  - 400 mg TMR Substrate ground to 6mm
  - Placed in 5x10 cm bags (50 ± 10 micron; Ankom #R5x10)
- **Rumen Fluid**
  - Collected at 8am in a preheated thermos and bathed in CO_2
  - Filtered through 3 layers cheese cloth
- **Experimental Unit: Glass Fermentation vessels**
  - 80% KSU buffer and 20% rumen fluid
  - Mineral treatments added to the vessels simultaneously with the rumen fluid
- Fermentation vessels placed in insulated reciprocating water bath heated to 39.5°C for a 48-h incubation
- Data were analyzed as a complete randomized design with PROC MIXED in SAS (SAS Institute Inc, Cary, NC)
- Significance equaled $P \leq 0.05$ and tendency at $0.05 < P \leq 0.20$

Measurements:

Fermentrics™: a full-service agricultural testing and research laboratory specializing in fully automated in-vitro gas fermentation analysis of feeds and forages that has proven effective in reviewing ingredients, TMR's and feed additives.

- Allow understanding of digestion kinetics of feeds and forages and can be used to estimate milk production.
- Provide the end user with options on how to adjust rations.

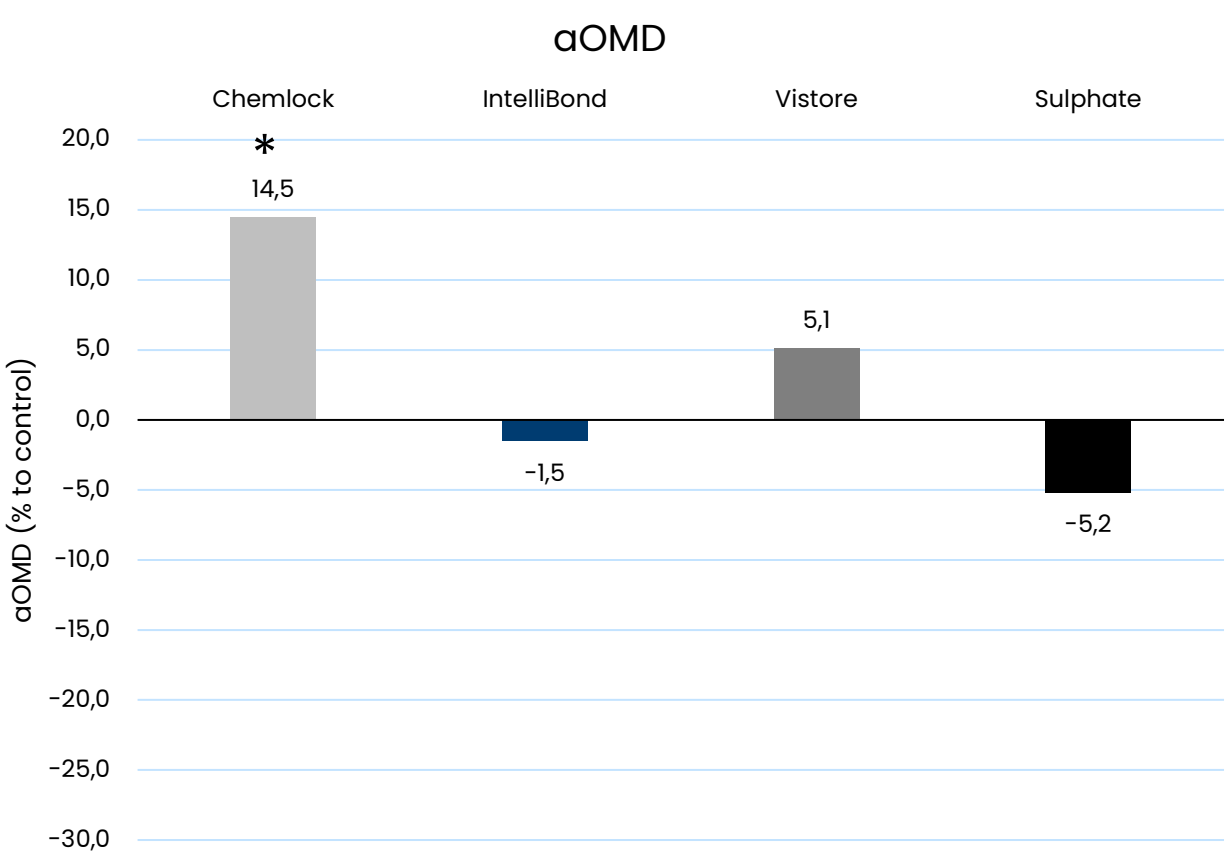
- **Apparent Organic Matter Disappearance (aOMD):** Apparent organic matter digestibility is the percent of organic matter digested

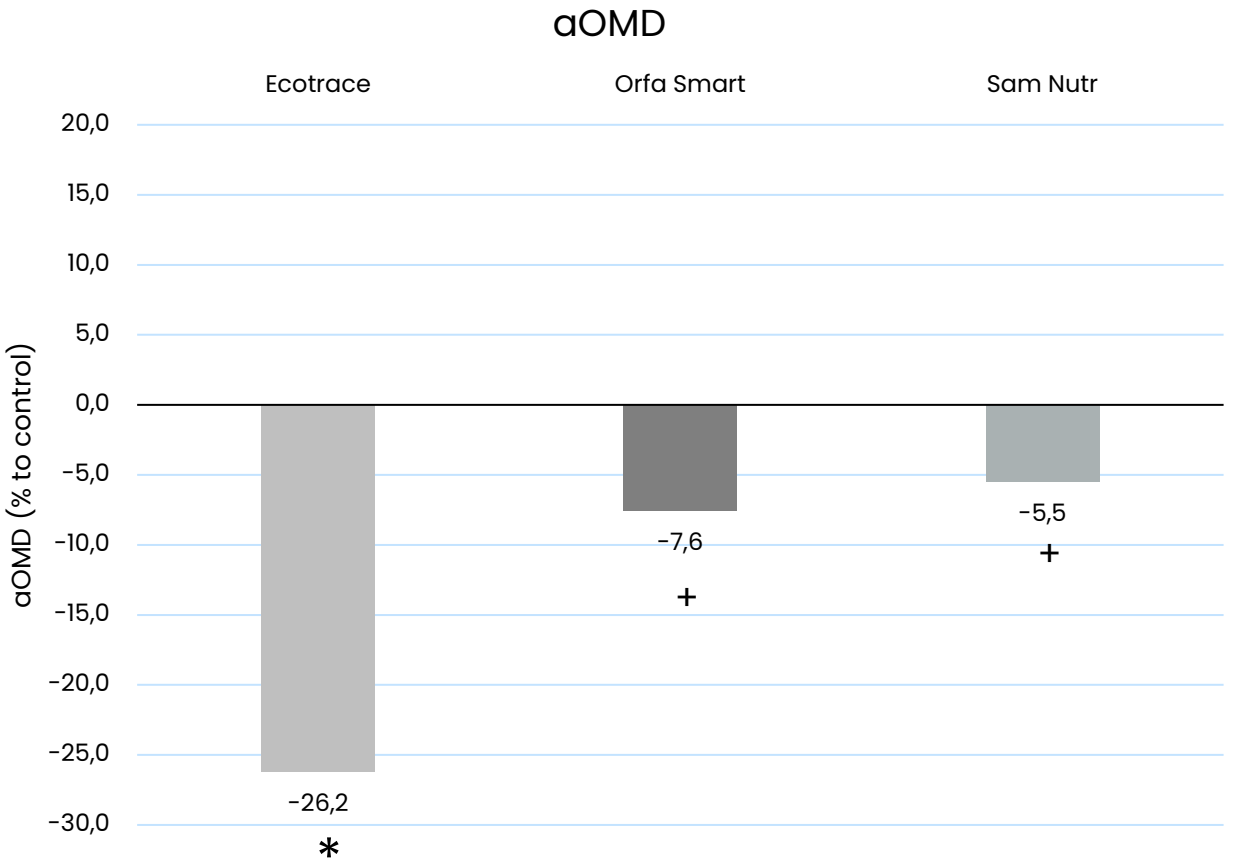
- **Apparent Microbial Biomass Production (aMBP):** Microbial biomass production is measured directly by analyzing the substrate that remains after 48-hour incubation with a NDF analysis (w/o amylase or sodium sulfite). The difference between the weight of the substrate before and after NDF analysis at the end of fermentation is the microbial biomass after accounting for microbial protein. aMBP is the main driver for the milk production equation used by the Fermentrics system.

- **CH4/aOMD:** Methane/apparent organic matter digestibility as a proxy for methane yield.

OHTM Experiment – aOMD Deviation from Control

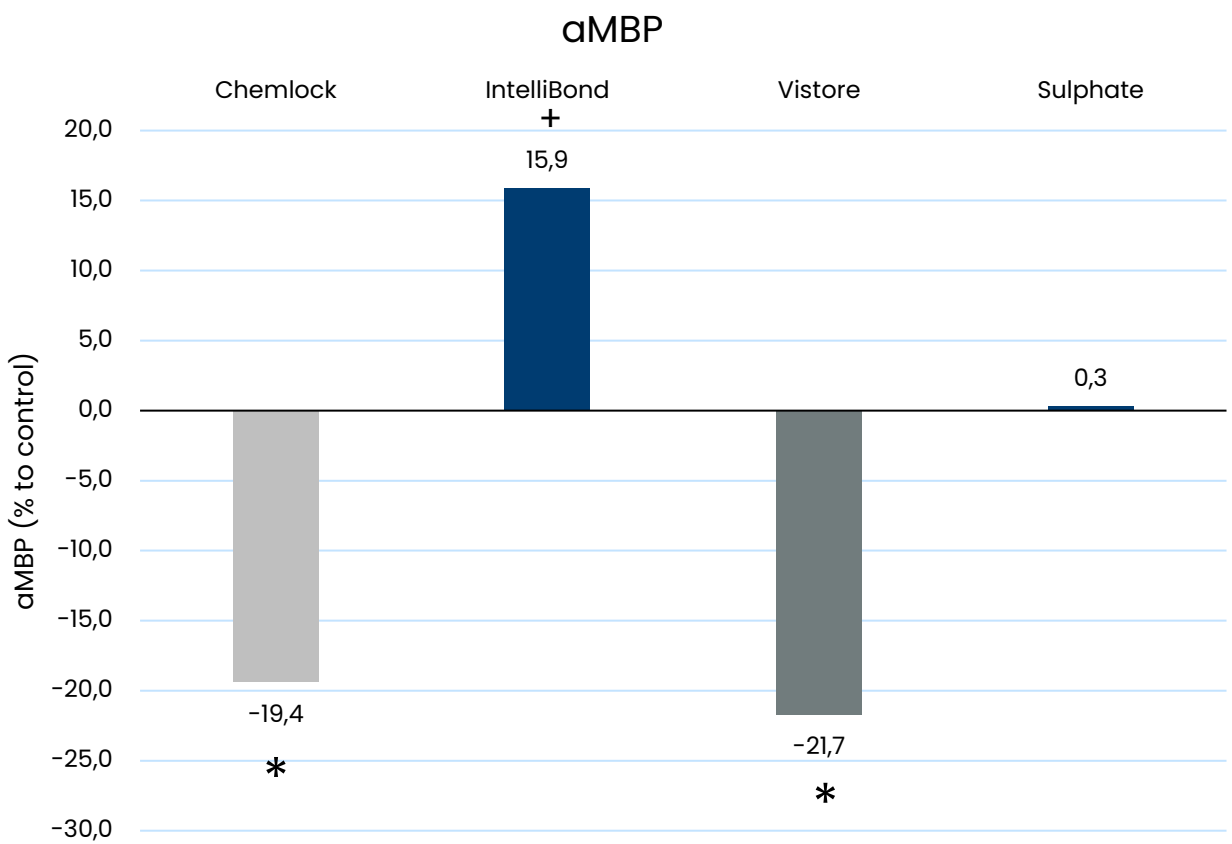
*$P \leq 0.05$
$^{+}0.05 > P \leq 0.2$

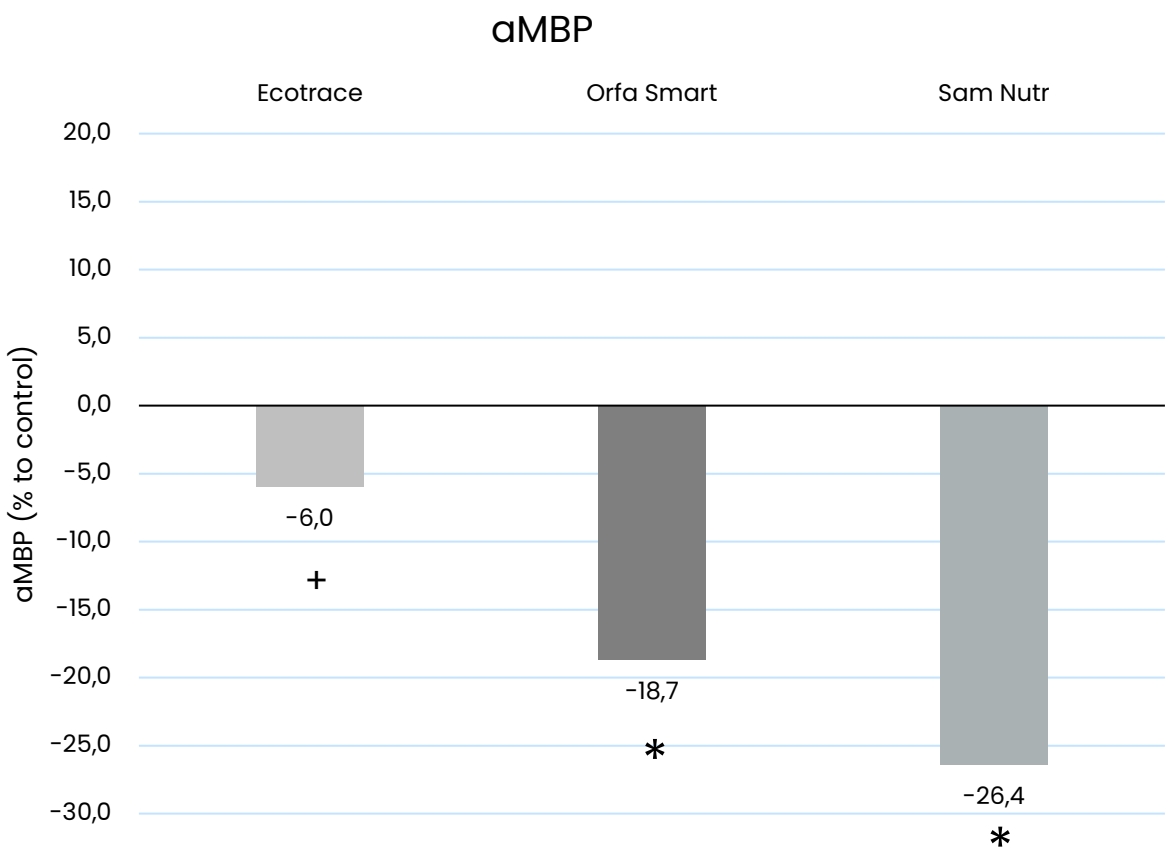




OHTM Experiment – aMBP Deviation from Control

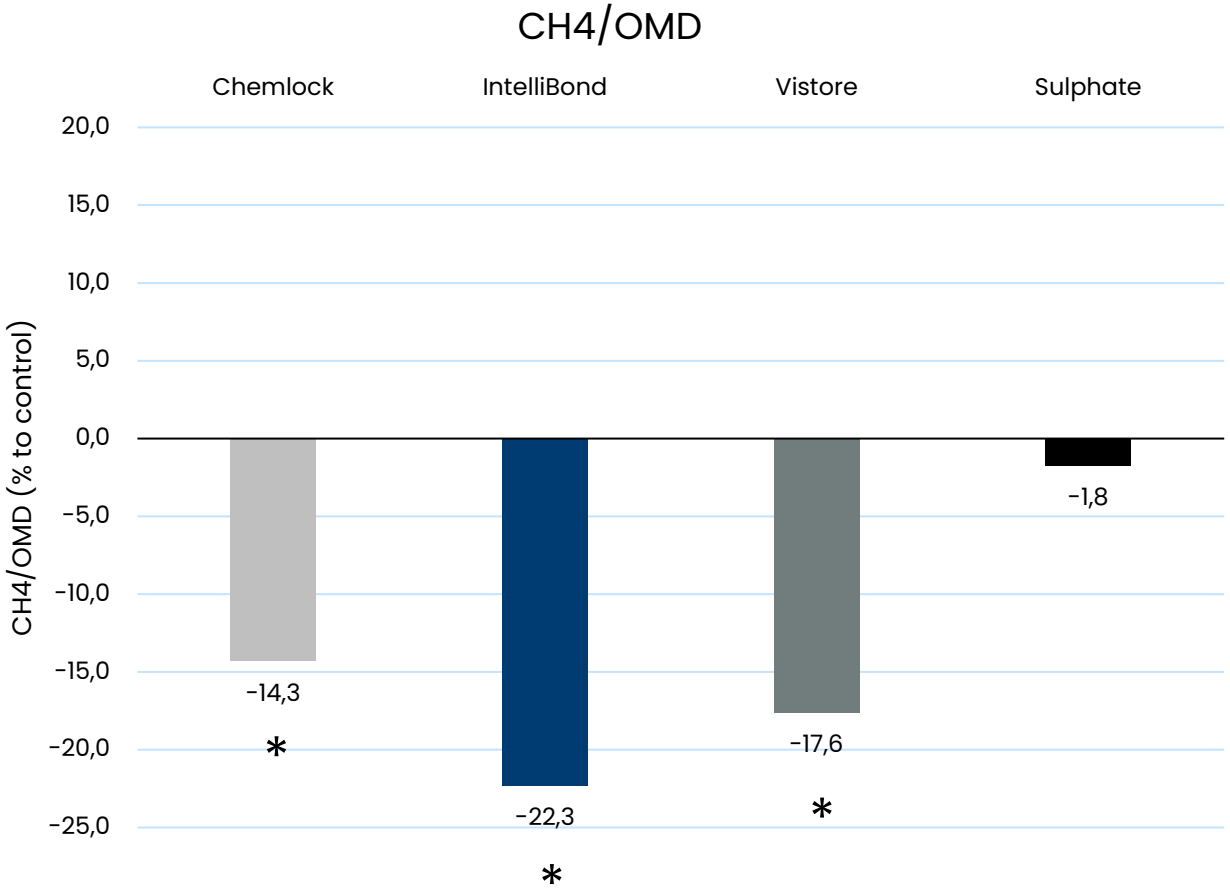
*P ≤ 0.05
+0.05 > P ≤ 0.2

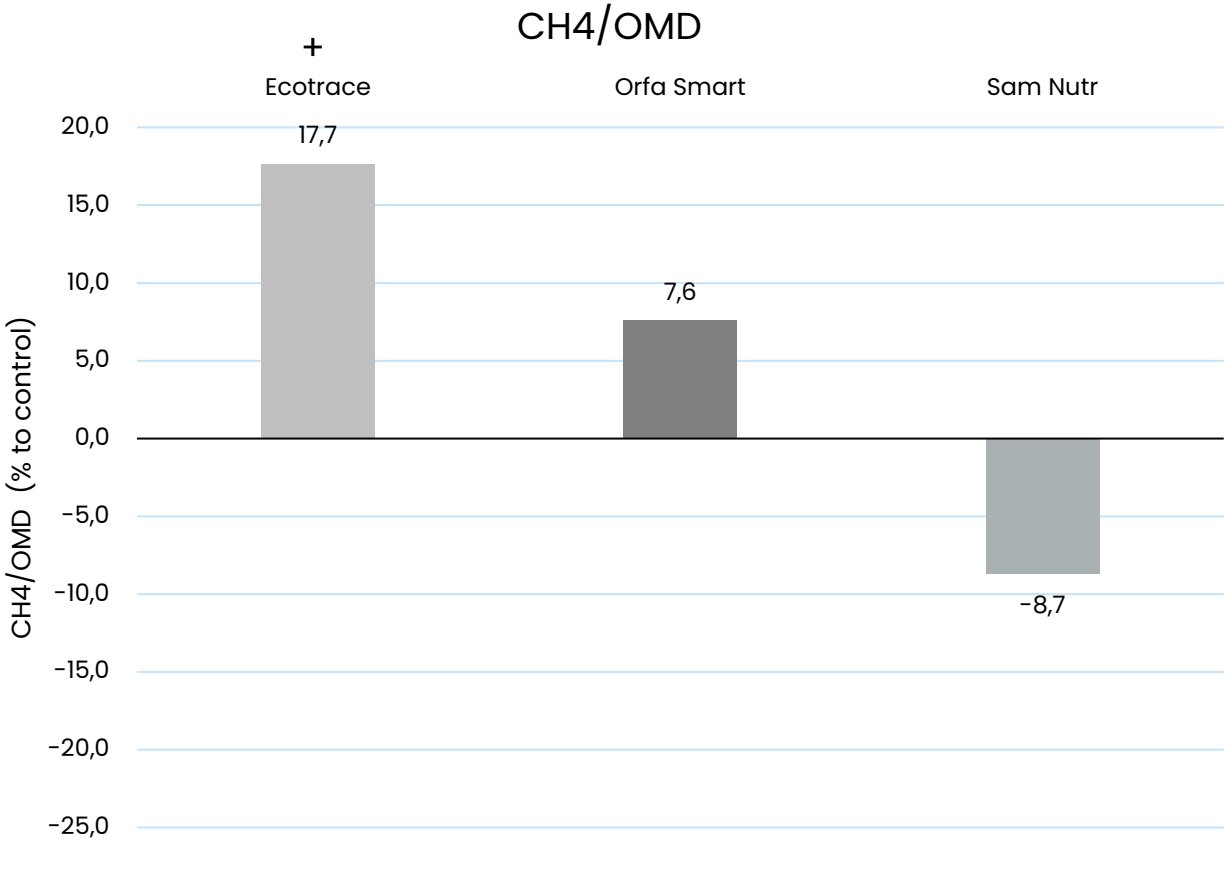




OHTM Experiment – CH_4/aOMD Deviation from Control

*$P \leq 0.05$
$^{+}0.05 > P \leq 0.2$





Fermentrics Trial Results and Conclusions:

Run 1:

- NC (P = 0.014) resulted in higher apparent organic matter disappearance (aOMD) while other treatments were not significantly different (NSD).

IntelliBond improved in vitro fermentation parameters of aMBP (proxy for milk production) compared to other trace mineral sources.

result in less aOMD.

- SN (P < 0.001) and OE (P < 0.001) had less aMBP, and EG tended to have less aMBP (P = 0.16).
- For CH_4/OMD, EG tended (P = 0.11) to generate higher levels and all others NSD.

*aMBP is the main driver for milk production used by the Fermentrics system.

Thank you.

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