Effect of sweet potato vine and urea molasses supplementation on feed intake, diet digestibility and methane emissions of heifers on a poor quality tropical diet

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Introduction

Sweet potato vine silage (SPVS) and urea-molasses blocks (UMB) are recommended as alternative supplementation for ruminants in tropical regions:

- High nitrogen concentration
- Low costs under smallholder conditions

→ We evaluated effects of SPVS and UMB supplementation on intake, digestibility and methane emissions of Holstein Friesian x Boran heifers

Fig. 1: Holstein Friesian x Boran heifers during adaptation period.

Materials and Methods

- Trials conducted at ILRI, Nairobi, Kenya in 2015.
- Six Holstein Friesian x Boran heifers served as experimental animals (Fig. 1).
- Three diet treatments:
  - Basal diet (BD)
  - SPVS
  - UMB
- Basal diet (BD) consisted of 61.4% wheat straw and 38.6% Rhodes grass hay (on dry matter –DM– basis).
- Diet SPVS contained 80% of BD plus 20% of SPVS (1.8% molasses, 67% vine, 31.2% root on DM basis).
- Diet UMB was BD + *ad libitum* UMB (35% molasses, 19% $CaHPO_4$, 10% urea 10%, 10% salt, 5% cotton seed meal).
- Quantitative and qualitative data on feed intake and faecal excretion was collected during two 7-day experimental periods.
- Enteric methane (CH_4) emissions were determined during 3 days of respiration chamber measurements.
- Both experimental periods were preceded by 21 days of adaptation to the diets.

Results

- Digestibility of DM (Tab. 1) was higher for diet SPVS ($p \leq 0.05$) than for BD but similar to UMB ($p > 0.05$).

Tab. 1: Intake and digestibility of diets BD, SPVS and UMB by Holstein Friesian x Boran heifers and resulting methane emissions.

Variable	BD	SPVS	UMB	SEM
Intake (g $kg^{-0.75}$ LW)				
Dry matter	70.9	76.0	66.8	3.08
Crude Protein	5.6	6.7	5.5	0.31
Digestibility (g kg^{-1})				
Dry matter	474 ^{a}	510 ^{b}	480 ^{ab}	10.1
CH_4 emission (liters)				
per animal x day	177	176	162	5.6
per kg DM Intake	58	54	58	1.5
per kg DM digested	123 ^{b}	105 ^{a}	121 ^{ab}	4.1

Means with different superscripts differ at $p \leq 0.05$.
DM Dry matter, SEM Standard Error of the Mean.
For diet abbreviations see Materials and Methods.

- Daily CH_4 emissions per animal and per kilogram DM intake (Fig. 2) did not differ between diets ($p > 0.05$).
- Per unit of digested DM (Fig. 2), CH_4 emissions were lower for SPVS than for BD ($p \leq 0.05$) .

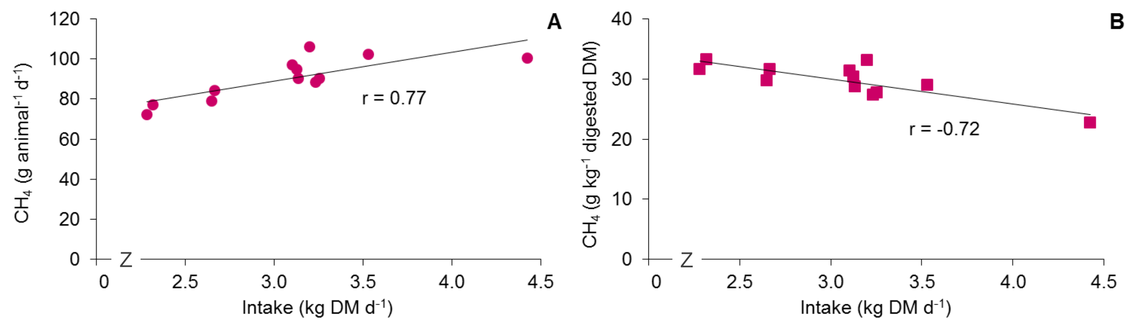

Fig. 2: Relationship between daily dry matter (DM) intake and
A) daily methane emission per animal;
B) unit of digested dry matter.
Note the differently scaled Y-axes.

Conclusion

Supplementation of the diet with about 20% SPVS has the potential to improve diet digestibility and decrease enteric methane emission in cattle fed with poor quality roughage.

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