Effect of sweet potato vine silage (SPVS) and urea molasses blocks (UMB) on 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

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% CaHPO₄, 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 (CH₄) 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<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.

<table>
<thead>
<tr>
<th>Variable</th>
<th>BD</th>
<th>SPVS</th>
<th>UMB</th>
<th>SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake (g kg⁻³ LW)</td>
<td>70.9</td>
<td>76.0</td>
<td>66.8</td>
<td>3.08</td>
</tr>
<tr>
<td>Dry matter</td>
<td>5.6</td>
<td>6.7</td>
<td>5.5</td>
<td>0.31</td>
</tr>
<tr>
<td>Crude Protein</td>
<td>474</td>
<td>510</td>
<td>480</td>
<td>10.1</td>
</tr>
<tr>
<td>Digestibility (g kg⁻¹)</td>
<td>177</td>
<td>176</td>
<td>162</td>
<td>5.6</td>
</tr>
<tr>
<td>CH₄ emission (liters)</td>
<td>58</td>
<td>54</td>
<td>58</td>
<td>1.5</td>
</tr>
<tr>
<td>per animal x day</td>
<td>123</td>
<td>105</td>
<td>121</td>
<td>4.1</td>
</tr>
<tr>
<td>per kg DM Intake</td>
<td>123</td>
<td>121</td>
<td></td>
<td></td>
</tr>
<tr>
<td>per kg DM digested</td>
<td>123</td>
<td>121</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

- Daily CH₄ 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), CH₄ emissions were lower for SPVS than for BD (p<0.05).

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.