

In-vitro digestibility of *Vigna unguiculata*, *Centrosema brasilianum* and *Flemingia macrophylla* before and after ensiling for pigs

¹Sonja Heinritz, ²Sandra Hoedtke, ¹Siriwan Martens, ²Annette Zeyner



1. Introduction

Tropical forages, in particular legumes with high protein content, present an attractive alternative to purchasing costly protein concentrates for smallholder pig producers.

In-vitro enzymatic degradability and gas production before and after ensiling was tested for three contrasting forages in order

- to reveal their potential to be included in pig diets
- to determine possible differences in quality between fresh and ensiled material
- to assess the influence of ensiling on the feedstuff.

2. Materials & Methods

➤ The legumes *Vigna unguiculata* CIAT 4555, *Centrosema brasilianum* CIAT 5234 and *Flemingia macrophylla* CIAT 21087 (Fig. 1 to 3) were harvested before flowering.

➤ Bromatological composition was determined from unfermented plants.

➤ Anti-nutritional factors (ANF) such as condensed tannins (CT) and trypsin inhibitory activity (TIA) were determined before and after ensiling.

➤ Silages were prepared in vacuum sealer bags on lab scale, inoculated with *Lactobacillus* CIAT S66.7 at 10⁵ cfu/g fresh matter (FM) and 20 g sucrose/kg FM, and stored for 3 months at 25°C.

➤ Enzymatic hydrolysis: fresh and ensiled material (Fig. 5) was incubated at 39 °C for 2 h with porcine pepsin and 4 h with pancreatin (Fig. 4).

➤ Gas test: predigested material was incubated for 72 h at 39 °C with pig faeces and gas volume read from syringes.

➤ Ground maize was included in the digestion studies solely and in combination with *Vigna* as easily digestible and typical feedstuff.



Fig. 1: *Vigna unguiculata* leaves



Fig. 2: *C. brasilianum* foliage and flowers



Fig. 3: *F. macrophylla* leaves



Fig. 4: Water bath

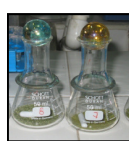


Fig. 5: Flasks with samples

3. Results & Discussion

➤ *Vigna* presented highest enzymatic dry matter (DM) degradability (D) and gas production (GP) among forages before ensiling (Fig. 6, Fig. 7).

→ *Vigna* had lowest amounts of NDF and ADF (365 and 235 g/kg DM resp.) and highest values in non fibre-bound protein and water soluble carbohydrates (185 and 111 g/kg DM resp.).

→ *Flemingia* and *Centrosema* contained ANF (CT 207 and 79 g/kg DM resp., TIA 198.8 and 8.9 mg trypsin inhibited/g DM resp.).

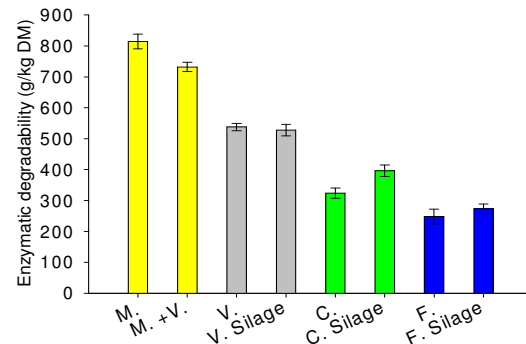


Fig.6: Enzymatic degradability of maize (M), maize + *Vigna* (V.), *Vigna*, *Centrosema* (C.), *Flemingia* (F) and their silages (error bars represent standard deviation)

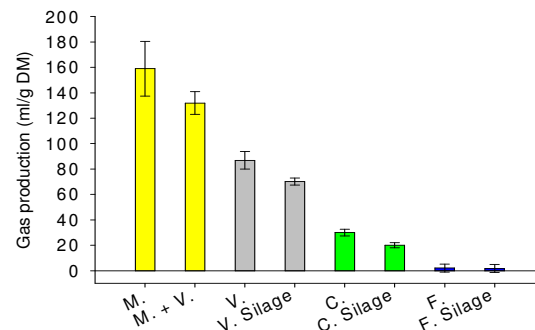


Fig.7: Gas production of maize (M), maize + *Vigna* (V.), *Vigna*, *Centrosema* (C.), *Flemingia* (F) and their silages (error bars represent standard deviation)

➤ *Centrosema* and *Flemingia* showed better D for the ensiled material.

→ reduction of CT during ensiling by 55 % and 84% resp..

➤ GP of all ensiled forages decreased compared to "fresh" material (Fig. 7).

➤ Calculated D of *Vigna* only when combined with maize rose to 608 g/kg DM.

➤ Maize showed highest D and GP, followed by maize+ *Vigna*.

4. Conclusions & Outlook

➤ The chemical composition of the feed material was reflected in their *in-vitro* digestibility.

➤ *Vigna unguiculata* showed highest degradability.

➤ Combination of *Vigna* with cereals such as maize has potential as alternative protein supplement for pigs in tropical countries.

➤ Influence of ensiling:

→ Ensiling reduced ANF content and improved enzymatic digestibility.

→ Ensiling reduced gas production, possibly due to decreased availability of WSC in silages.

Acknowledgement

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