1. INTRODUCTION

- Selected tropical forages, in particular legumes, having a high protein content, present an attractive alternative to expensive protein concentrates.
- Year round availability of fresh forages cannot always be ensured.
- Additionally, fiber, bulkiness, high water content, low energy concentration and their content of anti-nutritional components, like tannins and trypsin inhibitors, could reduce their application in pig feeding.
- Thus, the effect of ensiling on forage characteristics was investigated, to include them in pig diets.

2. MATERIALS & METHODS

- The legumes Vigna unguiculata, Stylosanthes guianensis, Centrosema brasilianum Canavalia brasiliensis, Cratyx argentea, Flemingia macrophylla, Desmodium velutinum and Leucaena diversifolia and the grass Brachiaria hybrid Mulato II were harvested before flowering, chopped and ensiled at a target dry matter of > 30% in small plastic bags on lab scale (Fig. 1).
- Four treatments were applied: control, addition of sucrose (2% of fresh weight), inoculated with a lactic acid bacteria (LAB) strain and LAB+sucrose.
- LAB, whose strain was developed at CIAT, was inoculated with a target 10^6 cfu/g FM.
- Silages were evaluated after 3d for pH and after 90d of ensiling at 25 °C on dry matter (DM) losses, quality and aerobic stability (Fig.2).
- Buffering capacity, which can restrict acidification, and nutritional value of all forages was determined from samples taken before ensiling.

3. RESULTS & DISCUSSION

- Buffering capacity was highest in Vigna and lowest in Flemingia (13.6 Vigna, 9.3 Cratyx, 6.4 Canavalia, 6.1 Leucaena, 5.5 Stylosanthes, 4.8 Desmodium, 4.7 Centrosema, 3.3 Flemingia, 2.2 Mulato).
- Worst silages were produced with Centrosema without sugar, having a strong butyric acid smell.
- After 3d of ensiling, the pH, which is a good indicator for the fermentation success, always was lowest in the treatment with LAB+sucrose and remained like that after 90d (Fig. 3).
- In the grass, as usually compared to legumes, pH after 90d was lowest in the control.

4. CONCLUSIONS & OUTLOOK

- All treatments were significantly different in final pH (90d) within the same forage species (P <0.05), ranging overall from 3.8-6.2, except for Canavalia in the two LAB treatments. The initial advantage of LAB vs. sugar only (Fig.3) diminished after 90d or was even reversed.

- The German evaluation scheme for silages based on chemical analysis calculates points from <30 (worst) to 100 (best), including butyric and acetic acid content as well as pH (depending on silage DM).

Table 1: DLG* points for pH depending on silage DM (min. – 5, max. + 10)

| Forage       | Control | Sugar | LAB | Sugar+LAB | pH  
|--------------|---------|-------|-----|-----------|------
| Cratyx       | -5.0**  | -5.0  | -5.0| 3.3       | -5.3 |
| Desmodium    | 0.0     | 0.0   | 10.0| 10.0      | 7.7  |
| Flemingia    | 0.0     | 6.2   | 8.6 | 10.0      | 10.0 |
| Mulato II    | 1.5     | 4.9   | 7.4 | 10.0      | 7.3  |
| Vigna        | -5.0.   | -4.5  | -5.0| -0.6      | 24.2 |
| Leucaena     | -5.0    | -3.8  | -5.0| 6.4       | 23.9 |
| Stylosanthes | 0.0     | 10.0  | 2.9 | 10.0      | 10.0 |
| Centrosema   | -5.0    | 3.3   | -5.0| 7.4       | 26.8 |
| Canavalia    | 0.0     | 6.3   | 10.0| 10.0      | 12.3 |

**Different letters within a row indicate significant differences among treatments, p< 0.05.

- Calculating DLG points on behalf of pH and DM, the best fermentation quality of silages was achieved with combined sugar and LAB, contrasting to the control.
- Highest overall losses in DM were found in Canavalia, Mulato II, Cratyx and Vigna silages (37-19%), being followed by Desmodium in control treatment with 16%.
- Silages generally remained aerobically stable over 4 days of monitoring.
- First results of Flemingia indicate a significant reduction of tannin concentration through ensiling, by up to 45 % of the original content.

ACKNOWLEDGEMENT

- This study is part of the project "More chicken and pork in the pot and money in pocket“ financed by BMZ.