Performance of pigs fed with fresh and ensiled forage of *Vigna unguiculata* CIAT 4555, *Lablab purpureus* CIAT 22759 and *Cajanus cajan*

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**XVI\(^{th}\) International Silage Conference**

Hämeenlinna, Finland, 2-4 July 2012
Introduction

• Over 70% of smallholder families keep monogastrics (swine and poultry) in mixed systems in Nicaragua

• Pig production is an important part of livelihood strategy

• Generally low animal productivity (1-10 pigs/farm; 100 g/pig*d LW gain)

• Feed concentrates rarely available and costly

• Main feed constituents: cereals such as sorghum
  ➢ Compete with human nutrition
  ➢ Low in essential amino acids

• Enrichment with by-products, e.g. rice bran

Thus local alternatives are needed for cereal substitution. Tropical forage legumes may present a viable option.
Objective

Evaluate the effect of the substitution of 250 g/kg of cereal-based feed with fresh forage and silage of *Vigna unguiculata* (cowpea) and *Cajanuss cajan* (pigeon pea), and silage only of *Lablab purpureus* (dolichos lablab), on the productive performance of growing pigs.

![Vigna unguiculata](image1.png)  ![Cajanus cajan](image2.png)  ![Lablab purpureus](image3.png)

*Vigna unguiculata*  *Cajanus cajan*  *Lablab purpureus*
Materials and Methods

**Experimental design:** completely randomized, 6 treatments and 6 replicates (control, 2 fresh forages and 3 silages).

**Statistical model:** $Y_{ijk} = \mu + T_i + b_1LW_j + \varepsilon_{ijk}$

**Animals:** 36 castrated males, 28.5 kg and 19.8 kg LW (1\textsuperscript{st} and 2\textsuperscript{nd} cycle)

**Adaptation period:** 7 days

**Measuring period:** 2 cycles of 35 days each

**Daily feed quantity:** 90 g DM/kg LW$^{0.75}$; 2 rations/day

**Variables:** Daily live weight gain, DM consumption and feed conversion
Materials and Methods

• On-station trial in El Sauce (NW Nicaragua, tropical lowland)

• 6 Treatments:

   Control Sorghum : rice bran 1:1

   Fresh Cajanus

   Cajanus silage

   Lablab silage

   Fresh Vigna

   Vigna silage

   Supplement of 250 g/kg DM:

• \textit{Vigna} for fresh feeding was biweekly sown for harvest at flowering stage, \textit{Cajanus} leaves were plucked on a daily basis from shrubs.
Materials and Methods

- **Ensiling of Vigna, Lablab and Cajanus** at > 300 g DM/kg FM.
- Silage additives: 40 g molasses/kg FM + *Lactobacillus* CIAT S66.7 at ~$10^5$ cfu/g FM
- Compacting in 60 l plastic bags and 20 l plastic buckets resp.
- Kept for at least 30 days indoors.

- Organoleptic characteristics of silage in general good, pleasant smell, free of butyric acid. Structure, texture and colour well maintained.
Results

Table 1. Composition of the experimental diets for growing pigs fed with fresh and ensiled forage legumes as supplement (g/kg DM)

<table>
<thead>
<tr>
<th></th>
<th>Control (C)</th>
<th>C+ fresh Cajanus</th>
<th>C+ Cajanus silage</th>
<th>C+ Lablab silage</th>
<th>C+ fresh Vigna</th>
<th>C+ Vigna silage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acid detergent fibre</td>
<td>62</td>
<td>197</td>
<td>195</td>
<td>163</td>
<td>149</td>
<td>142</td>
</tr>
<tr>
<td>Crude protein</td>
<td>129</td>
<td>144</td>
<td>146</td>
<td>139</td>
<td>134</td>
<td>147</td>
</tr>
</tbody>
</table>

Calculated theoretical lysine and gross energy content per kg DM

<table>
<thead>
<tr>
<th></th>
<th>Lysine</th>
<th>GE (MJ)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5.9</td>
<td>17.9*</td>
</tr>
<tr>
<td></td>
<td>8.7</td>
<td>18.1</td>
</tr>
<tr>
<td></td>
<td>8.8</td>
<td>18.1</td>
</tr>
<tr>
<td></td>
<td>7.7</td>
<td>17.7</td>
</tr>
<tr>
<td></td>
<td>7.2</td>
<td>18.0</td>
</tr>
<tr>
<td></td>
<td>7.4</td>
<td>17.6</td>
</tr>
</tbody>
</table>

*ME 13.0 MJ/kg DM

Average requirements: 180 g CP/kg DM, 11 g dig. lysine/kg DM, 13.6 MJ ME/kg DM (*Brazilian Tables for Poultry & Pigs 2005*)
Results

Figure 1. Performance of growing pigs fed with fresh and ensiled forage legumes as supplement.

Dry Matter Intake (g/animal\*d) ***

- Control (C)
- C+ fresh Cajanus
- C+ Cajanus silage
- C+ Lablab silage
- C+ fresh Vigna
- C + Vigna silage

***(P<0.001)  °(P<0.1)

Error bars mean standard deviation.

Live Weight Gain (g/animal\*d) ***

Feed Conversion (DMI/LWG) °

Figure 1. Performance of growing pigs fed with fresh and ensiled forage legumes as supplement.
Discussion

• Contrasting fresh vs. ensiled forages, effect on intake (P=0.052)
• Overall performance in terms of live weight gain poor
• Including Vigna silage, the LW gain increased by 39 % compared to the Control and with Lablab silage by 25 %,
  • i.e. the phase from 20-50 kg LW will take 7.9 months on Control diet, 5.7 months with Vigna silage and 6.3 months with Lablab silage, on average.
• Feed conversion was increased by ~40 % with Vigna and Lablab silages.
Conclusions

• Highest live weight gain with *Vigna unguiculata* silage, followed by ensiled *Lablab purpureus*.
• Both diets showed a tendency towards better feed conversion.

➢ At a low performance level, these legume silages can account for a quarter of the diet, reducing feed purchasing costs.

➢ In on-farm evaluations, farmers preferred silage to fresh forage.
Outlook

- When adopting this feeding strategy, farmers may be economically able to include high-value concentrates (e.g. soybean meal) in diets for smaller pigs, while emphasizing on forage feeding with > 40 kg LW.
Acknowledgements

• This work was part of the project "More chicken and pork in the pot, and money in pocket: Improving forages for monogastric animals with low-income farmers".
Thank you for your attention!