Nutritional characterisation of *Vigna unguiculata* as alternative protein source for monogastric animals

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1. THE MESSAGE

*Vigna unguiculata* grain has the potential to partially replace soybean as protein supplement in monogastric animal diets.

2. INTRODUCTION

*Vigna unguiculata* (Fig. 1&2) is a fast growing annual tropical legume.
- It grows on a wide range of soil, including acid soils of low fertility, has a vigorous seed production and is drought tolerant.
- Its seed is high in protein, starch and mineral content.
- In Colombia it was evaluated as alternative source of plant protein for monogastric animals to complement or replace soy.

3. MATERIALS & METHODS

Feeding trial with rats:
- Substitution of the protein of control diet with 33, 67 and 100 % by crude *V. unguiculata* grain maintaining the same crude protein and energetic level and similar fibre contents.
- To calculate the basal endogenous protein losses a diet without protein was included.
- Determination of apparent and true ileal digestibility of dry matter (DM), nitrogen (N) and energy.
- The true ileal digestibility was analysed using Cr₂O₃ in a colorimetric method (Furukawa & Tsukahara, 1966).
- Determination of *in-vitro* digestibility of proteins.
- *In-vitro* digestibility was measured using the ophthalialdehyde method (Church et al., 1983; Montoya et al., 2005) simulating the action in stomach and small intestine of monogastrics.

4. RESULTS

- The higher the inclusion rate of *V. unguiculata* grain, the lower the N digestibilities and the higher the N-flux [Table ]
- Good correlation between *in-vitro* and *in vivo* N digestibility, R²= 0.978 [Fig. 3].

Table: Apparent and true ileal digestibility of DM, N (AND, TND) and endogenous N-flux (ENF)

<table>
<thead>
<tr>
<th>Inclusion level of cowpea %</th>
<th>Control</th>
<th>33</th>
<th>67</th>
<th>100</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM</td>
<td>85</td>
<td>83</td>
<td>78</td>
<td>77</td>
<td>0.008</td>
</tr>
<tr>
<td>AND</td>
<td>78</td>
<td>57</td>
<td>38</td>
<td>39</td>
<td>0.001</td>
</tr>
<tr>
<td>TND</td>
<td>84</td>
<td>63</td>
<td>44</td>
<td>44</td>
<td>0.001</td>
</tr>
<tr>
<td>ENF</td>
<td>3.9</td>
<td>6.8</td>
<td>11.1</td>
<td>11.2</td>
<td>0.001</td>
</tr>
</tbody>
</table>

5. CONCLUSIONS

- The low fecal and ileal N digestibility in the diets where the soy protein was replaced with 67 and 100 % cowpea grain might be explained by the presence of anti-nutritional factors (ANF) which inhibit the protein hydrolysis.
- It is assumed that *V. unguiculata* enhances the stimulation of digestive secretions which increase the endogenous losses.
- Nevertheless it is concluded that *V. unguiculata* grain can be utilized as protein supplement for monogastric animals. Connected to that the use of thermic treatment to reduce ANF is being investigated.

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