

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.**



Fig. 1: *Vigna unguiculata* CIAT 9611 grain



Fig. 2: *V. unguiculata*, 10 weeks old at Palmira

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 fecal and 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 ophtaldialdehyde 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)

	Inclusion level of cowpea %				
	Control	33	67	100	P
DM	85 ^a	83 ^a	78 ^a	77 ^b	0.008
AND	78 ^a	57 ^b	38 ^c	39 ^c	0.001
TND	84 ^a	63 ^b	44 ^c	44 ^c	0.001
ENF	3.9 ^c	6.8 ^b	11.1 ^a	11.2 ^a	0.001

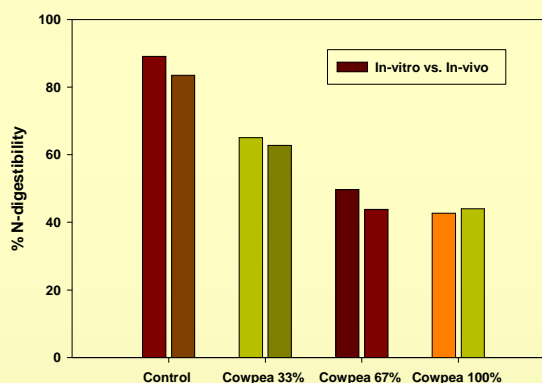


Fig. 3: True ileal N-digestibility *in-vitro* and *in vivo* at different inclusion level of *V. unguiculata* grain

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 hydrolisis.
- 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.