

# Nutritional characterisation of *Vigna unguiculata* as an 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* 9611 grain



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

## 2. INTRODUCTION

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

## 3. MATERIALS AND METHODS

- **Feeding trial with rats:**
  - Substitution of the protein of the control diet by 33, 67 and 100 % of crude *V. unguiculata* grain maintaining the same crude protein and energetic levels 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 Cr<sub>2</sub>O<sub>3</sub> by a colorimetric method.
- Determination of *in-vitro* digestibility of protein, measured using the ophtaldialdehyde method 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, R<sup>2</sup>= 0.978 (Fig. 3).

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

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

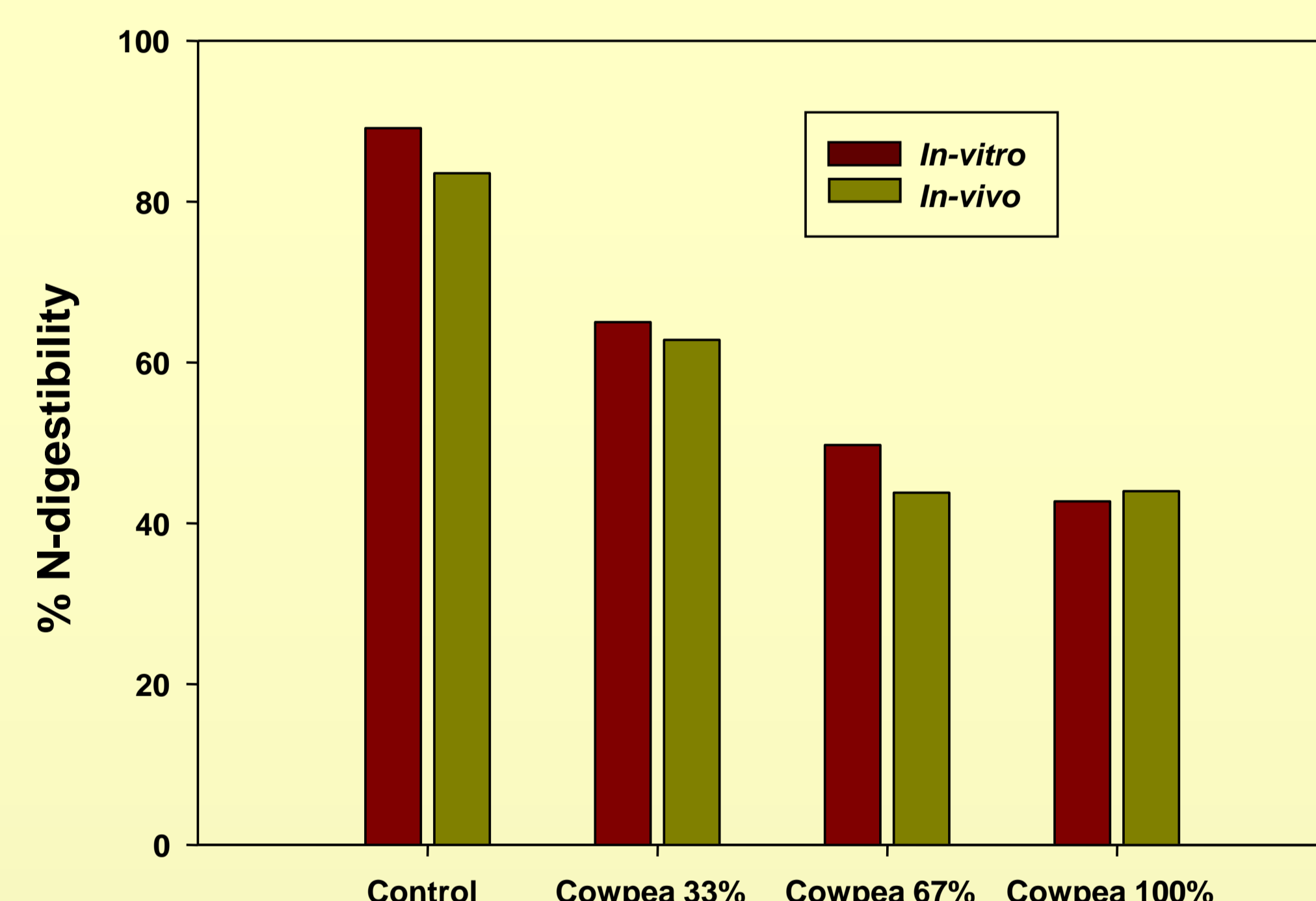


Fig. 3: True ileal N-digestibility *in-vitro* and *in-vivo* at different inclusion levels of *V. unguiculata* grain

## 5. CONCLUSIONS

- The low fecal and ileal N digestibility in the diets where the soybean 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 suggested 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.