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Presenter Information

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

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Keywords : *Vigna unguiculata*, rats, monogastric animals, digestibility

Introduction *Vigna unguiculata* is a fast growing annual tropical legume, which can grow even on acid soils of low fertility, has a vigorous seed production and is high in protein, starch and mineral content. That is why it was evaluated as alternative source of plant protein for monogastric animals in Colombia to complement or replace soy (Granito, 2004).

Materials and methods In a feeding trial with rats, the protein of the control diet was substituted with 33, 67 and 100% by crude cowpea grain. The apparent and true fecal and ileal coefficients of the digestibility of the dry matter (DM), nitrogen (N) and energy were determined in rats using chrome oxide for the true ileal digestibility (Furukawa y Tsukahara 1966). The grade of hydrolysis of the proteins was investigated by an *in-vitro* method with ophthaldialdehyde (OPA) (Church et al., 1983).

Results There were significant differences ($P \leq 0.01$) in the fecal and ileal N-digestibility between rations, i.e. the higher the inclusion of cowpea in the diet, the higher the endogenous N-flow (Table 1 and 2). The values for the digestibility *in-vivo* and *in-vitro* show a high correlation (Table 3), which means that the *in-vitro* method allows a good prediction of digestibility of legume proteins.

Table 1 Apparent and true fecal N-digestibility (AND, TND) and digestibility of DM and organic matter (OM).

	Inclusion level of cowpea %				
	Control	33	67	100	P
DM	83 ^b	85 ^a	86 ^a	86 ^a	0.001
OM	87 ^b	88 ^a	88 ^a	88 ^{ab}	0.042
AND	88 ^a	79 ^b	68 ^c	56 ^d	0.001
TND	96 ^a	89 ^b	76 ^c	65 ^d	0.001

Different letters in the row i.e. figures differ significantly $P \leq 0.05$

Table 2 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

Table 3 Comparison between the true ileal N-digestibility *in vivo* and *in vitro* of the different diets.

Diets	Digestibility %	
	<i>In-vitro</i>	<i>In-vivo</i> ¹
Control	89.1	83.5
Cowpea 33%	65.0	62.8
Cowpea 67%	49.7	43.8
Cowpea 100%	42.7	44.0
	R ² = 0.978	

¹ True ileal digestibility

Conclusions We assume that the low fecal and ileal N-digestibility in the diets where the soy protein was replaced with 67 and 100% cowpea grain can be explained by a presence of anti-nutritional factors which stimulate more secretion or inhibit hydrolysis, reabsorption and especially increase endogenous losses. Nevertheless we conclude that cowpea can be utilized as an alternative protein for monogastric animals.

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