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## Prececal and Cecal *in-vitro* Digestibility of Tropical Legume Grains for Pig Nutrition

JULIETA TORRES<sup>1</sup>, CARLOS A. MONTOYA<sup>2</sup>, LUZ STELLA MUÑOZ<sup>1</sup>, SIRIWAN MARTENS<sup>3</sup>, MICHAEL PETERS<sup>3</sup>

<sup>1</sup>Universidad Nacional de Colombia (UNAL), Sede Palmira, Department of Animal Science, Colombia

<sup>2</sup>Riddet Institute, New Zealand

<sup>3</sup>International Center for Tropical Agriculture (CIAT), Tropical Forages, Colombia

### Abstract

The high price of commercial protein sources as animal feed drives small producers to seek for alternative non-traditional sources. An experiment was conducted with tropical multipurpose legumes as possible protein sources for pigs: *Lablab purpureus* (LP), *Canavalia brasiliensis* (CB) and *Vigna unguiculata* (white WVU, pink PVU, red RVU) grains were compared to extruded full-fat soybean (SB). Nutritional composition and *in-vitro* enzymatic digestibility of protein (PD) and starch (SD) were determined (pepsin 120 min + pancreatin 240 min). Finally, an *in-vitro* cecal fermentation of the residue of the *in-vitro* enzymatic digestibility trial was modeled according to France et al. (1993) and volatile fatty acids (VFA) quantified. Protein was higher in CB and SB (291–367 g kg<sup>-1</sup>) as compared to WVU (208 g kg<sup>-1</sup>). The legume grains studied contained 316 to 560 g starch kg<sup>-1</sup>. The highest ( $p < 0.001$ ) PD was recorded for SB and WVU (76 and 66 %, respectively) and the lowest for LP (21 %). PD was negatively correlated ( $R = -0.71$ ,  $p < 0.05$ ) with trypsin inhibitor activity [LP-VU (26 vs. 22 TUI g<sup>-1</sup>), SB-CB (7 vs. 14 TUI g<sup>-1</sup>)]. SD was higher ( $p < 0.001$ ) for PVU, WVU, RVU (70, 64, 53 %) followed by LP and CB (52, 38 %). It was negatively correlated ( $R = -0.75$ ,  $p < 0.05$ ) with NDF content [CB (275 g kg<sup>-1</sup>), WVU (143 g kg<sup>-1</sup>)]. The gas production was highest ( $p < 0.001$ ) with WVU (482 ml g<sup>-1</sup> DM) and lowest for CB (335 ml g<sup>-1</sup> DM). Butyric acid production was highest in PVU and WVU vs. SB (83 and 82 vs. 29 mg g<sup>-1</sup> DM incubated,  $p < 0.011$ ). In conclusion, the superiority in PD, SD and composition of VFA suggest that *Vigna*, especially WVU, is an interesting alternative to SB because it can be produced locally by small farmers in the tropics. The raw, unprocessed application of the other grain legumes (LP and CB) is limited for pigs. Further studies on heat and other treatments as well as *in vivo* tests are indispensable for final recommendations.

**Keywords:** *Canavalia brasiliensis*, *in vitro* digestibility, *Lablab purpureus*, nutritional composition, pigs, tropical legume grains, *Vigna unguiculata*