Performance of young pigs fed plantain (*Musa spp.*) foliar residues meal included in the concentrates. Technical note

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Thirty two Yorkshire x Landrace x Duroc barrows of 61 days of age and 14 kg live weight were used. Animals were distributed according to a completely randomized design in four treatments, with 8 animals each, for studying the response of the animals to the inclusion in dry basis of 0, 5, 10 and 15 % of plantain (*Musa spp*) foliar residues meal in the feed. Meal was obtained by grinding the leaves and the upper first third of the pseudostem and later sun-dried. The variables initial live weight, final live weight, feed consumption, average daily gain and feed conversion, were recorded. There was no effect of the treatment at 87 d of age on final live weight (kg) and average dairy gain (g/d). Barrows fed diets containing plantain foliar residues meal did not reduce their feed consumption or undergo diarrhea. Feed conversion (kg DM/kg gain) was similar for all pigs (0 %, 2.63; 5 %, 3.00: 10 %, 2.91 and 15 %, 2.99). It is possible to include up to 15% of plantain foliar residues meal in the feeds for pre-fattening pigs.

Key words: *pre-fattening pigs, performance traits, plantain foliar residues*

For a long time the use of fruits as banana in pig feeding is well-known. These Musaceae are cultivated in different countries for exportation. As result, a substantial volume of fruits not fit for commercialization is originated (Clavijo and Maner 1974) that can be used in pig feeding.

The plantain is an energy source with very low protein content (Ravindran 1990, Babatunde 1992 and Ly 2004 and 2008). In contrast, the vegetative part of the plant which must be necessarily cut at fruit harvesting can contain higher protein concentrations (Gohl 1981). The aerial part has also the characteristic of being very aqueous and presenting high crude fiber content, thus, its use has been mainly studied for ruminant feeding (Ruiz 1981 and Camaño and Caro 2010). In the tropics, in backyard rearing, plantain leaves are usually supplied to pigs. However, there are very scarce zootechnical data regarding pig feeding with this source, among them, those recorded in Indonesia by Nitis *et al*. (1986) could be cited.

Since in tropical energy sources is very common that the protein deficit are particularly notable, the inclusion of foliar protein sources in diets for pigs, is suggested provided that their performance traits are not worsen.

The objective of this experiment was to study on the performance of young pigs the effect of including plantain foliar residues in the diet.

Thirty two Yorkshire x Landrace x Duroc barrows were used from 61 d of age and 14 kg live weight approximately. Animals were distributed according to a completely randomized design in four treatments with 8 pigs each.

Treatments consisted of including different levels of plantain (Muss pp) foliar residues in diets prepared from concentrates based on cereals.

In treatment 1 (control) no meal of plantain foliar residues was included. In 2, 5% were added. In treatment 3, 10 % were included and in 4, 15 %. Animal were individually housed in metallic cages with slotted floors (45 x 100 cm). Fifty cm of the floor were placed in an open pen.

Plantain foliar residues were obtained by cutting the plant before harvest time in different lots usually cultivated in plantations of Mayabeque province. These residues were composed of leaves and the upper third of the pseudostem, which were cut into pieces and sun-dried on a flat surface prepared *ad hoc*. Once dried, they were grinded and mixed to obtain the meal. For the analysis of the chemical composition of these residues, six representative samples were taken through the split method, described by García and Figueroa (1989). Sample analysis was carried out according to the diagram of Weende (AOAC 1984). The dry basis composition was: 97.76% dry matter, 12.79 % ash, 3.80 % acidified ether extract, 42.24 % crude fiber, 1.56 % nitrogen and 16.39 MJ/kg DM of gross energy. The acidified ether extract was determined with a mixture of petroleum ether and glacial acetic acid, according to the recommendations of Ly and Ávila (1990). The caloric value of the plantain foliar residues was measured in a pump adiabatic calorimeter. Torula yeast was included in the diet formulation to make them approximately isoprotein (table 1).

Feed was supplied twice daily in two equal rations (8:30 a.m. and 3:30 p.m.) according to the Cuban feeding standards (Grupo de Producción Porcina 2008). Water was supplied *ad libitum* through nipple type automatic troughs.

The experiment was developed between 61 and 87 d of age of the piglets. The variables initial live weight,

Table 1. Composition of the experimental diets (air dried)

Components	Meal of plantain foliar residues, % in diet			
	0	5	10	15
Meal of plantain foliar residues	-	5.00	10.00	15.00
Torula yeast	-	1.15	2.26	3.42
Commercial growing feed	100.00	93.85	87.74	81.58
Feed components (kg/100 kg feed)				
Wheat meal	76.55	71.84	67.17	62.45
Sunflowerseed meal	10.00	9.39	8.77	8.16
Torula yeast	5.04	4.73	4.42	4.11
Fish meal	2.00	1.88	1.75	1.63
DL.methionine amplified	1.70	1.60	1.49	1.39
$CaPO_4$ H. $2H_2O$	2.10	1.97	1.84	1.71
$CaCO_3$	1.09	1.02	0.96	0.89
NaCl	0.42	0.39	0.37	0.34
Vitamin and mineral premix[1]	1.10	1.03	0.97	0.90
Analysis %				
Crude protein (N x 6.25)	16.20	16.93	16.43	16.26
Crude fiber	3.80	4.99	6.18	7.37

[1]Mederos (1985) (Premix composition)

final live weight, feed consumption, average daily gain and feed conversion were recorded.

Data were processed through SAS (1997), considering the inclusion levels of meal of plantain foliar residues as the only source of variation.

In table 2 are shown the performance traits of pigs fed different levels of meal of plantain foliar residues in the diet. The inclusion level of the residues in the diet did not influence on the final live weight of the animals.

In this study there was no negative effect on increasing the crude fiber level in the diet from 3.8 % to 7.4 %, approximately. This coincide with the results of Baird *et al*. (1975) and Ravindran *et al*. (1984). Apparently, this could be related to the lignification degree of the cell wall, which influence unfavorably on the energy digestibility and the dietetic nitrogen (Kornegay 1977 and 1981 and Just 1981).

In feed consumption there were no significant differences between the diets studied. Average daily gain was maintained in the range of values reported in Cuba (López 1987, García *et al*. 1990 and Mederos 1992) on studying diets prepared with conventional or not feeds. Feed conversion did not differ between treatments.

During the course of the performance trial there were no digestive problems in the animals. This could be related to the astringent peculiarities of the plantain (Padillas 1978 and Arenas 1981).

According to data presented in this study, it is possible to include up to 15 % of meal of plantain foliar residues in diets for young pigs. In this way part of the plantain plant, which necessarily must be cut during the fruit harvesting, can be used as feed for pigs. Therefore it turns into a useful dietetic component, instead of being thrown away or simply being used as manure. Also, this will facilitate the sustainability of pig production, integrating into the availability of existing resources.

Table 2. Performance traits of pigs fed meal of foliar plantain residues

Indicator	Meal of plantain foliar residues, % in diet				S.E±	Sig
	0	5	10	15		
Initial LW, kg	13.7	13.6	13.6	13.7	0.2	N.S
Final LW, kg	28.3	28.0	28.2	27.6	0.7	N.S
Consumption, kg DM	38.1	42.3	42.2	41.3	1.9	N.S
Average daily gain, g/d	506.0	496.0	505.0	483.0	21.0	N.S
Conversion, kg DM/kg gain	2.63	3.0	2.91	2.99	0.2	N.S

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Received: June 3, 2011