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Apparent digestibility of dry and organic matter in Chinese potato rejection tubers (*Colocasia esculenta* (L.) Schott) in pigs.

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Graphical Abstract

Abstract.
The experiment was carried out at the Amazon Research, Postgraduate and Conservation Center (CIPCA) of the Amazon State University, where two levels of substitution of Chinese potato flour in the diet of growing pigs were evaluated for the effect, 3 animals were used castrated males resulting from crossbreeding (Largewhite x Duroc x Pietrain), with an initial average weight of 25 kg. The animals were placed in 3 metabolic cages and fed a control diet (T1) and two experimental diets T2 (20%) and T3 (40%) of

Chinese potato rejection tuber flour. Food consumption was adjusted at a rate of 0.10 kg.MS.kg PV0.75 day^{-1}. Fed twice a day (08:00 am and 3:00 pm) with drinking water at will. The research consisted of three stages, and divided into two phases, (one of adaptation to the diets with a duration of five days and the other phase of five days for stool collection). The feces weres collected in the morning, by the total collection method, stored in hermetic bags and kept refrigerated for the evaluation of the apparent digestibility of dry matter (DM) and organic matter (MO). The experiment was conducted through a 3x3 Latin square design; the comparison of means was performed with the Newman Keuls test (P≤0.05). Chinese potato tuber meal showed high coefficients (P≤0.05) of dry matter digestibility (DM), being higher in T2 (96.06%) and T3 (94.19%) with respect to control. However, in organic matter (MO) there were no significant differences (P> 0.05) between treatments: T1 (99.63%); T2 (99.62%) and T3 (99.67%). The inclusion of 20 and 40% of Chinese potato tuber meal in the diet of fattened pigs (largewhite x Duroc x Pietrain) did not affect the digestibility of MO. The best digestibility coefficient of the DM was obtained by replacing 20% of the corn with Chinese potato tubers meal, so that Chinese potato rejection can be used in pig feeding

keywords: *pigs, alternative food, apparent digestibility*

Introduction

High food consumption and rapid population growth have increased the cost of raw materials used to make balanced diets for monogastric animals (Aragadvay, Núñez, Velastegui, Villacis and Guerrero, 2016); therefore, it is necessary to find alternatives for feeding animals and at the same time does not compete with human food. One of the products that is produced in the Ecuadorian Amazon is precisely the Chinese potato, considered in the pastaza province as the most exploited agricultural crop, which contributes to the strengthening of family economies in the area. According to BanEcuador, (2017) 60% of the total production is directed to the international market; 20% represents the second and third quality Chinese potatoes that are marketed in the national market and the remaining 20% constitutes rejection (GADPPz, 2014).

For the use of Chinese potato rejection, the type and amount of nutrients it provides; as well as the determination of the presence of secondary metabolites that can affect consumption behavior and digestibility must take the nutritional value into account; which is influenced.

Materials and Methods

Location

The experimental work was carried outs in the Swine program of the Amazon Research, Postgraduate and Conservation Center (CIPCA), located on the Puyo - Tena road 44 km between the Santa Clara and Arosemena Tola cantons of the Pastaza and Napo provinces. It is located in a humid tropical environment, with annual rainfall reaching 4000 mm with a relative humidity of around 80% and varying temperatures between 15 to 25 ° C.

Experimental procedure

The method of total stool collection (Caicedo et al., 2017) was used to assess the apparent digestibility of the DM and MO of the diets. In the food and excreta samples the content of MS, MO and ash was determined according to the procedures described by the AOAC (2005). It was considered that the content of organic matter (MO) was the result of subtracting (100% ash).

For the production of the Chinese potato rejection tuber flour, we worked with the waste generated by the production of this tuber Rural Parish Teniente Hugo Ortiz, Allishungo Community; therefore, the tuber was first washed with a solution of 3% hypochlorite in water for 10 minutes. Once drained, it was sliced into slices and pre-dried in the sun for 8 hours and dried in an industrial rotary dryer (Burmester brand) at 70 ° C for two hours; once dried, it was ground in an industrial mill and sifted at 0.25mm, which was packed and stored

To evaluate the digestibility of the Chinese potato rejection tuber, 3 castrated male animals of the genotype fattening category (Largewhite x Duroc x Pietrain) were selected with an initial mean weight of 35 ± 2 kg, which were dewormed and placed in 3 cages metabolic of 0.40m x 1.50m (0.60m2). The application of the diet began with an adaptation of the food for five days, for each of the treatments and five days for the total stool collection. The treatments were control diet (T1) and two experimental diets T2 and T3 (replacement of 20 and 40% corn with Chinese potato tuber meal), the three diets adjusted with 17% crude protein (Rostagno et al., 2011), and formulated according to the recommendations of the (NRC, 2012). As food consumption was adjusted at a rate of 0.10 kg.MS.kg PV0.75 day-1 and fed twice a day, at 08:00 am and 15:00 pm, drinking water was available at will.

The design used was a Latin square (3 * 3). An ANOVA analysis was applied and the Newman Keuls test, processed by the statistical package SPSS version 22.1, was used for the difference between means.

Results and Discussion

The Table 1 shows the apparent digestibility of dry matter (MS) and organic matter (MO), in pigs (Largewhite x Duroc x Pietrain) fed with flour from the Chinese potato rejection tuber, replacing corn in 20 and 40% In the diets provided , significant differences were obtained for dry matter digestibility

(DM) P <0.0005; where T2 (20%) presented a dry matter digestibility (MS) of 96.02 higher in 2.78 and 1.87 to those obtained in T1 (control) of 93.28 and T3 (40%) of 94.14 respectively. The superiority of dry matter digestibility in T2 (20%) may be related to the low fiber content of the food supplied.

Table 1. Apparent digestibility coefficients of the MS and MO of Chinese potato tuber meal for pigs.

Variables	Inclusion levels of Chinese potato tuber flour,%			EE ±	P value
	T1 (control, 0)	T2 (20)	T3 (40)		
MS, %	93.28[b]	96.06[a]	94.19[b]	0.79	P<0.0005
MO, %	99.63	99.62	99.67	1.30	P=0.5856

Different letters per row show significant differences according to Newman Keuls P <0.005

According to Vargas and Hernández (2012), the digestibility of the flours of some vegetables such as potatoes, cassava and sweet potatoes are related to the omposition of starch (amylose and amylopectin) being more digestible those foods that have starches with low amylose content, being These easily digestible.

Caicedo (2013), indicates digestibility coefficients of DM (66.90%) in dry tubers and (31.50%) in fresh tubers of Chinese potatoes without prior treatment; lower than those reported for these results, in the same way, Rodríguez (2003), evaluated the total digestibility of sweet potato or sweet potato foliage, with the incorporation of lipids and zeolite in diets for growing pigs obtaining digestibility coefficients of 79.8 to 88.5 on the other hand, Quintero (2009), obtained digestibility coefficients of the DM of 82.4 and 82.5 when using diets of sweet potato flour and dried cassava. With respect to organic matter (MO), there were no significant differences between treatments T1 (control), T2 (20%) and T3 (40%).

Conclusions

Both of them 20 and 40% Chinese potatoes rejecting tuber flour showed an apparent high digestibility, so it's can be used in pig feeding. Although the best digestibility was 20%.

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