

EFFECT OF THE INCLUSION OF THE COCONUT FLOUR DEGRADED IN THE PRODUCTIVE PERFORMANCE OF THE GROWING RABBIT

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ABSTRACT

Defatted coconut flour is a by-product obtained from the production of coconut fruit oil, an economical and locally available agroindustrial byproduct, the nutritional balance that it suggests suggests its inclusion in rabbit feeding systems. The objective of this study was to evaluate the effect of productive behavior and carcass yield on fattened rabbits, fed with increasing levels of defatted coconut flour (HCD): 130 rabbits of the Chinchilla breed were used at weaning (35 d of age), distributed in a completely randomized design with five treatments: 0, 10, 20, 30 and 40% inclusion of HCD. We controlled the initial and final live weights, daily average gain, feed consumption, feed conversion, yield to the carcass and its valuable cuts. The final live weight of the animals during the fattening cycle was between 2060 and 2242 g / animal, in all cases above 2000 g which is the one established for the slaughter of the animals, the average weight gain oscillated between 25.4 and 28.4. The yield to the channel was not affected with the inclusion of HCD up to 40% in the diets, their average values ranged between 49.72 and 53.5%. These results suggest that the use of defatted coconut meal in diets for growing rabbits could improve the economic performance of the production system without impairing the performance of the animals.

Keywords: rabbit, defatted coconut meal, growth, yield to the carcass.

1.0 INTRODUCTION.

The raising of rabbits (*Oryctolagus cuniculus*) stands out for its rapid growth, high fertility, reproductive precocity and prolificacy, being able to play an important role in human nutrition, as its meat has a high protein value, low level of fat and cholesterol. Due to the characteristics of the rabbit's digestive system, it can be fed with numerous agricultural or agro-industrial byproducts (Gidenne, 2015), while reducing competition with human food.

In the production of rabbits, food represents approximately 60% of production costs (Gidenne et al., 2017). However, the use of by-products reduces the cost of food production and their impact on the environment (Bonaudo et al., 2014; Makkar, 2016).

In Cuba, although several alternatives are being sought for the formulation of diets for rabbit feeding, this is based fundamentally on the use of imported raw materials (corn, soybeans and alfalfa) whose prices tend to increase every day in the international market.

Therefore, it is necessary to identify alternative food resources in order to partially replace commercial concentrated feed under tropical conditions. Defatted coconut flour is an agroindustrial by-product from the production of coconut oil, economical, available locally with an adequate balance of nutrients, it can be considered a good source of protein (19-20%) and crude fibre (14.2%) Acosta et al., 2016). Its use in rabbit feeding has been reported (Vasconcelos, 2007, Aurea, 2009, Acosta et al., 2016).

The objective of our study was to evaluate the productive performance and performance indicators to the carcass of fattened rabbits, subjected to feeding variants where defatted coconut meal is incorporated.

2.0 MATERIAL AND METHODS

The work was carried out in the cunicultural installation of the Investigative Teaching Polygon of the Agricultural Technology Study Center (CETA) belonging to the Agroforestry Faculty of the University of Guantánamo.

2.1 Animals and experimental diets

Were used 130 rabbits of the Chinchilla weanling at 35 days of age with average live weights of 568 g, were located at the rate of two animals per cage distributed in a completely randomized design. Each animal was considered a repetition for the variables: initial live weight, final live weight and average daily gain and for the variables: feed intake and feed conversion the average of the cages. At the end of the fattening (78 days), 10 animals were slaughtered by treatment and the following measurements were made: Weight of the carcass, weight of the previous train, weight of the rear train, weight of the back, weight of the back and the ribs.

The diets were formulated to satisfy the nutritional requirements of the growing rabbits (De Blas and Mateos, 2010), Table 1. For the elaboration of the diets the raw materials were ground in a hammer mill, the mixtures were made manually. The defatted coconut flour was obtained from the oil extraction factory of Baracoa, Guantanamo Cuba.

Table 1: Percentage composition of the ingredients in the evaluated diets.

Ingredients	Inclusion levels of defatted coconut flour				
	0 %	10 %	20 %	30 %	40 %
Corn meal	24.72	23.99	23.05	16.65	7.8

Alfalfa flour	55.33	50.04	45.84	46.33	47.96
Soybean meal	12.87	10.11	6.85	2.85	0
Degreased coconut flour	0.00	10.00	20.0	30.0	40.0
Dicalcium phosphate	1.06	0.90	0.73	0.58	0.45
Calcium carbonate	0.00	0.00	0.00	0.00	0.17
Common salt	0.30	0.30	0.30	0.30	0.30
Methionine	0.12	0.12	0.12	0.12	0.12
Lysine	0.00	0.04	0.11	0.17	0.20
Premix	2.00	2.00	2.00	2.00	2.00
Zeolite	1.50	1.00	1.00	1.00	1.00
Coconut oil	2.10	1.50	0	0	0

The animals were subjected to five treatments, which consisted of diets with levels of 0, 10, 20, 30 and 40% inclusion of defatted coconut flour. The food was offered increasingly at a rate of 4% of the live weight of the animals, offering 40% of the diet in the morning and 60% in the afternoon, the water was supplied ad libitum.

2.2 Analytical determinations of food

The chemical analyzes of the diets were carried out in the ICA (Institute of Animal Science). The contents of dry matter, ash, organic matter, crude protein and crude fiber were determined from the methodology described by the AOAC (1995) of the diets. The fractionation of the fibrous fraction was carried out according to Van Soest (1991), calcium, and phosphorus were determined according to Herrera (1980).

2.3 Statistic analysis

For the statistical analysis of the data the statistical package Statgraphics plus 5.1 was used, a simple analysis of variance was carried out to determine the effect of the inclusion of the

defatted coconut meal in the chemical composition of the diets, the productive indicators, performance to the channel and its valuable cuts, the differences between the means were determined by Duncan's test (1955).

3.0 RESULTS AND DISCUSSION

It can be seen in (Table 2) the similarity in the nutritional content of the diets prepared with the inclusion of defatted coconut meal, the MS maintained values between 87 and 89%, which suggests an adequate concentration of nutrients coinciding with the recommended (Retore et al., 2010) that reports values of 86-89% using agroindustrial by-products in rabbit feeding.

The crude protein content showed an average around 18% is in correspondence with the recommendations for this species reported by (Rodríguez, 2009, De Blas and Mateos 2010) that its main recommendations were 14.2 - 18.0%; (Retore et al., 2010) that obtained values of 18% and above (Khan et al., 2016) that when formulating diets used in rabbit feeding with agro-industrial by-products, the % was 16.

The diets with the inclusion of the HCD showed an excellent content of cellulosic material with crude fiber in 14%, coinciding with (Trocino et al., 2013) that recommend for diets of rabbits in the stage of post-weaning and growth between 12- 14% fiber.

Total dietary fiber (TDF) is the most important fraction of commercial diets for rabbits (35-50% as food). Its importance is related to the influence on the speed of passage of the digesta and the function as substrate of the microbiota, which in turn affect and regulate the performance of rabbit growth and digestive health (Gidenne et al., 2010a). The insoluble fiber corresponding to neutral detergent fiber (NDF) has been widely recognized as the most important fiber fraction and used to express fiber requirements: it represents around 65-90% of TDF in commercial diets for rabbits and is quantified by fairly standardized methodologies (Gidenne et al., 2010b).

The current recommendations establish that rabbit diets should contain at least 30% neutral detergent fiber (NDF) and 16% acid detergent fiber (ADF) (De Blas and Mateos, 2010), data that are below the indicators in the bromatological composition of the diets used in our work.

The quantity and quality of the protein presented by a diet is reflected in its amino acid composition, an important indicator that influences in a positive or negative way in obtaining the weight of the animals.

The final live weight of the animals obtained during the fattening cycle was in the range of 2060 and 2242 g / animal, in all cases above 2000 g, which is the one established for the slaughter of the animals; the greater weight to the sacrifice was obtained in the animals of the control diet, nevertheless we consider that the defatted coconut flour constitutes an attractive raw material, based on that the animals where the lower weights were obtained that was when it was included to 40% reach the weight at slaughter to only 60 days of fattening of the rabbits, could be related to the quality of the protein of the defatted coconut harona.

The results of the final live weight of the animals in this study report higher values than those obtained by (Abubakar et al., 2015) who reported a final weight that ranged from 1150-1615 g with feeding systems where soy was replaced as protein food and used other agro-industrial by-products in the diets. When comparing the final weight values obtained by rabbits in this study, they surpass those obtained by (Mennani et al., 2017) when they partially replaced soybeans and corn by agroindustrial byproducts such as apricot and rebus seeds. Algeria and the slaughter weights ranged from 1886-1996 g.

The average weight gain obtained by the animals showed reduction and with this significant difference with respect to the control from the inclusion of defatted coconut meal in 20% in the diet, however, the animals of the groups where it was included 20%, 30% and 40% of defatted coconut flour showed a high growth rate with GMD higher than 25 g, basically promoted by the adequate consumption of nutrients made by the animals. This confirms that the specific characteristics of the raw materials used in the elaboration of the feed have a determining role in the consumption and performance of the animals (Lebas, 2004).

Makinde et al., 2017 evaluated the effect of the use of different agroindustrial by-products on rabbit growth, with values in the nutrient composition of the diets very similar to ours and weight gain values (9.86-19.35 g) they behaved inferior to those obtained in this study (25.4-28.4 g).

The feed intake shown by the animals reveals that it decreases since 30% of defatted coconut meal is incorporated in the diet, showing a significant difference of the treatments with 30 and 40% inclusion of HCD with respect to the However, the amount of food consumed coincides with what was reported with (Vasconcelos, 2007), which reported that food consumption in rabbits decreases when it is included in 25% of their diets.

The feed conversion showed values from 3.64 to 3.90 g of feed / g of meat increase, with significant differences between the animals that were fed diets without the incorporation of coconut flour and those that consumed the diets with levels higher than 20% inclusion of defatted coconut meal, however, excellent feed conversion rates were obtained considering that their values were lower than the 4 g of food / g increase in meat, the average feed conversion reported by (Vasconcelos, 2007) were 3.29 lower than those obtained in this work, with a positive effect for this indicator with the inclusion of up to 25% of the coconut meal in the diet.

The results obtained in the different productive indicators of the growing rabbit in this study are in correspondence with the literature reports on the levels of inclusion of these agricultural by-products food in rabbits' diets in different countries, without causing adverse effects on the yield (Orunmuyi et al., 2006; Adeyemi et al., 2014; Ansah., 2014; Makinde, 2016; Makinde et al., 2017; Mennani et al., 2017).

4.0 CONCLUSION

The defatted coconut meal can be included in the diet to feed the rabbit in fattening up to 40% without affecting the performance of its productive indicators and yields to the carcass.

The use of this food reduces the inclusion of alfalfa hay and substitutes soy and corn in diets to fatten rabbits, while increasing the economic indexes and reducing the cost of feed.

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