Productive behavior of rabbits fed with *Leucaena leucocephala* (Lam.) de Wit, foliage in the fattening phase

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ABSTRACT

Objective: To assess the productive behavior of rabbits fed with a diet that included 33% fresh *Leucaena leucocephala* foliage during the fattening phase.

Design/Methodology/Approach: Twenty 60-day-old New Zealand rabbits with an average live weight of 960 g were used. Using a completely randomized, 2×2 factorial design, five male and five female rabbits were distributed among the following treatments: ACCH treatment (300-g commercial feed for female rabbits), ACCM treatment (300-g commercial feed for male rabbits), ACFLCH treatment (200-g commercial feed with 100 g *Leucaena* foliage for female rabbits), and ACFLCM treatment (200-g commercial feed with 100 g *Leucaena* foliage for male rabbits). An analysis of variance and a Tukey's test were applied to determine the effect of the treatments on each of the variables analyzed.

Results: The rabbits that consumed the ACFLCM and ACFLCH diets with the addition of *Leucaena* gained more weight ($P<0.05$): 23.18±6.35 and 21.59±10.23 g/rabbit/day. Feed intake was higher ($P<0.05$) with a *Leucaena* foliage diet: 48.04±0.50 and 47.68±0.84 g/rabbit/day. A significant difference ($P>0.05$) in final weight was observed among treatments (ACCM, 1,971±256.6; ACFLCM, 2,211.8±197.7; ACCH, 2,012.4±275.6; and ACFLCH, 2,184.0±464.9).

Study Limitations/Implications: Proper and correct use of available forage must be made to guarantee that animals have access to food all year round.

Findings/Conclusions: The addition of *Leucaena* foliage in the diet did not generate a decrease in growth or feed intake.

Keywords: Acceptability, consumption, rabbit finishing, weight gain, leguminous plant.

INTRODUCTION

In the tropics of Mexico, rabbit breeding has been of great importance; however, providing them with a balanced diet as a main food source increases production costs (Adedeji *et al.*, 2013). Rabbit meat has several outstanding characteristics, including the quality of its protein and its low-fat content. Meanwhile, rabbit production can be carried out in smaller areas and the flexible diet of rabbits can include food made from plant material, which reduces costs (Martínez *et al.*, 2010; Palma and Hurtado, 2010). Foods such as leguminous shrubs (foliage) are a high-value protein option for rabbit nutrition (García-Trujillo, 1991).

Leucaena leucocephala is found throughout the country. Consequently, it has aroused interest as food for ruminants and non-ruminants —particularly rabbits, to whose diets it can be added up to 20% (Nieves *et al.*, 2005). Its combination with other species of the same family has a 30% acceptance in rabbit feed, improving yields and reducing production costs (Nieves *et al.*, 2002). In this respect, further assessments are needed to determine the maximum percentage of *Leucaena leucocephala* that can be added to the diet of rabbits before it reaches a toxicity level.

Therefore, the objective of this research was to assess the productive behavior of rabbits fed with *Leucaena leucocephala* foliage in the fattening phase.

MATERIAL AND METHODS

Study area location

The study was conducted from June 20 to August 15, 2019, at the Module for Agroecological Rabbit Research and Production (MIPAC) of the National Technological Institute of Mexico - campus Chiná, Campeche, Mexico. The MIPAC is located at 19° 46' 13" N and 90° 30' 13" W, at 33 m.a.s.l. It has a sub-humid climate with summer rains, an average annual temperature of 26 °C, and a rainfall of 1,200 mm/year (García, 2004).

Animals and handling

Twenty 60-day-old New Zealand rabbits (10 males [M] and 10 females [F], all of them weaned) with an average live weight of 960 g were used for the experiment. Rabbits were housed in individual cages with galvanized feeders and drinkers. They were provided with a base diet (300 g/rabbit/day) for 10 days before the test and the corresponding treatments maintained the same amount until the end of the experiment. All animals had water available *ad libitum*. For assessment purposes the cages were also individually identified with each animal.

Experimental procedure

Commercial feed was purchased from a feed distributor. The raw material (forage) was collected in the field. The ration formulation complied with the recommendations of the National Research Council (NRC, 1998). Fresh *Leucaena leucocephala* foliage was cut and included in the feed of the corresponding treatment. The bromatological composition of *Leucaena leucocephala* was also analyzed to determine protein percentages in the diet of the fattening animals (Table 1).

Table 1. Treatment and nutritional composition of *Leucaena leucocephala* for fattening rabbits.

Ingredients	Treatments			
	Food inclusion (g)			
	ACCM	ACCH	ACFLCH	ACFLCM
Commercial food	300	300	200	200
Leucaena leucocephala			100	100
Chemical composition (%)	Commercial food		*Leucaena leucocephala*	
Crude protein	16.5		21.8	
Fat	2.5		13.44	
Fiber	16		18	
Dry matter	88		94	
Ashes	12		6.6	

treatment: 300-g commercial feed for female rabbits; ACCM treatment: 300-g commercial feed for male rabbits; ACFLCH treatment: 200-g commercial feed with 100 g *leucaena* foliage for female rabbits; ACFLCM treatment: 200-g commercial feed with 100 g *leucaena* foliage for male rabbits.

Design and treatments

A 2×2 factorial design completely randomized was used. Five male and five female rabbits were distributed among the following treatments: ACCH (300-g commercial feed for female rabbits), ACCM (300-g commercial feed for male rabbits), ACFLCH (200-g commercial feed with 100 g *leucaena* foliage for female rabbits) and ACFLCM (200-g commercial feed with 100 g *leucaena* foliage for male rabbits).

Productive behavior

Animals were weighed before the morning feeding at the beginning and every 5 days until the end of the experiment. The following productive indicators were quantified: initial live weight (g), final live weight (kg), daily feed intake (g/rabbit), daily weight gain (g/rabbit) and feed conversion (kg).

Statistical analysis

Data were processed using the InfoStat statistical software, using a significance level of $P<0.05$ (Di Rienzo, 2020). The effect of the treatments on each of the variables analyzed was determined with Tukey's test.

RESULTS AND DISCUSSION

Table 2 shows the productive behavior of rabbits during the assessment phase. The final live weight of the rabbits had significant differences ($p\leq0.05$) between treatments: the animals that consumed ACFLCM and ACFLCH gained more weight than those that consumed ACCH and ACCM.

In relation to sex, Figure 1 shows significant differences in consumption in the treatments ($p\geq0.05$) that add *Leucaena leucocephala* to the diets for male and female rabbits, compared to animals that only received commercial diet. This result matches the findings of Nieves

Table 2. Productive behavior of male and female rabbits, with the use of commercial feed and *Leucaena leucocephala*.

Productive indicators	Males		Females	
	ACCM	ACFLM	ACCH	ACFLCH
Initial weight (g)	841.6±331.0b	1093.6±546.2a	935.2±325.8b	975.2±285.4a
Final weight (Kg)	1.971±256.6b	2.211.8±197.7a	2.012.4±275.6b	2.184.0±464.9a
Daily weight gain (g/rabbit)	20.18±3.17b	23.18±6.35a	19.24±3.42b	21.59±10.23a
Dry matter intake (g/rabbit)	36.30±0.53b	48.04.2±0.50a	36.14±0.90b	47.68±0.84a
Feed conversion (Kg)	1.80±0.25b	2.04±0.52a	1.92±0.33b	2.76±1.66a
Cost per kg increased (Kg)	10.00	8.00	10.00	8.00

ACCH treatment: 300-g commercial feed for female rabbits; ACCM treatment: 300-g commercial feed for male rabbits; ACFLCH treatment: 200-g commercial feed with 100 g *Leucaena* foliage for female rabbits; ACFLCM treatment: 200-g commercial feed with 100 g *Leucaena* foliage for male rabbits. Different letters in the same row indicate significant differences, according to Tukey's test ($p \leq 0.05$).

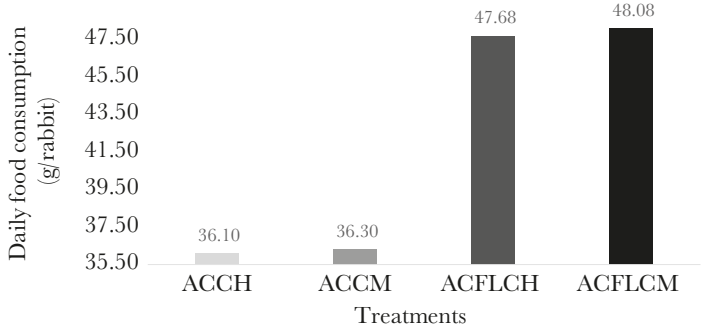

Figure 1. Voluntary consumption by male and female rabbits of commercial feed plus *Leucaena leucocephala*.

et al. (2005), who included 40% *Leucaena* foliage with a higher preference in the diets of fattening rabbits.

Weight gain was significantly higher ($p \leq 0.05$) in rabbits subjected to the ACFLCM and ACFLCH treatment than with ACCH and ACCM. These results are similar to the 19.11 g weight gain with a base diet and 40% *leucaena* addition recorded in fattening by Nieves *et al.* (2002) in Guanare, Portuguesa, Venezuela. However, Pilco *et al.* (2018) reported that better productive indexes were observed in the weight gain of the rabbits with a 10% *leucaena* addition to the diet (Figure 2).

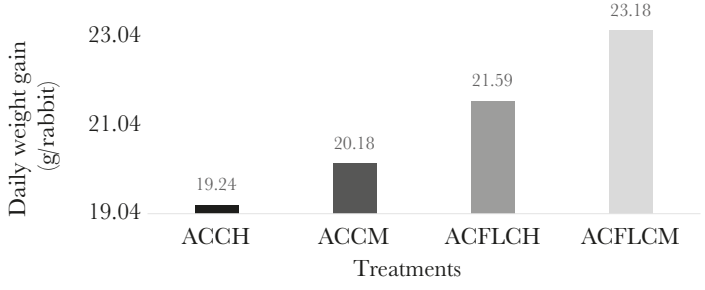

Figure 2. Weight gain in male and female rabbits with commercial feed plus *Leucaena leucocephala*.

CONCLUSIONS

Diets with added *leucaena* are an alternative feed supplement for rabbit production. On the one hand, an increase in daily weight gain of the animal and greater food consumption was found with diets that included *Leucaena*. In conclusion, compared with commercial feed on its own, the addition of *Leucaena leucocephala* foliage in the finishing phases maintained and improved the productive behavior of the rabbits.

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