EVALUATION OF AN ORGANIC DIET FOR GROWING RABBITS (*Oryctolagus cuniculus*) BASED ON ALFALFA (*Medicago sativa*) AND CORN (*Zea mays*)

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ABSTRACT

In order to evaluate the performance and profitability of growing rabbits fed with organic feedstuff a trial was conducted at the Zootecnia Departament Rabbitry, Universidad Autónoma Chapingo, Mexico, from August to September, 2003. A commercial rabbit formula including the prebiotic Bio-Mos was treatment 1 (T1). Organic fresh alfalfa and dry corn, added with the prebiotic Bio-Mos and common salt constituted treatment 2 (T2). A total of 60 weaned rabbits were used (30 by treatment), 6 young with similar weight were allocated in each cage, having 5 cages by treatment. Offered and rejected feed, to calculate feed consumption; weekly rabbits weight to calculate average daily gain; and mortality rate were recorded until animals reach 2kg live weight. Records were analyzed by SAS (Proc GLM and Proc FREQ). There were significant differences ($P<0.05$) for gain (30.24 and 20.02 g for T1 and T2 respectively) between treatments. There were not differences ($P\geq0.05$) in feed consumption (95.74 and 72.92 g for T1 and T2 respectively), and mortality rate (13.42 and 21.12 % for T1 and T2 respectively). In order to estimate the treatments profitability for the growing period, the previous technical parameters and the following prices were utilized. Fresh organic alfalfa $0.46, organic corn $2.16, rabbit commercial feeding $2.98, Bio-Mos $65.00, weaning rabbits $20.50 (by kg, live weight), conventional finished rabbits $41.00, organic finished rabbits $45.00 (by kg, carcass weight). It was assumed that organic products had a prime of 10% over conventional products price and that feeding represents 80% of the total production costs. T2 profit was superior 17.61% in relation with T1. As expected, growing period to reach 2kg live weight was longer for rabbits feed with organic diet than conventional diet (42 vs. 65 d for T1 and T2 respectively), because of the lower gains this diet generated in comparison with commercial formula feeding. However organic production resulted more profitable because of both the prime prices this kind of products have and the technical parameters that can be obtained with the organic diet. The advantage of organic rabbit can be possible as long as the market for organic products keeps growing. To find out other organic ingredients to improve the organic diet formula and improve the technical parameters, and ways to reduce the feed waste is recommended.

Key words: rabbit, growing, corn, alfalfa, organic.

INTRODUCTION

Rabbit production is an alternative for both backyard and industrial production. In small scale it can be developed in rural and urban areas. Small producers can obtain not only food with high protein content for their diet, but monetary income as it has been shown for Mexican conditions by GÓMEZ (2002).

The income small producers receive is restricted because of the small amount of rabbits they produce, and because of the low prices they receive from the intermediary. A way to increase the small producer income is their organization for commercialization, but another way is to improve the quality of its product. Improving quality can be done through organic production. Organic products have a prime price in the market that can be superior (from 10 to 50%, as GOMEZ *et al*. (2003) indicate) to conventional products

Organic rabbit production not only can increase the small producer income but can provide a better meat quality to the family's producer diet. Additionally organic production does not use chemicals that pollute the environment, it contributes to the natural biological cycle's regeneration and it does not risk human health.

Small Mexican farmers use this method to produce corn all over the country and alfalfa in temperate and arid areas. Organic corn and alfalfa are currently available in Mexico and can be used to feed rabbits in order to generate organic rabbit meat. Technical parameters for rabbit production using organic corn and alfalfa are unknown in Mexico. Consequently an estimation of the potential income the small rabbit producer can obtain under organic production is not possible.

The objective of this study was to evaluate the growing rabbit performance and profitability, fed with organic corn and alfalfa in comparison with rabbits fed with conventional commercial feeding.

MATERIAL AND METHODS

The trial was conducted during August and September 2003, at a Zootecnia Departament Rabbitry, Universidad Autónoma Chapingo, Mexico, which is located at km. 38.5 México-Texcoco Highway, at 19° 29´ N latitude, 98° 53´ W longitude, and 2250 meters above sea level altitude. The climatic formula of the place is Cb (wo(w)(i`)g, with 571.5 mm of precipitation and average temperature of 15.2 °C (GARCIA, 1981).

The rabbitry was 12 m long and 6 m wide and made of the following materials: the floor was concrete, the roof consisted of asbestos sheets, and the walls were made of bricks except for the ventilation inlets. There were individual commercial cages made of galvanized wire (80x55x30cm) to allocate the animals. A food hopper was used to feed the rabbits. The cages had an automatic watering system with nipple drinkers.

Treatment 1 (T1) consisted of rabbit commercial pelletized feeding (Malta-Cleyton, T.M.). Treatment 2 (T2) consisted of fresh organic alfalfa and dry organic corn in a

proportion of 60% and 40% respectively (dry mater bases). These ingredients were offered independently, corn in the feeder and alfalfa over the cage. Because of the way the organic feed was offered, animal had the opportunity of selection and they consumed a 50-50 proportion of corn and alfalfa (dry mater bases). Both treatments include the prebiotic Bio-Mos (Alltech T.M.) for diarrhea prevention, in a proportion of 2kg by ton. T2 additional included 0.1% of NaCl, to satisfy the nutritional requirements and because they are available to small producers.

Proximal analysis content from both diets is in table 1. Both diets satisfied the minimum of nutritional requirements indicated by DE BLAS and WISEMAN (2000) in relation to energy (2.51 Mcal/kg), crude protein (14 to 16 %), crude fiber (13 to 14.5%), Cl, and Na.

Table 1. Diets proximal analysis (%)

	Commercial feed	Alfalfa	Corn
Dry mater	90.36	12.5	87.29
Crude fiber	16.48	23.87	2.31
Minerals	10.41	8.89	1.5
Ether extract	5.35	3.5	5.57
Protein (N x 6.25)	15.98	20.05	8.82

A total of 60 male and female hybrid young, from Californian, Chinchilla, and White New Zealand breeds were used to evaluate the 2 different diets. Animals were 38 days old when the experiment started. The average weaning weight was 929 and 996 g for T1 and T2 respectively. Thirty rabbits by treatment were allocated in 5 sets of 6 rabbits per cage.

After a week period (adaptation to the new diet), the following records were taken: amount offered and rejected feed, to calculate the average feed consumption (CO) per animal; weekly rabbits weight per cage, to calculate the average daily gain (DG) per young; average feed conversion (FC) was calculated dividing CO by DG. Daily mortality was recorded as well and added up to calculate the total mortality (MT) for the fattening period. Records were taken until animals reached a weight of 2 kg.

Statistical model to analyze de records was: $Y_{ijk} = \mu + T_i\ W_j + IW + CO + e_{ijk}$, were Y_{ijk} represents the independent variable; μ the population mean; T_i the treatment effect; W_j the week effect; IW and CO the initial body weight and the feed consumption covariates; and e_{ij} represents the experimental error. CO was covariate when DG was analyzed but not when CO was the independent variable. Proc GLM from the Statistical Analysis System (SAS, V8, 1999) was used to analyze the records. MT was analyzed through Proc FREQ and tested by Chi square test.

RESULTS AND DISCUSSION

Daily feed consumption, gain, and feed conversion, least square means, for the 6 weeks both treatments had information, and for the total growing period are in table 2. There were not significant differences (P>0.05) for feed consumption which varied between 57 and 140 g through weeks. The average feed consumption for the total fattening period was 96 and 73 g for T1 and T2 respectively. Because of the way the organic feed was offered, there was some wasted feed in T2. Gain was significantly different (P≤0.05) through weeks and highly significant (P≤0.01) between treatments. Commercial and organic corn-alfalfa feeding produced average daily gains of 30 and 20 g respectively.

Feed conversion was 3.22 and 3.81 for T1 and T2 respectively. Differences for FC were not tested (because feed consumption was a covariate when gain was analyzed) but the values were used for economic analysis. ESTRELLA and ÁLVAREZ, (1994) reported feed conversion of 3.37 and 4.26 for commercial and alfalfa based diet respectively. BAUTISTA and AGUILAR (1994) and ACOSTA and BAUTISTA (1995) reported feed conversion of 2.6 and 3.7 respectively for commercial feeding. GUERRA and ORTEGA (1997) found 4.1 feed conversion for a diet with 60% of alfalfa. The animals utilized by the author here referred were from Californian and New Zealand pure breeds.

Table 2. Daily feed consumption, gain, and feed conversion, least square means per week (W) and for the total period

Variable	Treatment	W1	W2	W3	W4	W5	W6	Average
Feed consumption	T1	57.14	83.51	75.16	104.95	140.47	111.33	95.74[a]
	T2	73.33	56.57	66.06	71.03	86.58	83.95	72.92[a]
Gain	T1	34.85	22.06	27.33	33.32	29.65	34.22	30.24[a]
	T2	18.80	19.30	12.59	16.51	24.99	27.94	20.02[b]
Feed conversion	T1	1.63	3.78	2.75	3.14	4.75	3.26	3.22
	T2	3.90	2.97	5.24	4.30	3.46	3.00	3.81

Means with same letter in column are not different (α≤ 0.05).

Greater commercial feed consumption may be due to the higher size the animal reached in T1 and because of the digestive tract capacity for the animals in T2 which were eating fresh alfalfa. For a commercial diet (equivalent to T1 in this experiment) BAUTISTA and AGUILAR, (1994) found similar results for feed consumption; ACOSTA and BAUTISTA, (1995), and ESTRELLA and ÁLVAREZ (1994) reported 104 and 93 g respectively. For a diet similar to T2 (including 60% of alfalfa), GUERRA and ORTEGA, (1997), reported 127.8 g.

Differences between treatments for gain are obvious, since T1 was a balanced diet whereas T2 was not. For commercial feeding, similar results (28 and 30 g) were found by ESTRELLA and ÁLVAREZ (1994) and ACOSTA and BAUTISTA (1995) respectively, whereas MILLÁN and VELASCO (2003) found higher values (form 34.09 to 35.52 g) for

three different commercial formulas. For diets based on alfalfa, gains of 24, 31, 38 and 41 g have been reported (ESTRELLA and ÁLVAREZ 1994; CARABAÑO and FRAGA, 1989; POTE *et al*., 1980).

Growing period to reach 2kg live weight was 42 and 65 d for T1 and T2 respectively. Mortality was not significantly different (P>0.05) between treatments; it was13.42 and 21.12 % for T1 and T2 respectively.

Given the previous technical parameters and the same number (30) of growing rabbits per batch, 225 conventional and 133 organic animals can be produced per year. The price for conventional rabbit is $ 21.70 and we assumed a 10% prime for the organic rabbit ($23.90). The income will be $ 9 527.17 and $ 6 258.86 for conventional and organic rabbits respectively. Considering by-products the total income can be $ 10 099.17 and $ 6 596.86 respectively.

Diet cost by kg was $ 2.98 and $ 1.85 for conventional and organic diet respectively. Given the number of animals (including mortality) to feed, the fattening period, and the average feed consumption, the feeding cost will be $ 2 894.97 and $ 1 324.06 for conventional and organic production. Assuming a $ 20. 50 cost for weaning rabbit and a total of $ 239.00 for other fixed costs, the total costs, profits and cost-benefit relationship will be $ 8 422.77, $ 1 676.20, 20% and $ 5 007.06, $ 1 589.80, 32% for the conventional and organic systems.

CONCLUSIONS

As expected, growing period to reach 2kg live weight was longer for rabbits feed with organic corn-alfalfa diet because of the lower gains this diet generate in comparison with commercial formula feeding. However organic production cost-benefit was 12% higher than conventional feeding, because of both the prime prices these kind of products have and the technical parameters can be obtained with the organic diet. The advantage of organic rabbit can be possible as long as the market for organic products keeps growing. To find out other ingredients to better formulate the organic diet and improve the technical parameters, and ways to reduce the feed waste is recommended.

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