

PRODUCTIVE PERFORMANCE OF RABBITS FED WITH DIETS CONTAINING RAMIE (*BOEHMERIA NIVEA*) HAY IN SUBSTITUTION TO ALFALFA (*MEDICAGO SATIVA*) HAY

de Toledo G.S.P.*, da Silva L.P., de Quadros A.R.B., Retore M., Araújo I.G., Brum H.S.,
Ferreira P., Melchior R.

Departamento de Zootecnia, CCR – Universidade Federal de Santa Maria, Camobi, 97105-900 Santa Maria, Brazil

*Corresponding author: gst@smail.ufsm.br

ABSTRACT

An experiment was carried out to evaluate the performance of growing rabbits fed with non pelleted coarsely ground diets, containing, besides maize (*Zea mays*) and soybean (*Glycine max*) meal, alfalfa (*Medicago sativa*) and ramie (*Boehmeria nivea*) hays. The experiment was conducted from August 18 to October 6, 2006. Thirty nine animals of 40 days of age were utilized and assigned to three treatments: Alfalfa 15% (control), Ramie 15% and Alfalfa 7.5%+Ramie 7.5%, corresponding to the forage inclusion level in each diet. The experimental design was completely randomized with three treatments and thirteen replications, where each animal was considered an experimental unit. The evaluated parameters were: average daily weight gain, average feed intake, feed conversion, carcass yield, hot carcass weight, cold carcass weight, drip loss percentage, pH 1 hour and pH 24 hours after slaughtering. Data were analyzed by analysis of variance and the averages compared by Duncan test ($P<0.05$). The treatment Alfalfa 7.5%+Ramie 7.5% showed higher average daily gain (28.0 g/d) against 26.4 and 25.7 g/d than the treatments Ramie 15% and Alfalfa 15%, respectively. The average feed intake was higher with the treatments with ramie inclusion, 93.7 g and 87.1 g for the treatments Alfalfa 7.5%+Ramie 7.5% and Ramie 15%, respectively, than with 15% alfalfa (83.8 g/d). Although, with no differences in the feed conversion, which stayed around 3.30 on average. For the main slaughter parameters, effects of type of forage were not significant. The results indicate that the combination of ramie+alfalfa hays, as main fiber source ingredient in the diets, caused a positive synergic effect. Apparently, this combination increased the palatability, but this hypothesis must be tested in further studies, because the preliminary analyses of the formulations did not show nutritional data that can subsidize this explanation. The authors conclude that ramie could replace 15% of alfalfa of the control diet and its association with alfalfa may improve growth performance.

Key words: Ramie, Alfalfa, Growth, Coarsely ground diets, Carcass yield.

INTRODUCTION

The feed is the most expensive part of the animal raising. Then, new ingredients are continually searched with the intention to reduce costs and keep or even improve the productive responses, guaranteeing the raising activity success.

Rabbits are herbivorous non ruminants animals, with functional caecum, which have capacity to extract nutrients of fibrous aliments and convert them in high biological value proteins. For that, they need sources of fiber included in their diets, because the fibers are also necessary to avoid digestive disturbances that can retard the productive performance or even cause fatal diarrheas, mainly during the growing phase (Santomá *et al.*, 1993; Ferreira, 1994).

Alfalfa (*Medicago sativa*) hay is the most utilized fiber source in diets to rabbits, although it is a very expensive product. This fact is the result of high exigencies of growing, especially despite of the conditions of soil fertility, good drainage and pH near to neutrality, characteristics found in a few units

of Brazilian soil mapping (Silva *et al.*, 1995). In this context, ramie (*Boehmeria nivea*), textile plant belonging to *Urticaceae* family and with extraordinary potential as fiber source, appears like a viable alternative to substitute alfalfa hay in rabbits feeding and other non ruminant species of functional caecum, because it tolerates less favorable conditions of growing, keeping satisfactory palatability and digestibility (Ferreira *et al.*, 1995).

The present study was carried out with the aim to evaluate the influence of partial and total substitution of alfalfa hay by ramie hay, in feeds for growing rabbits.

MATERIALS AND METHODS

The experiment was conducted in the Rabbit Laboratory of the Department of Animal Science, at the Federal University of Santa Maria, Brazil. The period of experiment was from August 18 to October 6, 2006. Thirty nine rabbits crossed (New Zealand White x Californian) males and females were weaned at 35 days of age, with initial liveweight of 563 ± 72 g, and housed in individual cages elevated from 70 cm of the ground, under open sky.

The experimental design was completely randomized with three treatments and thirteen replications, where each animal was consider an experimental unit.

The adaptation period was constituted by five days and the experimental period fifty days, where the weight of the animals and the diets were collected to calculate the average daily gain, average feed intake and feed conversion in the period. The water was offered *ad libitum* to the animals and the diets, coarsely ground form, were supplied once a day in the morning.

The treatments were constituted by: Alfalfa 15%=feed containing 15% alfalfa hay; Ramie 15%=feed with 15% ramie hay and Alfalfa 7.5% + Ramie 7.5%=feed containing 7.5% alfalfa hay and 7.5% ramie hay. The compositions of the hays are reported in Table 1. The diets formulation and composition are reported in Table 2.

Table 1: Chemical composition of the hays (% DM)

Hays	Dry matter	Crude protein	NDF	ADF	ADL	Total ash
Ramie	89	19	50	39	6	16
Alfalfa	86	20	45	34	8	11

At the end of the experiment, the rabbits were submitted to 12 hours of fasting, slaughtered by a neck hit followed by bleeding, removing of paws, skin, tail, head and viscera (digestive tract, heart and lungs). The evaluated parameters were: average daily gain, average feed intake, feed conversion, mortality, slaughter liveweight, carcass yield, hot carcass weight, cold carcass weight and drip loss percentage. The carcass pH was determined on the muscle *Biceps femoris* with a penetration electrode of 3 mm of diameter, one hour after slaughtering and 24 hours later under cooling (4°C).

The results were submitted to analyses of variance and the averages compared by Duncan test ($P < 0.05$).

RESULTS AND DISCUSSION

The animals fed with the treatment Alfalfa 7.5% + Ramie 7.5% obtained higher average daily gain (28.0 g/d) than the treatment Ramie 15% (26.4 g), what it is justified by the highest feed intake (Table 3). The low daily gains of all treatments are because the non pelleted coarsely ground diets, which are not very indicated to rabbits feeding. Although, the highest average feed intake can not be attributed to the levels of crude fiber of the diet or to their lowest digestibility, because the diets show close similarity to fiber content (Table 1). Mendes *et al.* (1980), working with ramie in the levels of 0, 25

and 50% of inclusion, obtained daily gain weights of 22.3, 22.1 and 6.5 g/day, respectively. Gabbi *et al.* (2004), supplementing ramie hay in the levels of 0, 20 and 40% in diets of growing rabbits, observed lower intake with the increase of fiber level in the diet. In this work, either the fiber levels as the other nutrients were kept at the same level among the treatments, where the ramie hay was substituting the alfalfa hay (maximum inclusion quantity of 15% in the diet). In this way, it does not have dietetic unbalancing among the diets, allowing evaluate the real effectiveness of the tested ingredient (ramie hay) on the performance parameters.

Table 2: Ingredients and chemical composition of the experimental diets

	Diets		
	Alfalfa 15%	Ramie 15%	Alfalfa 7.5% + Ramie 7.5%
Ingredientes (%):			
Maize grain	47.8	45.4	46.80
Soybean meal	18.9	21.7	20.5
Rice hull	8.2	8.2	8.2
Alfalfa hay	15.0	---	7.5
Ramie hay	---	15.0	7.5
Wheat bran	8.2	8.2	8.2
Salt	0.5	0.5	0.5
Soybean oil	0.76	---	0.06
Dicalcium phosphate	0.3	0.2	0.25
Limestone	---	0.5	0.25
Vit + min premix	0.3	0.3	0.3
Chemical composition (% DM):			
Digestible Energy (kcal/kg DM)	2500	2530	2500
Crude protein	16.0	16.0	16.1
Crude fiber	12.0	13.0	12.0
Total Digestive Nutrients	54	57	56
Ca	0.55	0.55	0.54
P	0.33	0.32	0.33
Lisine	0.77	0.74	0.77
Met + Cist	0.50	0.57	0.56

The results showed that the combination of alfalfa and ramie hays in the 1:1 proportion as main fiber source ingredient in the feed (Alfalfa 7.5% + Ramie 7.5%), caused a positive synergic effect on average daily gain and feed intake. Apparently, this combination increased palatability, although this hypothesis must be tested in further studies, once that the preliminary analysis of the formulations does not indicate nutritional data to subsidize the explanation.

Table 3: Initial liveweight, average daily gain, average feed intake, feed conversion ratio and mortality of growing rabbits (mean ± SD)

	Diets			Probability
	Alfalfa 15%	Ramie 15%	Alfalfa 7.5% + Ramie 7.5%	
Initial liveweight (g)	573 ± 65	548 ± 76	568 ± 75	0.642
Average daily gain (g/day)	25.7 ^b ± 2.1	26.4 ^{ab} ± 2.6	28.0 ^a ± 2.0	0.001
Average feed intake (g/day)	83.8 ^b ± 5.6	87.1 ^{ab} ± 6.9	93.7 ^a ± 6.8	0.020
Feed conversion ratio	3.26 ± 0.27	3.30 ± 0.32	3.34 ± 0.39	0.731
Mortality (%)	0	0	0	-

^{a, b}Means with different letters in the same raw differ significantly according to Duncan test (P<0.05)

To the carcass parameters (Table 4), the carcass yield, based in the hot carcass weight, hot and cold carcass weights did not differ among the treatments, although the drip loss percentage was higher with the treatment Ramie 15%. Some pH values differences were detected only one hour after slaughtering. Twenty four hours later, the values stayed in 6.18 on average. It is important emphasize that observation of normal values of pH fall, suggests that the other parameters indicating quality, such as capacity of water retention, color and tenderness, will show satisfactory results, because these factors are influenced by the pH (Zeola *et al.*, 2002).

Table 4: Slaughter liveweight, carcass yield, hot carcass weight, cold carcass weight, drip loss, pH one hour and 24 hours after slaughtering of growing rabbits (mean \pm SD)

	Diets			Probability
	Alfalfa 15%	Ramie 15%	Alfalfa 7.5%+ Ramie 7.5%	
Slaughter liveweight (g)	1744 ^b \pm 104	1809 ^b \pm 108	1920 ^a \pm 92	0.037
Carcass yield (%)	51.8 \pm 2.7	52.0 \pm 4.6	49.5 \pm 2.1	0.075
Hot carcass weight (g)	907 \pm 75	941 \pm 73	941 \pm 87	0.618
Cold carcass weight (g)	899 \pm 75	916 \pm 70	931 \pm 86	0.705
Drip loss (%)	1.09 ^b \pm 0.1	1.38 ^a \pm 0.2	1.08 ^b \pm 0.1	0.005
pH 1 hour	6.65 ^b \pm 0.2	6.69 ^b \pm 0.2	6.87 ^a \pm 0.1	0.036
pH 24 hours	6.17 \pm 0.1	6.19 \pm 0.1	6.16 \pm 0.1	0.697

^{a, b} Means with different letters in the same raw differ significantly according to Duncan test (P<0.05)

CONCLUSIONS

Ramie could replace all the 15% of alfalfa of the control diet and its association with alfalfa may improve growth performance.

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