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Formulações dietéticas para cordeiros Morada Nova em confinamento, usando o NRC (2007): Perda por cocção e força de cisalhamento[1]

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Resumo: Objetivou-se com este trabalho, avaliar a formulações dietéticas para cordeiros Morada Nova em confinamento, tomando por base o NRC (2007), sobre a força de cisalhamento e perda de peso por cocção. O experimento foi conduzido na Fazenda Experimental da Universidade Estadual Vale do Acaraú, em Sobral-CE, no período de 16 de Dezembro de 2013 a 21 de Fevereiro de 2014. Foram utilizados vinte cordeiros Morada Nova com quatro meses de idade e peso médio de 18,8kg distribuídos em delineamento inteiramente ao acaso em arranjo fatorial 2 x 2 (duas dietas prescritas pelo NRC (2007) - maturidade precoce e tardia e dois níveis de restrição – 0 e 15% na matéria seca dos teores de Proteína Bruta (PB) e Nutrientes Digestíveis Totais (NDT) dietéticos. As perdas durante a cocção foram calculadas pela diferença de peso das amostras antes e depois de submetidas ao tratamento térmico. Depois, ainda com as mesmas amostras, por meio de texturômetro, foi determinada a força de cisalhamento. Os dados foram submetidos à análise de variância e as médias comparadas pelo teste de Tukey a 5%. Não houve efeito das dietas, nem de restrição de nutrientes, sobre os parâmetros avaliados. De acordo com os parâmetros avaliados, as dietas podem ser formuladas para maturidade precoce e tardia inclusive com restrição de 15 % de NDT e PB. Nesta pesquisa, a carne de cordeiros Morada Nova pode ser classificada como macia.

Palavras–chave: carne**,** maciez, qualidade

Dietary formulations to Morada Nova lambs under feedlot, based on the NRC (2007): shear force and cooking loss

Abstract: The objective of this study was to evaluate the use and application of dietary formulations to Morada Nova lambs in feedlot, based on the NRC (2007), on the shear force and cooking loss. The experiment was conducted at the Experimental Station of Universidade Estadual Vale do Acaraú in Sobral-Ceará, Brazil, from 16th December 2013 to 21st February 2014. Twenty Morada Nova lambs, four months old, weighing 18,8kg were used in a completely randomized design in a factorial scheme 2 x 2 (two diets according to the NRC (2007) - early and late maturity, and two levels of restriction (0 or 15%) of both Crude Protein (CP) and Total Digestible Nutrients (TDN) in dry matter. The cooking losses were calculated from the weight difference of the sample before and after the cooking. The shear force was measured in a texturometer. Data were analyzed by variance and means compared by Tukey test at 5% of probability . There were no effect of diets formulation, as well, of nutrient restriction on those parameters. According evaluated parameters, diets may be formulated for both early and late maturity including with restriction of TDN and CP. Meat of Morada Nova's lambs can be classified like "soft" according shear force.
Keywords: meat, quality, softness

Introduction

Currently, the formulation of diets for sheep in Brazil has been following the recommendations of NRC (2007), an international system that determined the nutritional requirements for genetic groups of sheep farming in temperate conditions. The best adjustment in supply of nutrients to maximize feed efficiency of Morada Nova lambs in feedlot finishing, under tropical conditions, requires an evaluation between nutritional requirements according this system and nutrients restriction that does not affect meat quality. Energy level can influence physical traits of the flesh, as the shear force and cooking loss. Factors are associated with meat tenderness. In this context, research on indicators of meat quality of Morada Nova lambs is very important to meet the consumer market demand by establishing eating patterns that provide desirable characteristics. The objective of this present study

was to evaluate the use and application of dietary formulations for Morada Nova lambs in feedlot finished, based on the NRC (2007), with restriction or not of nutrients, on the shear force and water loss by cooking.

Material and Methods

The experiment was conducted at the Center for Research in Small Ruminants Nutrition of the Experimental Station of Universidade Estadual Vale do Acaraú (UVA) in Sobral-Ceará, Brazil, in the period of 16th December 2013 to 21st February 2014. Twenty Morada Nova lambs with four months old and weighing 18.8 kg for termination in feedlot system were used with average expected weight gain of 200 g/day, distributed in a completely randomized design in a factorial scheme 2 x 2 (two diets prescribed by the NRC (2007) - early and late maturity – with two levels of restriction – 0 or 15% both CP and TDN in dry matter), resulting in four diets (treatments) with five replications: Diet 1-early maturity without restriction (0%); Diet 2-early maturity with restriction (15%); Diet 3-late maturity without restriction (0%); Diet 4-late maturity with restriction (15%). Diets were fed twice a day, at 08:30 and 16:30 hours. Water and mineral salt were available *ad libitum*. The value of 15% of restriction was determined in the moment of diet's formulation. The values of CP and TDN presented in the Table 1 varied according animal's selectivity.

Table 1. Chemical and proximate composition of the experimental diets according to the NRC (2007)

Proximate composition of the experimental diets				
Food	Diet 1	Diet 2	Diet 3	Diet 4
Hay elephant grass	14.28	42.22	54.96	42.79
Cashew nut meal	0.18	13.16	6.68	-
Corn Germ	45.67	-	-	-
Soybean meal	9.59	6.75	35.09	-
Soybean oil	-	-	2.22	-
Corn	29.35	37.19	-	-
Cotton cake	-	-	-	54.78
Limestone	0.93	0.68	1.05	2.43

Chemical composition of the experimental diets				
Components	Diet 1	Diet 2	Diet 3	Diet 4
Dry matter based on natural matter (%)	90.5	91.3	91.5	92.5
Crude protein (%DM)	13.0	11.8	21.5	18.7
Ether extract (% DM)	5.2	8.8	7.2	5.8
Neutral detergent fiber (%DM)	26.8	40.2	51.3	53.5
Acid detergent fiber (%DM)	10.5	20.9	28.3	36.6
Total digestible nutrients	76.2	67.2	60.1	47.1

The shear force (SF) and cooking loss was based on the methodology described by Duckett et al. (1998). The samples consisting of cubes measuring about 2.0 cm edge, weighed, and then baked in a grill, preheated to 170° C, until the temperature reached 71° C the geometric center, which took 16 minutes (eight minutes each side). To check this, an infrared thermometer was used, equipped with digital player. They were, then, cooled to room temperature and weighed again. The cooking losses were calculated from the weight difference of the sample before and after subjected to heat treatment, expressed as percentage (g/100g). Later, still with the same samples using a texturometer equipped with a blade type Warner Bratzler, operating at 20 cm/min, they were recorded the peak SF and the result expressed in kg-f/cm^2, determined automatically by the program. Data were subjected to analysis of variance and means compared by Tukey test at 5% significance level.

Results and Discussion

There was no effect of diets as NRC (2007) or of nutrient restriction for cooking loss and SF with mean values of 43.4% and 6.8 kgf/cm^2, respectively (Table 2). Silva Sobrinho (1999) working with lambs of different genotypes obtained average values of cooking loss of 38.41%, fewer than values obtained here. These values were higher than cooking loss (37.7%) and shear force (4,34kg-f) reported by Zeola et al. (2002) for Morada Nova lambs fed diets with different concentrate levels. Whereas the meat with a value of above 11 kg/f shear force is classified as hard, between 8 and 11 kg/f acceptable and below 8 kg/f as soft (MONTE et al., 2012). Based on this reference, we can say that meat of Morada Nova lambs, evaluated in this study, can be classified as soft. Although higher

values of cooking loss that could indicate a meat less succulent, SF indicated a "soft" meat. Measures of water retention capacity and levels of lipids in the meat are still necessary for this characterization.

Table 2. Loss on cooking and shear force from meat of Morada Nova lambs under different dietary formulations

Variables	Diet according to NRC (2007)		Restriction of Nutrients		Coefficient of variation %
	Early maturity	Late maturity	0%	15%	
Weight loss for cooking (%)	42.8	44.1	43.3	43.6	5.8
Shear force (kgf/cm^2)	6.3	7.4	6.4	7.2	22.4

Conclusions

According evaluated parameters, diets may be formulated for both early and late maturity including with restriction of TDN and CP. With the animals used in this research, meat of Morada Nova's lambs can be classified like "soft" according shear force.

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