



## Formulações dietéticas para cordeiros Morada Nova em confinamento, usando o NRC (2007): Pesos dos não-componentes de carcaça<sup>1</sup>

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**Resumo:** Objetivou-se com este trabalho avaliar o uso e aplicação de formulações dietéticas para cordeiros Morada Nova sob terminação em confinamento, tomando por base o NRC (2007), sobre os pesos dos não-componentes de carcaça. O experimento foi realizado na cidade de Sobral-CE, no período de 16 de Dezembro de 2013 a 21 de Fevereiro de 2014. Foram utilizados vinte animais distribuídos em delineamento inteiramente ao acaso em esquema fatorial 2 x 2 (duas dietas prescritas pelo NRC (2007) - maturidade precoce e tardia com dois níveis de restrição – 0 or 15% da Proteína Bruta-PB e Nutrientes Digestíveis Totais-NDT). Os parâmetros avaliados foram os pesos dos não componentes da carcaça: sangue, coração, fígado, cabeça, patas, rins, pele e pulmão. Os dados foram submetidos à análise de variância e as médias comparadas pelo teste Tukey a 5%. Houve interação significativa apenas para os pesos de pele e pulmão (P<0,05). Houve efeito significativo entre dietas conforme o NRC. Não houve diferença significativa para o peso do sangue. Já em relação à restrição de nutrientes, verificou-se diferença para o peso do fígado e dos rins. Para a pele e pulmão, houve superioridade de valores quando os cordeiros receberam dieta indicada para maturidade precoce sem restrição nutricional. O adensamento energético indicado na formulação para maturidade precoce contribui para o maior crescimento dos órgãos. A restrição de nutrientes aplicada às dietas recomendadas pelo NRC interfere nos pesos dos dois principais não componentes da carcaça, fígado e rins.

**Palavras-chave:** crescimento, manejo nutricional, órgãos.

### Use and application of dietary formulations for Morada Nova lambs under feedlot finishing in the brazilian semi-arid, based on the NRC (2007): Weights of non-carcass components

**Abstract:** The objective of this study was to evaluate the use and application of dietary formulations for Morada Nova lambs under feedlot finishing, based on the NRC (2007), about the weight of non-carcass components. The experiment was conducted in Sobral-Ceará-Brazil, in the period of 16<sup>th</sup> December 2013 to 21<sup>st</sup> February 2014. Twenty animals distributed in a completely randomized design in a factorial 2x2 (two diets prescribed by NRC (2007) for 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). Weights of non-carcass components were evaluated: blood, heart, liver, head, feet, kidneys, skin, lungs. Data were submitted to analysis of variance and means were compared by Tukey test at 5%. There was a significant interaction only for skin and lung weights (P <0.05). There was a significant effect between diets according to NRC. No significant difference only for the weight of blood. In relation to nutrient restriction, differences were found for the weight of liver and kidneys. For skin and lung, there was superiority of values when the lambs were fed a diet suitable for early maturity and without nutrient restriction. The energy density formulation indicated for early maturity contributes to the greater development of the organs. The restriction of nutrients applied to NRC diets interferes in weights of the main non-carcass components, liver and kidneys.

**Keywords:** growth, nutritional management, organs.

### Introduction

The absence of a Brazilian nutritional requirements system leads to the practice of sheep diets formulation according to NRC (2007), the main system adopted in the country for this purpose. The recommendations of this system, however, were developed under non-tropical conditions, often derived from genetic groups and different foods existing in Brazil. This can result in inadequate supply of nutrients (RESENDE et al., 2008). To assess the



actual nutrient supply condition in order to include genetic groups and feed used in the Brazilian semiarid region where it has the largest quantitative Brazilian sheep, can bring economic and productive benefits for convenience and better nutrient use efficiency. In this context, often due to the recovery of non-carcass components, which represent 40 to 60% of liveweight also does not occur. Optimized diets as the supply of nutrients can contribute to adding value to these organs, widely used in typical dishes of the Brazilian Northeast (SILVA SOBRINHO, 2001). The objective of this work, therefore, was to evaluate the use and application of dietary formulations for Morada Nova lambs in feedlot finished, based on the NRC (2007), with or not restriction of both crude protein-CP and total digestible nutrients-TDN, on the weights of non-components of carcass.

### Material and Methods

The experiment was conducted at the Center for Research in Small Ruminants Nutrition in Experimental Station of Universidade Estadual Vale do Acaraú in Sobral-Ceará, Brazil, in the period of 16<sup>th</sup> December 2013 to 21<sup>st</sup> February 2014. Twenty finishing Morada Nova lambs with four months old and weighing 18.8 kg with average expected weight gain of 200 g/day, were used in a completely randomized design in a factorial scheme 2 x 2 (two diets prescribed by the NRC (2007) - early and late maturity and two levels of restriction – 0 or 15% of 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

Proximal 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 basis (% as fed)	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

After 65 days of confinement, the animals were subjected to fasting for solids and liquids for 18 hours. At slaughter, the animals were stunned by concussion, followed by bleeding through the carotid and jugular section. The blood collected was then weighed container. Soon after bleeding was carried out skinning, and the removal and heavy skin. Then, an opening was made throughout the ventral midline for removal and weighing of the heart, lung, liver and kidneys. After evisceration, the head and feet were removed according Silva Sobrinho (2001) scheme. These body parts were analyzed in their absolute weight and percentage of empty weight. Data were subjected to analysis of variance and means compared by Tukey test at a 5% significance level.

### Results and Discussion

There was a significant interaction between the factors evaluated, only for skin and lung weights ( $P < 0.05$ ). There was a significant effect of diets, according to NRC (2007). About diets there was just no difference ( $P > 0.05$ ) for blood weight. For all others, the use of the recommended diet for early maturity resulted in better values. As for the restriction of nutrients or not, there was a difference only to the weight of the liver and kidneys ( $P < 0.05$ ) (Table 2), with higher values for the non-restriction. To the skin and lungs, there was higher values when the lambs were fed a diet suitable for early maturity and no food restriction (Table 3).



The organs and viscera have different growth rates during the life of the animal, when compared to other parts of the body (KAMALZADEH et al., 1998), and the prospect of increased energy density to the diets promoted by diet indicated by the NRC (2007) for early maturity contributed to this growth. According to Ferrel & Jenkins (1998), the non-carcass components respond positively to energy intake. Dietary restriction can reduce the size of internal organs in relation to body weight, particularly the liver, that is more affected than the growth of the animal as a whole (ALVES, 2003). This factor can contribute to the lower values of the liver and kidneys to the animals with nutrients restriction (Table 2).

Table 2. Weights of the carcass components of Morada Nova lambs under different dietary formulations

Variables	Diet according to NRC (2007)		Restriction of Nutrients		Coefficients of variation %
	Early maturity	Late maturity	0%	15%	
Blood (g)	1.2	1.1	1.1	1.1	14.2
Heart (g)	0.1 <sup>a</sup>	0.09 <sup>b</sup>	0.1	0.09	17.3
Liver (g)	0.5 <sup>a</sup>	0.3 <sup>b</sup>	0.4 <sup>a</sup>	0.3 <sup>b</sup>	18.5
Head (g)	1.2 <sup>a</sup>	1.0 <sup>b</sup>	1.0	1.1	13.1
Paws (g)	0.6 <sup>a</sup>	0.50 <sup>b</sup>	0.55	0.54	11.2
Kidneys (g)	0.06 <sup>a</sup>	0.05 <sup>b</sup>	0.06 <sup>a</sup>	0.05 <sup>b</sup>	12.4

Means followed by different letters in the same row differ ( $P < 0.05$ ) by Tukey test.

Table 3. Skin weights and lungs of Morada Nova lambs under different dietary formulations

Diet according to NRC (2007)	Skin (g)		Lung (g)	
	Without Restriction (0%)	With Restriction (15%)	Without Restriction (0%)	With Restriction (15%)
Early maturity	2,49 <sup>aA</sup>	2,01 <sup>aB</sup>	0,67 <sup>aA</sup>	0,52 <sup>aB</sup>
Late maturity	1,72 <sup>bA</sup>	1,91 <sup>aA</sup>	0,42 <sup>bA</sup>	0,41 <sup>bA</sup>
Coefficients of variation (%)	14,85		13,73	

Means followed by different lowercase letters, in the same column differ ( $P < 0.05$ ) by Tukey test.

Means followed by different capital letters in the same row differ ( $P < 0.05$ ) by Tukey test.

### Conclusions

The energy density in the formulation indicated for early maturity contributes to the greater organs development. The nutrients restriction applied to the diets recommended by the NRC (2007) affects the kidneys and liver weights.

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