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HEMATOLOGICAL PARAMETERS OF RABBITS SUBMITTED TO FEED RESTRICTION

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Resumo: O desenvolvimento de estratégias para a redução dos custos de alimentação são fundamentais para a maior rentabilidade na produção de coelhos. Este trabalho objetivou avaliar o efeito da restrição alimentar sobre os parâmetros hematológicos de coelhos na fase de crescimento. Aos 35 dias, vinte e quatro coelhos machos e fêmeas da raça Nova Zelândia Branca foram alojados em seis gaiolas (dois animais/gaiola) e mantidos até os 84 dias. Metade dos coelhos (doze) recebeu alimentação à vontade durante todo o período experimental e a outra metade (doze) foi submetida à restrição alimentar nos períodos de 35 à 42 dias (45 g/dia/coelho) e 56 à 63 dias (85 g/dia/coelho). Para análise hematológica aos 84 dias, foram selecionados doze coelhos, sendo seis por tratamento. De acordo com os resultados, menor número de hemácias (P = 0,0037), hemoglobina (P = 0,0484) e hematócrito (P = 0,0361) foram observados nos coelhos submetidos à restrição alimentar, entretanto, a maioria dos parâmetros sanguíneos (leucócitos, neutrófilos, linfócitos, monócitos, eosinófilos, basófilos e plaquetas) não apresentou alteração significativa (P≥0,05). Desta forma, a restrição alimentar parece não prejudicar a saúde dos coelhos, podendo, portanto, ser adotada como sistema de alimentação alternativo.

Keywords: *ad libitum*, blood picture, growing rabbits, health condition

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Introduction

Rabbit production is a livestock activity that apply technical, practical and economic knowledge. In Brazil, the first challenge is to overcome cultural barriers to rabbit meat consumption. The second challenge is to reduce the rabbit production costs, especially the feed, which represents about 60 to 70% of the total cost. Feed restriction is an animal production strategy with the purpose of delimiting the amount of feed intake. This way, there has been an increased interest in studying feed restriction in growing rabbits in order to reduce the feeding costs and also be exploited in the feeding regimen, especially in periods of scarcity of commercial feed and forages. Feed restriction can also reduce the incidence of pathologies (Alabiso et al., 2017), especially after a stressful time, such as weaning (Gallois et al., 2008).

Blood picture provides valuable information about health condition of an organism and, thus, it is an indicator of internal changes which can be caused by external conditions (Tumová et al., 2007). There is a little information available concerning the alternative feeding systems on the blood picture of rabbits. Therefore, the objective of this study was to evaluate the effect of feed restriction on hematological parameters in growing rabbits.

Material and methods

The study was carried out at the Federal Institute of Minas Gerais (IFMG) in partnership with the University of Brazil. The procedures involving animals were approved by the Institutional Animal Care and Use Committee (CEUA/IFMG), under protocol number 03/2017. The experimental period started at weaning (35 d) and finished at slaughter (84 d). A total of twenty-four male and female New Zealand White rabbits were randomly allocated two per cage. The cages (0.6 x 0.6 m) were equipped with nipple water drinkers and semi-automatic feeders. The rabbits were allowed *ad libitum* access to water. A commercial pelleted diet (Total 17) was provided (CP: 17.7%, ADF: 17.2%, DE: 2450 kcal kg^{-1}). Half of the rabbits (twelve)

were fed *ad libitum* over the experimental period. The other half (twelve) was subjected to feed restriction from 35 to 42 d (45 g/d/animal) and from 56 to 63 d (85 g/d/animal). Following the restriction period the animals were fed *ad libitum*. Average ambient temperature was 13.3ºC (minimum) and 31.4ºC (maximum) and average relative humidity was 61.5%. The lighting program consisted of natural photoperiod over the entire experimental period (from October to November).

At 84 d, twelve rabbits (six per feeding treatment) were selected according to the weight and slaughtered by physical stunning and bleeding. Blood samples (3.0 ml) were collected via the jugular vein into blood collection tubes (Vacutube EDTA, Biocon Diagnósticos, Belo Horizonte, Minas Gerais, Brazil). Analyses were carried out at the laboratory (Agropec Centro de Saúde Animal, Bambuí, Minas Gerais, Brazil) within the next two hours using an ABX Micros 60 Hematology Analyzer (Horiba, Montpellier, France). Individual serum samples were analyzed for red blood cell, hemoglobin, haematocrit, leukocyte, band and segmented neutrophil, lymphocyte, monocyte, eosinophil, basophil, platelet, metamyelocyte, myelocyte, promyelocyte and blast. Statistica 9.0 software was used. Normality analysis, homogeneity of variances and residue analysis were performed. The means were compared by the F test or or Kruskal-Wallis test at the 5% probability level. The experimental unit was the individual rabbit.

Results and discussion

All measurements of blood picture from this study were in a physiological range. Significantly lower number of red blood cell (P = 0.0037), hemoglobin (P = 0.0484) and haematocrit (P = 0.0361) have been observed in rabbits subjected to feed restriction (Table 1). For hemoglobin content, similar result was observed by Ebeid et al. (2012). According to those authors, this reduction could be due to the reduction in erythrocytes' counts. For haematocrit results, El-Moty and El-Moty (1991) also reported reduced content, however Ebeid et al. (2012) observed no

significant alteration in rabbits restricted. Haematocrit is considered one of the most common haematological characteristic which expresses a share of blood cells from total blood value (Tumová et al., 2007).

In our study most parameters of blood picture (leukocyte, band and segmented neutrophil, lymphocyte, monocyte, eosinophil, basophil and platelet) were not influenced (P≥0.05) by feed restriction. In general, our results were similar to Tumová et al. (2007) except for the lower number of neutrophiles and higher number of lymphocytes after nutrition deprivation. For leukocyte number, our result was similar to Ebeid et al. (2012). According to our study, there was no result for metamyelocyte, myelocyte, promyelocyte and blast.

Table 1 – Means and standard deviations of the hematological parameters of rabbits subjected to feed restriction *vs*. *ad libitum* feeding

Parameters	**Feeding systems**[1]		**Test**	
	Ad libitum	**Feed restriction**	**Value**	**P**
Red blood cell (mm^3)	6.15 ± 0.16 A	5.74 ± 0.21 B	14.12	0.0037[2]
Hemoglobin ($g\ l^{-1}$)	12.08 ± 0.29 A	11.60 ± 0.44 B	5.05	0.0484[2]
Haematocrit (%)	39.03 ± 1.26 A	37.12 ± 1.48 B	5.86	0.0361[2]
Leukocyte ($g\ l^{-1}$)	5.47 ± 2.62 A	5.72 ± 1.98 A	0.03	0.8559[2]
Band neutrophil (mm^3)	1.00 ± 0.89 A	0.33 ± 0.82 A	1.82	0.2073[2]
Segmented neutrophil (mm^3)	63.50 ± 8.55 A	52.00 ± 18.33 A	1.94	0.1939[2]
Lymphocyte (mm^3)	32.00 ± 8.94 A	43.50 ± 17.95 A	1.97	0.1905[2]
Monocyte (mm^3)	3.17 ± 1.47 A	2.83 ± 1.94 A	0.11	0.7444[2]
Eosinophil (mm^3)	0.33 ± 0.52 A	0.50 ± 0.55 A	0.29	0.5995[2]
Basophil (mm^3)	0.00 ± 0.00 A	0.33 ± 0.82 A	1.00	0.3173[3]
Platelet	153,500.00 ± 71,868.63 A	193,000.00 ± 86,190.49 A	0.74	0.4088[2]

[1]Feed restriction from 35 to 42 d (45 g/d/rabbit) and 56 to 63 d (85 g/d/rabbit). [A,B]Values followed by the same letter in a row are not significantly different (P≥0.05) by F test(2) or Kruskal-Wallis test(3).

Conclusion

It seemed that feed restriction resulted in normal blood picture in growing rabbits, thus, this alternative feeding system could be adopted for minimizing feeding costs and leading to economic advantage to producers. However, further studies should be carried out for substantiation.

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