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Effect of Magnesium Oxide and Sodium Bicarbonate on Physical and Chemical Composition Carcass of Lori-Bakhtiari Fattening Lambs

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Abstract: The effect of magnesium oxide and sodium bicarbonate on the physical and chemical composition of carcass was investigated. Eighteen ram lambs with an average weight of 35.1±0.62 Kg were randomly selected and divided into 3 groups of treatment (6 lambs/ treatment group). The experiment was prolonged for 75 day. The rations were included: diet 1 (control diet), diet 2 (control diet plus 0.05% magnesium oxide) and diet 3 (control diet plus 0.2% sodium bicarbonate). At the end of the experiment, all lambs were slaughtered and their carcasses were analyzed according to Farid's method. Right half carcass for weighing meat, fat and bone were studied in different cuts of carcasses and the averaged values were compared by means of statistical analysis. Highest and lowest average lean meat were observed in the group receiving 0.05% magnesium oxide (6.65±0.86 Kg) and control (5.84±0.30 Kg), respectively. But that was not statistically significant ($P>0.05$). Experimental results showed that there were statistically significant differences in average carcass fat ($P<0.05$). Therefore, the lowest average carcass fat was observed in the group receiving 0.05% magnesium oxide. The comparison carcass chemical composition percentage between different treatments was observed with significant difference ($P<0.05$). The highest carcass protein percentage (17.30±0.64%) and lowest percentage of carcass fat (27.93±0.14%) was observed in the 0.05 % magnesium oxide group.

Key words: Slaughter · Lean meat · Magnesium oxide · Bone · Half right carcass

INTRODUCTION

Fattening is state of art in living animal weight gain in a relatively short period of time [1, 2]. In order to increase meat production, the consideration to fattening seems to be necessary and the main purpose of fattening is to produce meat with high quality and quantities meat without increasing the number of live stock and to achieve good profits in a short time period [2]. Ranchers often for increase growth fattening animal from concentrate in diets used. This can increase the speed and extent of fermentation and rumen ecosystem imbalances that ultimately will reduce feed efficiency or lend to metabolic disorders [3]. However, diets contain high levels of concentrate may disorder digestion which lead to reduce rumen buffering capacity and subsequently increase the acidity of the rumen [4]. Consumption of high concentrate or rapid utilization of carbohydrates causes rapidly increase in fermentation process and high accumulation of lactic acid in rumen. As a result, pH of rumen shift from 6.8 to 5.5 or even lower to acidic condition. In such pH, acidosis caused a metabolic disorder and consequences of the animal production reduced to death [5, 6]. Proper use of dietary buffers may increase consistency to the diet. Because of buffers resist against any changes of pH rumen and neutralize the created acidity; that maintains the consistency of nearly neutral pH rumen. Cellulose digestion in buffer condition may improve the proportion of rumen volatile fatty acids [7-11]. Buffers are able to adjust the acidity of rumen contents; that can improve rumen environmental conditions [12]. Many chemicals have been examined as a buffer in ruminant feed, such as sodium bicarbonate and magnesium oxide can be noted. Addition of buffers to nutritional feed may ration of fattening lambs with the changes in rumen may be effectively benefitted of generation of mild organic acid which reduces percentages of carcass fat and increase lean meat.

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Table 1: Ingredients (dry matter basis) and chemical composition of the experimental rations

Ingredients (%)											
Wheat	Barley	Corn	Soybean meal	Cotton seed meal	Wheat barn	Rice barn	Enzymatic	Mineral and Vitamin permix[1]	NaCl	Ca	P
14	33.8	3	3.1	3.8	33	4	1.6	2	0.3	0.8	0.6

Chemical composition (%)				
Crude Protein	Neutral detergent fiber	Acidic detergent fiber	Ash	Metabolizable Energy (MCal/Kg)[2]
14.16	41.2	20.6	6.3	2.6

[1]Supplies per kg of feed: 4.9 mg of Zn, 4.05 mg of Mn,0.45 mg of Cu, 0.075 mg of I, 0.1 mg of Se, 2.500 IU Vitamin A,400 mg of Vitamin D, 2.5 IU Vitamin E

[2]Calculated metabolized energy

MATERIALS AND METHODS

In this experiment, 18 lori - bakhtiari fattening lambs were randomly selected with weighting average of 35.1±0.62 Kg and all of the selected lambs ARE divided into three treatment groups with six repetitions and fattened for duration of 75 days. These lambs, before putting in individual boxes, were conserved without water and feed for 12 hours. The experimental diet was regulated based on common diets in order to supply the requirements of NRC standards [13]. Rations were isocaloric (2.6 Mcal/Kg metabolizable energy) and isonitrogenous (14.16% cp). Rations were including: diet 1 (control diet), diet 2 (control diet plus 0.05% magnesium oxide) and diet 3 (control diet plus 0.2% sodium bicarbonate). The animals were fed with diets included 40% forage and 60% of concentrate. The components of experimental diet are shown in Table 1. The adaptation period was conducted for duration of 10 day post-transition of lambs to individual boxes and with initiation period; the nutrition diets of experiments for different groups after preparation were given to lambs as As-Fed in three periods mornings (AM), mid-day and evenings (PM). The leftover feed was weighted in each time as post-collection. After finishing the fattening period, in order to investigate the effect of different nutritious diets on carcass characteristics, all lambs were slaughtered according to lamic slaughtering Farid's method [14]. After skinning the animals, alimentary system was detached. Then, the weight contents of rumen and alimentary system and the empty weight of body were determined. Percentage of meat protein and fat meat measured in laboratory by micro Kejldahl Kjeltec Model 1030 and soxhlet soxtec Model 1043 (Foss, Hilleroed, Denmark). The collected data were analyzed by SAS statistical software SAS version 9.1 [15]. The mean difference was compared with level 0.05% Duncan multi ranges test and also t-test.

RESULTS AND DISCUSSION

Physical Composition of Carcass: The least square means of carcass physical composition are shown in Table 2. Experimental result are statistically significant differences between lean and mean bone while in experimental treatment groups did not show ($P>0.05$). The highest and lowest average lean belong to the group receiving 0.05% magnesium oxide (6.65±0.86 Kg) and controls (5.84±0.30 Kg), respectively. Therefore, the numerical group received magnesium oxide was 810 g leaner than the control group. This piece of formation can be inferred that the group receiving 0.05% magnesium oxide had the highest feed intake during the fattening period. Subsequently, the average daily gain increases then other treatments tested and therefore, the highest average final weight and lean in group with 0.05% magnesium oxide was observed. Test results had statistically significant differences between carcass fat different treatments shows ($P<0.05$). According to data summarized in the above table; it can be concluded that the lowest carcass fat (1.72±0.47 Kg) was related to receiving group with 0.05% magnesium oxide. Presumably because of magnesium oxide with an alkaline condition in rumen environment prevent any changes in the rumen volatile fatty acids proportion; which subsequently has increased propionate prevent and thus prevent any increase in carcass fat. On the other hand, an increase in the lean and fat reduce can thoroughly increase the available protein animal including microbial and feed noted [16-18].

Chemical Composition of Carcass: Percentage of the meat chemical composition gear 10, 11 and 12 are shown in Table 3. Significant differences exist between experimental groups. Perspective crude protein percentage and crude fat meat without bones, the ribs 10, 11 and 12 were observed ($P<0.05$). Highest percentage of crude protein (%17.3±0.64) and lowest percentage of

Table 2: Comparison means of square for carcass physical composition

Treatments	N	Lean	Fat	Bone
Control	6	5.84±0.30[a]	2.43±0.44[a]	2.08±0.09[a]
Magnesium Oxide	6	6.65±0.86[a]	1.72±0.47[b]	2.23±0.14[a]
Sodium Bicarbonate	6	6.39±0.54[a]	2.13±0.46[ab]	2.24±0.13[a]

In each column, the numbers without same letters have significant difference (p>0.05)

Table 3: Comparison means of square for percentage of carcass chemical composition

Treatments	N	Moisture%	Protein%	Fat%
Control	6	51.55±1.03[a]	16.01±0.52[b]	30.51±1.28[a]
Magnesium Oxide	6	52.40±0.49[a]	17.30±0.64[a]	27.93±0.68[c]
Sodium Bicarbonate	6	52.26±0.54[a]	17.0±0.48[a]	29.10±0.58[b]

In each column, the numbers without same letters have significant difference (p>0.05)

fat meat (27.93±0.14%) in group with 0.05% of magnesium oxide was observed. That was due to lower crude fat percentage in group with magnesium oxide. Also energy consumption for ammonia to urea in liver and kidneys and the related maintenance energy increased. The obtained results were in agreement and competitive with the reported data by Denton *et al*. [19] and Mc Donald *et al*. [20]. That was also due to high percentage of crude protein enhanced the efficiency of useful dietary protein. Meat moisture percentage was not affected by treatments (P>0.05). Highest and lowest moisture percentage were related to the group receiving magnesium oxide (%52.40±0.49) and control (%5.55±1.03), respectively. It was concluded that with an increase in the fat percentage of moisture percentage was reduced.

CONCLUSION

The results showed that addition of 0.05% magnesium oxide to dietary specified lamb group has reduced the fat carcass and also increased the lean meat. It is concluded that presence of small amount of magnesium oxide may assist the buffer condition and enhance lamb lean meat production. The presented experimental data were repeatable with different levels of other ruminants.

REFERENCES

1. Mayer, J., 2006. Regulation of energy intake and the body weight: the glucostatic theory and the lipostatic hypothesis. Annals of the New York Academy of Sciences, 63(1): 15-43.
2. Mundan, D., S. Gogebakan, C. Ergun and I.H. Kaban, 2012. Evaluation of Fattening Performance of Holstein Cattle at Different Initial Weights Under Summer Season Conditions in the District of Silifke of Mersin Province. Journal of Animal and Veterinary Advances, 11(2): 186-190.
3. Martin, S.A., 1998. Manipulation of ruminal fermentation with organic acids: a review. Journal of Animal Science, 76(12): 3123-3132.
4. Bodas, R., P. Frutos, F.J. Giraldez, G. Hervas and S. Lopez, 2009. Effect of sodium bicarbonate supplementation on feed intake, digestibility, digesta kinetics, nitrogen balance and ruminal fermentation in young fattening lambs. Spanish Journal of Agricultural Research, 7(2): 330-341.
5. Hui, Y.H., 1993. Dairy science and technology handbook. 3: Applications science, technology and engineering. VCH Publishers Inc.
6. Schmidt, G.H. and L.D. Vleck, 1974. Principles of dairy science. WH Freeman and Company.
7. Beede, D., J. Briceno and C. Staples, 1987. Lactational performance of mid-lactation Holstein cows fed two diet types with varying contents of refined trona or sodium bicarbonate. Journal of Dairy Science, 70(Suppl 1): 199.
8. Sanchez, W.K. and D.K. Beede, 1996. Is there an optimal cation-anion difference for lactation diets? Animal Feed Science and Technology, 59(1): 3-12.
9. Erdman, R.A., 1988. Dietary buffering requirements of the lactating dairy cow: a review. Journal of Dairy Science, 71(12): 3246-3266.
10. Sere, C. and H. Steinfeld, 1996. World livestock production systems. FAO.
11. Speedy, A.W., 2003. Global production and consumption of animal source foods. The Journal of Nutrition, 133(11): 4048S-4053S.
12. Le Ruyet, P. and W. Tucker, 1992. Ruminal buffers: Temporal effects on buffering capacity and pH of ruminal fluid from cows fed a high concentrate diet. Journal of Dairy Science, 75(4): 1069-1077.
13. NRC, N.R.C., 2001. Nutrient requirements of dairy cattle. 7th Rev. Ed, pp: 381.
14. Farid, A., 1991. Slaughter and carcass characteristics of three fattailed sheep breeds and their crosses with Corriedale and Targhee rams. Small Ruminant Research, 5(3): 255-271.
15. Institute, S., 2002. PROC user's manual, version 9.1. SAS Institute Cary, NC.

16. Sanders, K., C. Richardsom and D. Holthaus, 1996. Effect of different zeolite material on in vitro digestibility ammonia release and pH. Journal of Animal Science, 74(1): 273.
17. Morishita, M., M. Miyagi, Y. Yamasaki, K. Tsuruda, K. Kawahara and Y. Iwamoto, 1998. Pilot study on the effect of a mouthrinse containing silver zeolite on plaque formation. Journal of Clinical Dentistry, 9: 94-96.
18. Erwanto, E., W. Zakaria and M. Prayuwidayati, The Use of Ammoniated Zeolite to Improve Rumen Metabolism in Ruminant. Animal Production, 13(3): 138-142.
19. Denton, R.M. and C.I. Pogson, 1976. Metabolic regulation. Chapman and Hall London.
20. McDonald, P.R., A. Edwards, J.F. Greenhalgh and C.A. Morgan, 1995. Animal Nutrition. 5th Edition. Longman.