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Effect of coconut oil on rumen and duodenal ammonia concentrations and some blood biochemistry parameters in yearling rams

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Abstract. *The purpose of the study was to investigate the effect of supplementing coconut oil to the ration of small ruminants upon the digestive processes in the rumen and duodenum and on blood proteins levels in lambs. Nine male Blackhead Pleven yearling rams were used in the experiment. The experimental design included two periods. During the first period, the first group of yearling rams received a ration of 1 kg barley and 1 kg grass hay; the second group – 0.800 kg barley, 0,200 kg sunflower meal and 1 kg grass hay, and the third group 0.800 kg barley, 0.200 kg sunflower expeller and 1 kg grass hay/ During the experimental period, 0.02 kg coconut oil was applied via cannulae at the time of the morning feeding in all three groups. The supplementation of coconut oil to ration I increased rumen ammonia content in animals before feeding ($p<0.05$). Adding coconut oil to rations did not alter the duodenal ammonia concentrations. Blood total protein in animals varied between 79.85 to 93.42 g/l in all groups and study periods.*

Keywords: rumen fermentation, duodenal content, ammonia, lamb digestion

Introduction

The last decade has witnessed a growing interest in nutritional supplements as modifiers of the digestion in forestomachs of ruminants. For this purpose, enzyme preparations, probiotics, prebiotics, vegetable oils and extracts are used (Nedeva et al., 2008; Kung et al., 2002; Pinos et al., 2002; Sivkova, 2007). It was found out that the inclusion of fats increased dietary energy due to their high caloricity. They are converted metabolically in a more efficient manner compared to volatile fatty acids formed in forestomachs (Kronfeld, 1976), thus altering rumen digestion. Reduced dry matter and fibre digestion in rumen, lower ammonia concentration and lower acetate/propionate ratio have been reported (Palmquist 1991; Onetti et al., 2001). Recent findings provide proofs of considerably reduced methanogenesis after supplementation with medium-chain fatty acids, contributing at a significant extent to improvement of productivity and feed utilization in ruminants (Machmüller et al, 2003).

Rations of ruminants usually contain 2-5% total fat, out of which 1-2.5% fatty acids. Old nutrition norms allowed the use of lipid supplements to correct the nutritive value. Some nutritional supplements have a negative impact on digestion in forestomachs. Since 1970, the digestion of lipids in the rumen is extensively studied with regard to its functionality and the subsequent effect on lipid metabolism in ruminants.

The purpose of this study was to investigate the effect of supplementing coconut oil to the ration of small ruminants upon the digestive processes in the rumen and duodenum and on blood proteins levels in yearling rams.

Material and methods

An experiment was carried out with nine male Blackhead Pleven yearling rams with average body weight of 45.2 kg to investigate the effect of dietary coconut oil supplementation. Twenty days prior to the experiment, cannulae were operatively placed on rumen's dorsal sac by the method of Aliev (1960). The experiment started after a 10-day period of adaptation of animals to rations.

The yearling rams were divided in three groups with three animals in each. They were reared indoor, in individual boxes, and had a constant access to drinking water and salt licks. The experimental design included two periods. During the first period, the first group of lambs received a ration of 1 kg barley and 1 kg grass hay; the second group – 0.800 kg barley, 0.200 kg sunflower meal and 1 kg grass hay, and the third group 0.800 kg barley, 0.200 kg sunflower expeller and 1 kg grass hay. Rations were offered twice daily at 8:00 AM and 1:00 PM. The amount and chemical composition of diets fed to the three groups during the first period are presented in Tables 1– 4.

During the second experimental period, the same rations were fed. At the same time, yearling rams received coconut oil at 20 g/day via the rumen cannula. Coconut oil is a source of medium-chain fatty acids. It contains 7.59% capric acid, 50.65% lauric acid, 17.9% myristic acid, 10.47% palmitic acid, 3.59% stearic acid, 8.33% oleic acid and 1.47% linoleic acid. Experimental periods were with 10-day duration and by that time, rumen and blood samples were collected for analysis.

Rumen content was sampled three times daily for 4 days during each period: prior to feeding, 2.5 h after feeding and 5 h after feeding. After a 2-week pause, animals were reoperated as per Aliev (1960) and cannulae were placed on the cranial part of the duodenum (4-6 cm to the pylorus).

Experimental periods lasted for 7 days, during which duodenal content samples were obtained. After the first period, animals were allowed to adapt to the new ration for 10 days.

Duodenal chyme was obtained from the cranial cannula prior to feeding and 2.5 h after feeding for 4 days. Blood was sampled from v. jugularis externa 2.5 h after feeding to determine the concentrations of total protein, albumin and globulins. The blood proteins assays were described elsewhere (Sivkova, 2007). Data were statistically processed by Statistica for Windows software (StatSoft Inc. 1994).

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Table 1. Chemical composition of the feeding forage (%)

Feed	DM	Chemical composition (%)			
		CP	CFb	CF	Ash
Meadow hay	88.20	9.03	28.30	1.90	1.00
Barley	89.90	9.60	5.00	1.70	1.30
Sunflower meal	88.80	32.50	27.50	1.50	5.70
Sunflower expeller	89.70	31.10	16.90	8.80	6.20

DM – dray matter , CP – crude protein, CFb – crude fiber, CF – crude fat

Table 2. Daily ration of the first group of yearling rams

Feed	kg	Consumed DM (kg)	Consumed daily (g)			
			CP	CFb	CF	Ash
Meadow hay	1.000	0.882	90.3	283	19	10
Barley	1.000	0.899	96.0	50	17	13
Total		1.781	186.3	333	36	23

Table 3. Daily ration of the second group of yearling rams

Feed	kg	Consumed DM (kg)	Consumed daily (g)			
			CP	CFb	CF	Ash
Meadow hay	1.000	0.882	90.3	283	19	10
Barley	0.800	0.719	77.0	40	14	10
Sunflower meal	0.200	0.178	65.0	55	3	10
Total		1.779	232	378	36	30

Table 4. Daily ration of the third group of yearling rams

Feed	kg	Consumed DM (kg)	Consumed daily (g)			
			CP	CFb	CF	Ash
Meadow hay	1.000	0.882	90.3	283	19	10
Barley	0.800	0.719	77.0	40	14	10
sunflower expeller	0.200	0.179	62.0	34	18	12
Total		1.780	229	357	51	32

Results and discussion

Rumen ammonia concentrations

Ammonia is the end product of vegetable or animal protein metabolism in rumen and a source substance for synthesis of amino acids by many rumen bacterial species. Its rumen levels vary within a rather large range. Ammonia concentrations depend mostly on the degree of decomposition of proteins, the metabolic activity of rumen microflora, the evacuation rate of nutrients to the abomasum, the activity of absorption though the ruminal wall and the level of microbial protein synthesis (Hristov et al., 2005), which largely depend on the species, breed and age of animals, diet composition, the ratio of concentrate and roughage, time, frequency of feeding etc.

Data about rumen ammonia concentrations in studied yearling rams are presented at Figure 1. The addition of coconut oil to a diet of 1 kg barley and 1 kg grass hay (ration I) increased rumen ammonia concentrations ($p<0.05$) in experimental animals prior to feeding.

For ration II, the replacement of 0.200 kg barley with sunflower meal resulted in increased dietary crude protein by 25%, compared to ration I. Ammonia concentrations ranged between 8.07 and 18.25 mg/100 ml. Under these conditions, the supplementation of coconut oil in concentrate increased rumen ammonia levels 2.5 h after feeding ($p<0.05$) and exhibited a tendency towards reduction in time periods before feeding. In ration III, 0.200 kg barley from the concentrate was replaced by 0.200 kg sunflower expeller. This way, the dietary protein content was almost equal to that of ration II and the fat content was by 40% higher. The addition of coconut oil inn this case did not cause significant changes in rumen ammonia concentrations both prior to and after feeding.

The change in ammonia levels with the different rations was

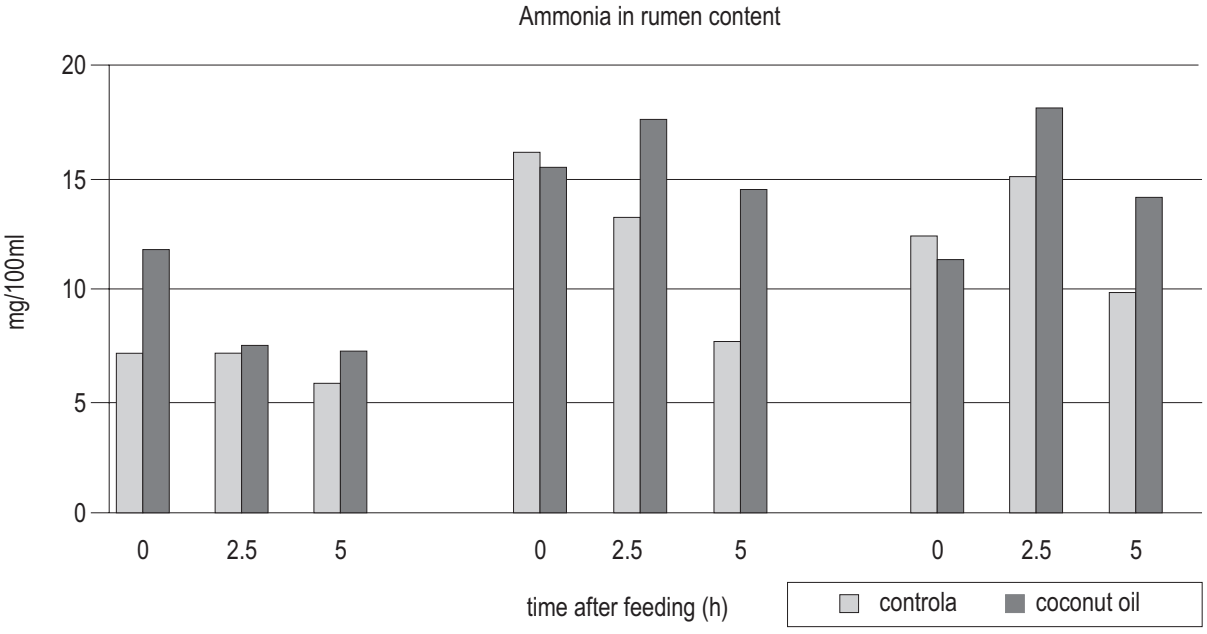

Figure 1. Effect of coconut oil on rumen ammonia concentrations in yearling rams

often attributed to the more intensive utilization of dietary nitrogen and a better synchronization between energy and nitrogen contents (Henning et al., 1993). Another reason for changed rumen ammonia concentration after addition of nutritional supplements could be the decrease in pH values. Bach et al. (2005) observed lower proteolytic activity and reduced ammonia levels along with pH decrease when dairy cattle were fed high concentrate diet.

Duodenal ammonia concentrations

The ammonia formed after degradation of vegetable proteins, is absorbed in blood and is carried to the liver through the portal vein. The degree of absorption depends on the extent of proteolysis in rumen, the pH and the amount of rumen volatile fatty acids. When the content of volatile fatty acids is low and the absorption is enhanced, the risk of systemic intoxication with ammonia increases. Simultaneously with absorption, a part of released ammonia passes into the duodenal chyme.

Figure 2. presents the data about duodenal ammonia concentrations during the experimental periods. Ammonia concentrations

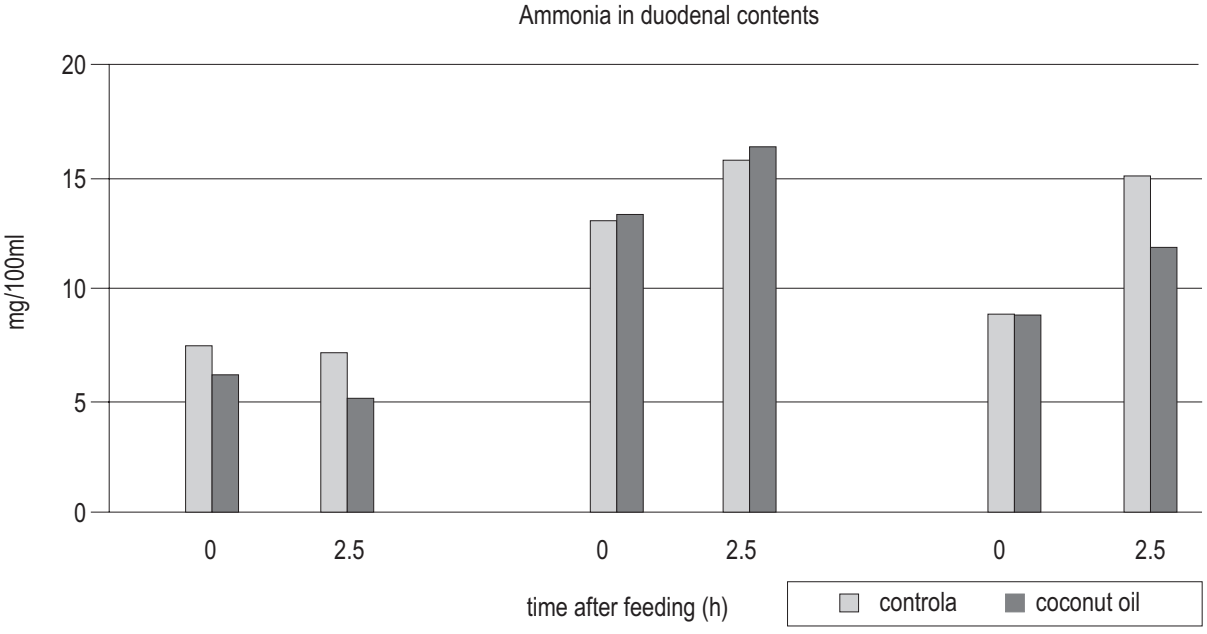

Figure 2. Effect of coconut oil on duodenal ammonia concentrations in yearling rams

changed after supplementation of rations with coconut oil, especially after feeding. In animals that received ration I, the pre-feeding ammonia level was 7.7 mg/100 ml, while 2.5 h after feeding decreased insignificantly to 7.32 mg/100 ml. The addition of coconut oil to ration I reduced ammonia concentrations ($p<0.05$) 2.5 h after feeding to 5.27 mg/100 ml.

When ration II was fed, the highest duodenal ammonia level was attained - 13.09 mg/100 ml prior to feeding and 15.90 mg/100 ml 2.5 h after feeding. The addition of coconut oil to this ration did not alter significantly the studied parameter. The same tendency was present with ration III. In post feeding hours, coconut supplementation resulted in increased ammonia concentrations ($p<0.05$) – from 9.03 mg/100 ml to 11.92 mg/100 ml (2.5 h after feeding).

Nutritional supplements fed to ruminants, apart from the changes in rumen and intestinal digestion, induced also alterations in a number of parameters such as blood glucose, serum proteins (albumin, globulins) etc. (Sivkova et al., 2004). The administration of coconut oil in the rumen of experimental animals has also changed studied blood proteins. Serum total protein in yearling rams varied from 79.85 to 93.42 g/l in all groups and all time intervals (Table 5). The addition of coconut oil increased prefeeding total protein concentrations with rations II and III, and the levels 2.5 h after feeding with rations I and II ($p<0.01 – 0.001$).

The effect of administered coconut oil in the rumen on serum albumin and globulins (Table 5) consisted in reduction of albumin and increased globulins (from statistically insignificant to $p<0.001$), with most significant differences with ration II composed of 0.800 kg barley, 0.200 kg sunflower meal and 1 kg grass hay ($p<0.05$-0.001).

Table 5. Effect of coconut oil on blood proteins in yearling rams

Ration	n	Hour of study	
		Before feeding	2.5h after feeding
		Mean ± SEM	Mean ± SEM
		Total protein (g/l)	
ration I	12	83.80 ± 1.75	80.29 ± 1.07
ration I + coconut oil	12	85.60 ± 1.41	88.27*** ± 1.53
ration II	12	85.39 ± 1.62	79.85^{aa} ± 0.72
ration II + coconut oil	12	92.77** ± 1.76	90.31** ± 2.73
ration III	12	82.36 ± 1.83	82.87 ± 2.20
ration III + coconut oil	12	93.42*** ± 1.31	88.93 ± 3.01
		Albumins (g/l)	
ration I	12	46.25 ± 1.34	47.77 ± 0.95
ration I + coconut oil	12	46.11 ± 2.89	44.50 ± 1.39
ration II	12	45.28 ± 0.84	45.97 ± 0.76
ration II + coconut oil	12	40.49* ± 1.60	38.40*** ± 0.70
ration III	12	47.65 ± 0.98	46.94 ± 0.81
ration III + coconut oil	12	45.51 ± 0.91	44.66 ± 1.18
		Globulins (g/l)	
ration I	12	37.65 ± 1.78	32.62^{***a} ± 1.10
ration I + coconut oil	12	38.46 ± 4.26	43.72 ± 2.59
ration II	12	39.90 ± 1.81	33.88^{aa} ± 0.80
ration II + coconut oil	12	52.26** ± 3.23	52.09*** ± 3.23
ration III	12	34.41 ± 1.98	35.70 ± 2.23
ration III + coconut oil	12	46.74*** ± 1.36	44.07* ± 2.59
		Albumins/Globulins	
ration I	12	1.27 ± 0.08	1.49^{a} ± 0.07
ration I + coconut oil	12	1.33 ± 0.12	1.05^{***a} ± 0.05
ration II	12	1.17 ± 0.07	1.37^{a} ± 0.05
ration II + coconut oil	12	0.80*** ± 0.04	0.76*** ± 0.03
ration III	12	1.47 ± 0.14	1.37 ± 0.08
ration III + coconut oil	12	1.00** ± 0.02	1.03*** ± 0.03

* - comparison of results between control and experimentally group; a - comparison of results before and after feeding; *, a - $p<0,05$; * *, aa - $p<0,01$; * * *, aaa - $p<0,001$

Conclusion

The administration of coconut oil in the rumen of yearling rams fed different rations had a various effect on rumen and duodenal ammonia concentrations. The administration of coconut oil in the forestomachs induced changes in blood proteins, increasing their levels before feeding with rations II and III and 2.5 h after receiving rations I and II ($p<0.01 – 0.001$). Coconut oil decrease blood albumin and globulins in experimental animals fed the three rations (from statistically insignificant to $p<0.001$), with most consistent differences being observed with ration II, composed of 0.800 kg barley, 0.200 kg sunflower meal and 1 kg grass hay ($p<0.05-0.001$).

References

Aliev A, 1960. A modification of the fistula method for study of digestion in the divisions of the ruminant stomach, Fiziologicheskii zhurnal SSSR imeni I.M. Sechenova, 46, 1505-1509 (Ru).

Bach A, Calsamiglia S and Stern MD, 2005. Nitrogen metabolism in the rumen. Journal of Dairy Science, 88,9-21.

Henning P, Steyn D and Meissner H, 1993. Effect of synchronization of energy and nitrogen supply on ruminal characteristics and microbial grough. Journal of Animal Science, 71, 2516-2528.

Hristov A, Ropp J, Grandeen K, Abedi S, Etter RP, Melgar A and Foley AE, 2005. Effect of carbohydrate sourse on ammonia utilization in lacting dairy cows. Journal of Animal Science, 83,408-421.

Kung LJ, Cohen MA, Rode LM and Treacher R, 2002. The effect of fibrolytic enzymes sprayed into forages fed in a total mixed ration to lacting dairy cows. 2002. Journal of Dairy Science, 85, 2396-2402.

Kronfeld D, 1976. Advance in animal physiology and animal nutrition, 1, 7, 5–26.

Machmüller A, Soliva C and Kreuzer M, 2003. Effect of coconut oil and defaunation treatment on methanogenesis in sheep. Reproduction Nutrition Development, 43, 41–55.

Nedeva N, Sivkova K, Radev V, Tcankova M and Slavov T, 2008. Influence of preparation multienzimniya Hostazym C 100 at buffalo kalf fed rations with different proportion of concentrated feed and bulky. I Influence of Hostazym C 100 on the concentration of hydrogen ions, ammonia, total and molar ratio of volatile fatty acids. Animal Science, V, 100-106 .

Onetti S, Shaver G R, McGuire M A and Grummer R, 2001. Effect of type and level of dietary fat on rumen fermentation and performance of dairy cows fed corn silage – based diets. Journal of Dairy Science, 84, 12, 2751 – 2759.

Pinos RJ, Gonzales SS, Mendoza GD, Barcena R, Cobo M, Hernandes A and Ortega M, 2002. Effect of exogenous fibrolytic enzyme on ruminal fermentation and digestibilyti of alfalfa and rya-grass hay fed lambs. Journal of Animal Science, 80, 3016-3020.

Palmquist D, 1991. Influence of source and amount of dietary fat and digestibility in lactating cows. Journal of Dairy Science, 74, 1345–1352.

Sivkova K, 2007. Digestive processes in ruminants, depending on the composition and structure of the ration. Thesis for DSc, Stara Zagora, 280.

Sivkova K, Radev V, Todorova P, Tododrov M and Enev E, 2004. Effect of the multienzyme Protozin-A on the level of some haematological parameters of sheep. Trakia Journal of Science, 2, 2, 31-34.

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Todorov N and Mitev J, 1995. Effect of level of feeding during dry period, and body condition score on reproductive performance in dairy cows, IX th International Conference on Production Diseases in Farm Animals, Sept.11 – 14, Berlin, Germany, p. 302 (Abstr.).

Thesis:

Penkov D, 2008. Estimation of metabolic energy and true digestibility of amino acids of some feeds in experiments with muscus duck (Carina moshata, L). Thesis for DSc. Agrarian University, Plovdiv, 314 pp.

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