EFFECT OF FEEDING COCONUT OIL AT DIFFERENT DIETARY LEVELS ON THE PROTEIN PROFILE OF GOAT MILK

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Introduction

The rumen microbial ecosystem in ruminants mainly consists of bacteria and protozoa. The presence of ciliated protozoa in the rumen ecosystem is associated with an increased recycling of microbial nitrogen in the rumen (Jouany *et al.*, 1996) and reduced amino acid supply to the intestine. Thus, elimination of protozoa from the rumen is desirable, when performance of the animal is limited by the availability of amino acids for protein synthesis. Such effects sometimes lead to protein deficiencies in ruminants. Previous studies have reported that feeding of a diet rich in fat either saturated or unsaturated fatty acids could decrease the protozoal population in the rumen. Thus, the objective of this study was to determine the effect of coconut oil, which is rich in saturated fatty acids on the crude protein content and the protein profile of goat milk.

Materials and Methods

Twenty four Jamnapari lactating goats reared at the goat breeding center, Imbulandanda, were used. They were divided into three groups and were assigned to different dietary treatments. The composition of each diet is shown in Table 1. Since the treatment groups contained 2.5 % and 5 % of coconut oil, sucrose was added to balance the energy levels of each of the diets. Paddy husk was used as a filler to make sure all three diets are identical in all nutrients. A 250 g of the experimental diet was given to each goat daily. Total nitrogen content of milk was determined by the Kjeldahl method using DK 6 heating digester and UDK 132 semiautomatic distillation unit. Protein profile was determined from sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS PAGE), using Mini-PROTEAN II Electrophoresis Cells. Four milk samples from each of the dietary groups were randomly selected for SDS PAGE analysis. Total protein content of skimmed milk was determined by Bradford method.

One-way ANOVA with Neuman Keuls post hoc test was used for the statistical analysis of the concentrations of crude milk proteins in goats fed with the different diets.

Table 1. Composition of the experimental diets

Ingredients (%)	Control	Diet with 2.5 % Coconut oil	Diet with 5 % Coconut oil
Rice polish	40	40	40
Maize	30	30	30
Dhal powder	15	15	15
Urea	2	2	2
Mineral mixture	3	3	3
Coconut oil	0	2.5	5
Sucrose/Sugar	10	5	0
Paddy husk	0	2.5	5

Results

The crude protein concentrations of the three experimental groups are expressed as mean . SEM (standard error of the mean) and shown in Table 2. The results revealed that the crude protein concentrations were not different among the three groups. Fig. 1 shows the protein profiles of the three groups determined by SDS PAGE. The protein profile of milk from the control group (lanes 2-5) was not different from that of the 2.5 % coconut oil group (lanes 6-9). The most prominent protein band of these two groups was identified as casein (around 25-35 kDa). However, it was not prominent in the 5 % coconut oil fed group (lanes 10-13). The milk obtained from the 5 % coconut oil fed group showed a clearly separated serum albumin band at about 66 kDa. The protein bands around 14 kDa and 18 kDa were recognized as -lactalbumin and -lactoglobulin, respectively (Salem *et al.*, 2009).

Discussion

The results showed that there was no significant difference in the crude protein levels among the coconut oil fed groups compared with that of the control, suggesting that the coconut oil does not influence the crude protein level in milk. However, analysis of the protein profile revealed that the milk obtained from the 5 % coconut oil fed group contained comparatively high amounts of serum albumin than that obtained from the other two groups. Evidence suggests that serum albumin which appears in milk is not synthesized in the mammary gland, but transferred from the serum. However, *de novo* synthesis of albumin takes place in the mammary gland of goats (Leitner *et al.*, 2004). The results also showed that high levels of coconut oil in the feed increased the albumin content in milk. This difference may be explained by the fact that dietary fat could influence the microbial flora, which is responsible for the utilization of dietary proteins in ruminants. Dietary fat has been shown to inhibit the growth of protozoa in the rumen and may also influence the protein synthesis in the tissues. It is interesting to note that the study also showed that the dietary fat had an influence on the protein profiles. The mechanism that causes the above changes is not understood. It can be concluded that the feeding of relatively high dose of coconut oil influences the protein profile of milk.

Table 2. Crude protein concentrations in different dietary groups

	Control	Diet with 2.5 % Coconut oil	Diet with 5 % Coconut oil
Crude protein (%)	4.30 ± 0.44	3.99 ± 0.60	4.15 ± 0.50

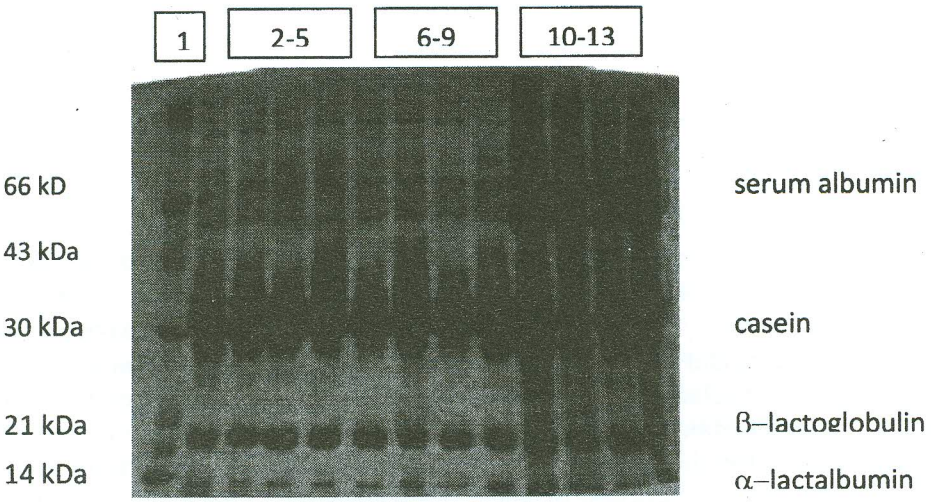

Figure 1. Milk protein profiles after 21 days of feeding
(Lane 1 protein markers, Lanes 2-5 control group, Lanes 6-9 Diet with 2.5 % coconut oil, Lanes 10-13 Diet with 5 % coconut oil)

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