

Methane production of goats during feed restriction and refeeding

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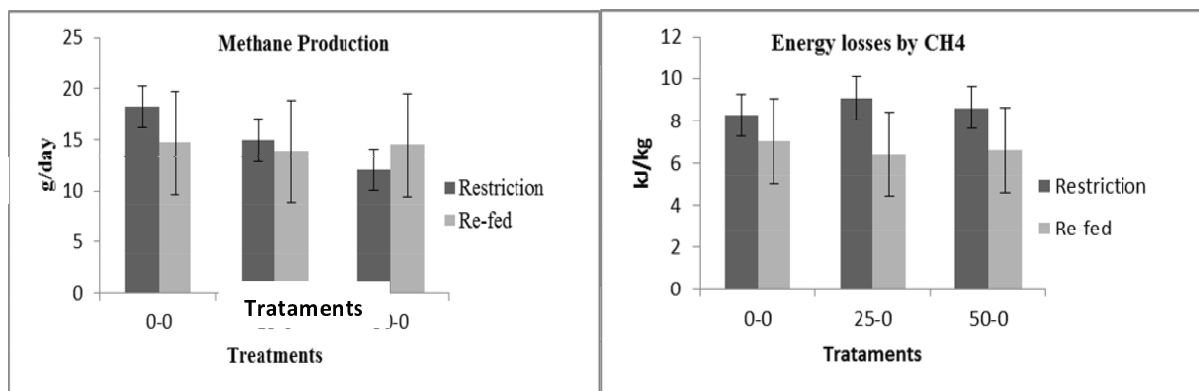
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Introduction Goats have the ability to adapt to periods of poor nutrition in both for medium or long term. Microbial fermentation of feed in the rumen results in enteric CH₄ production that represents energetic losses for the animal (Beauchemin and McGinn, 2006), however the amount of feed consumed is assumed to affect emissions levels of CH₄ (Johnson and Johnson 1995). Based on these assumptions, this study aimed to evaluate the effect of feed restriction and refeeding on methane production and energetic efficiency.

Material and methods A total of 15 Nubian goats, non-pregnant and non-lactating, were randomly distributed into five groups (blocks) of three animals. In the first period, each goat within the group was allocated to one of treatments: ad libitum (T0), and intake reduced by 25% (T25) and by 50% (T50) of ad libitum intake. In the second period all animals were fed ad libitum. Goats were housed in individual metabolic cages and the diet was equal for all treatments, consisted of 47% corn hay and 53% concentrate (15 % crude protein, 16.5 MJ/kg GE on fresh weight), calculated according to NRC (2007) to meet their growth requirements. During a digestion trial, feed intake, feed refusals, faeces and urine were collected during 6-d after 20-d adaptation period. Aggregated samples were dried and gross energy was determined using a Parr calorimeter. The measurements of methane emission were performed using the sulphur hexafluoride (SF₆) tracer technique and analyzes were conducted at Embrapa Environment (CNPMA). The experimental design was a randomized complete block design using mixed models with fixed effect of treatment and random effect of blocks and error, using the MIXED procedure of SAS (version 9.2).

Results Figure 1 reveals that the animals fed ad libitum had greater CH₄ production (g/day), compared to those subjected to 25% and 50% restriction. When re-fed, goats subjected to 50% feed restriction showed a slight increase in CH₄ production, whereas no differences in CH₄ production were observed for goats subjected to 25% feed restriction. Dry matter intake (DMI) between first and second period of goats fed ad libitum (737.6 ± 98.08 and 691.75 ± 98.08, respectively) and of goat subjected to 25% feed restriction (550.7 ± 98.08 and 748.09 ± 98.08, respectively) did not differ (P < 0.05). DMI of goats subjected to 50% feed restriction in the first period (384.9 ± 98.08) was less than that on re-feeding (742.5 ± 98.08).

Figures 1 and 2- CH₄ production (g / day) and methane energy losses were expressed as a proportion of gross energy intake in animals submitted to feed restriction, followed by a re-feeding.



Conclusions Goats subjected to a severe restriction and then re-fed showed only a slight increase in amount of CH₄ (g/day), but animals fed moderate restrictions, when re-fed, do not exhibit a significant increase in the CH₄ production. The results support the view that under-fed and re-fed goats are more energy efficient and overall may have reduced methane yields as a result.

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References

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