

Sulfur-Containing Diet Shift Hydrogen Metabolism and Reduce Methane Emission and Modulated Gut Microbiome in Goats

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Abstract : The study investigated that using corn gluten (CG) instead of cornmeal (CM) increased dietary sulfur shifted H₂ metabolism from methanogenesis to alternative sink and modulated microbiome in the rumen as well as hindgut segments of goats. Ruminant fermentation, CH₄ emissions and microbial abundance in goats (n = 24). The experiment was performed using a randomized block design with two dietary treatments (CM and CG with 400 g/kg DM each). Goats in CG increased sulfur, NDF and CP intake and decreased starch intake as compared with those in CM. Goats that received CG diet had decreased dissolved hydrogen (dH₂) (P = 0.01) and dissolved methane yield and emission (dCH₄) (P = 0.001), while increased dH₂S both in the rumen and hindgut segments than those fed CM. Goats fed CG had higher (p < 0.01) gene copies of microbiota and cellulolytic bacteria, whereas starch utilizing bacterial species were less in the rumen and hindgut than those fed CM. Higher (P < 0.05) methanogenic diversity and abundances of Methanimicrococcus and Methanomicrobium were observed in goats that consumed CG, whilst containing lower Methanobrevibacter populations than those receiving CM. The study suggested that goats fed corn gluten improved the gene copies of microbiota and fibrolytic bacterial species while reducing starch utilizing species in the rumen and hindgut segments as compared with that fed cornmeal. Goats consuming corn gluten had a more enriched methanogenic diversity and reduced Methanobrevibacter, a contributor to CH₄ emissions, as compared with goats fed CM. Corn gluten could be used as an alternative feed to decrease the enteric CH₄ emission in ruminant production.

Keywords : dissolved gasses, methanogenesis, microbial community, metagenomics

Conference Title : ICNRAS 2022 : International Conference on Nutrition of Ruminants in Animal Science

Conference Location : Sydney, Australia

Conference Dates : May 16-17, 2022