Mitigation of Ruminal Methane Production in Non-Lactating Purebred Holstein Friesian Heifers: Dietary Inclusion of *Gliricidia sepium* and Brewer's Yeast (*Saccharomyces cerevisiae*)

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Methane is a major greenhouse gas (GHG) produced by ruminants, which affects the world climate change with a global warming potential (GWP) of 25 CO_2 equivalents. This study assessed the ability of *Gliricidia sepium* (GS) and Brewer's yeast (*Saccharomyces cerevisiae*) (SC) in mitigating the enteric methane production in Holstein Friesian heifers. The experiment was conducted as a 4×4 Latin square crossover design, using four non-lactating purebred Holstein Friesian heifers of the same age with an initial body weight of 370.5±13.2 kg. Four dietary treatments: (A); basal total mixed ration (TMR), (B); TMR+10 g of SC, (C); TMR replaced by 30% of GS and (D); TMR replaced by 30% of GS+10 g of SC were fed to the four heifers in a rotational manner during four test periods. Methane measurements were taken on the first and the seventh day of test periods, using the Syngas Analyser Gasboard-3100P. Significantly lower (P=0.007) methane emissions were showed by heifers fed with diets B, C and D. Moreover, total methane emission was reduced by 81.07%, 65.05% and 54.88% in treatments B, C and D, respectively compared to the treatment A. No significant difference (P=0.16) in dry matter intake (DMI) by heifers was observed among the treatments. Treatments B, C and D showed significantly higher apparent dry matter digestibility (ADMD) (P=0.009), apparent crude protein digestibility (ACPD) (P=0.005), apparent neutral detergent fibre digestibility (ANDFD) (P=0.009) and apparent soluble carbohydrate digestibility (ASCD) (P=0.025). A significantly higher (P=0.018) apparent acid detergent fibre digestibility (AADFD) was observed in heifers with diets B and D. Strong negative correlation coefficients were detected between methane emission percentages of dietary treatments with ADMD (r=-0.98), ACPD (r=-0.96), ANDFD (r=-0.98), ASCD (r=-0.98) and AADFD (r=-0.92). This study manifests the potential of dietary inclusion of GS and SC to mitigate the enteric methane production in non-lactating purebred Holstein Friesian heifers.

Keywords: Brewer's yeast (*Saccharomyces cerevisiae*), *Gliricidia sepium*, Global warming, Holstein Friesian heifers, Methane mitigation

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