Forage-Finished Beef Steers and Enteric Methane in Uruguay: Reducing Emissions by Managing Forage Fiber Content

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In Uruguay, methane (CH_4) emitted from livestock sector contributes with 46.1 % of the total national emissions, where more than 70% of the beef finishing cattle are fed with forage varying the quantity or quality offered. As CH_4 emissions are affected by quantity and quality of food intake, there is a need to quantify these changes. This work aimed to quantify the effect of different NDF content of forage diets on CH_4 emissions from beef steers during the finishing stage. A total of 36 Angus steers ($\bar{x}$ = 437 kg live weight, LW), were blocked by LW and randomly assigned to one of two treatments. In addition, each block was grouped in three lots (n = 12) and accommodated in three different pens, where both treatments were applied using automatic individual feeding systems for 97 days. The treatments were: low-quality diet with high NDF (54.9%, H_NDF) and high-quality diet with lower NDF (47.8%, L_NDF). Dry matter intake (DMI), LW, and average daily gain (ADG) were determined. At the end of the feeding period, CH_4 emissions were measured using the SF_6 tracer gas technique during five consecutive days. Statistical analysis was performed on 30 animals due to a sampling effectiveness of 86%. The results show that DMI and ADG were significantly higher ($P < 0.05$) in L_NDF animals (9.9 vs 8.2 kg DMI/day and 0.68 vs 0.32 kg/day ADG, respectively). The total daily CH_4 emission per animal was higher ($P = 0.0476$)) in L_NDF than H_NDF (215 vs 194 g CH_4, respectively); however, the emission intensity expressed per unit of DMI was 8% lower ($P = 0.0363$; 21.7 vs 23.7 g CH_4/kg DMI) and almost 1.9 times lower per unit of LW gain ($P < 0.0001$; 327 vs 633 g CH_4/kg LW) when compared to H_NDF. These results confirm that high quality forage diets with low fiber content used at finishing stages are an alternative to reduce enteric emissions intensity while improving productivity variables.