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AN EVALUATION OF THE SULFUR HEXAFLUORIDE (SF6) TRACER, FACE MASK AND RESPIRATION CHAMBER TECHNIQUES FOR MEASURING METHANE EMISSIONS FROM CATTLE

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To measure and to develop strategies to mitigate livestock methane emissions it is important to have alternative techniques suitable for different conditions. The objective of this study was to compare the two most widely used techniques, respiration chamber and the SF6 tracer technique, with the face mask technique. Seventeen crossbred young bulls (Holstein x Gyr) fed at three levels of intake were used in a 3 x 3 factorial design study. Three levels of intake consisted of a DM (dry matter) supply restricted to 1.3 and 1.8% of BW (body weight) and ad libitum. After an adaptation period, CH4 emissions were measured first using the SF6 technique for 5 consecutive days, second using the face mask technique, over a 3 days period (20 min/day; 6 hours after feeding) with the face mask attached to the animal's face and third using the chambers technique, where the animals were evaluated for a two 20-22 hours periods. Data were analysed using the MIXED procedure of SAS. There was no interaction between level of intake and techniques. Methane production (g/day) averaged 87.9, 103.2 and 107.9 (± 6.0) for SF6, face mask and chamber technique respectively. Emissions estimated by the SF6 technique were significantly lower than the chamber measurements. However, when the methane emission was corrected for differences in DMI, BW and performance, no differences were found among techniques. A strong and positive correlation was found between the SF6 and respiration measurements for total CH4 emissions (g/d, $r = 0.94$) and between the face mask and chamber technique ($r = 0.85$). Face mask technique averaged higher day-to-day (14.1%) and animal-to-animal (26.7%) variations than SF6 tracer and chamber technique. There was a general agreement between all techniques evaluated, and then we conclude that SF6 and face mask techniques are reasonably good for estimating CH4 emissions.

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EVALUATION OF METHANE EMISSIONS BY SF6 TECHNIQUE IN UROCHLOA BRIZANTHA CV. MARANDU IN DAIRY BRAZILIAN COWS

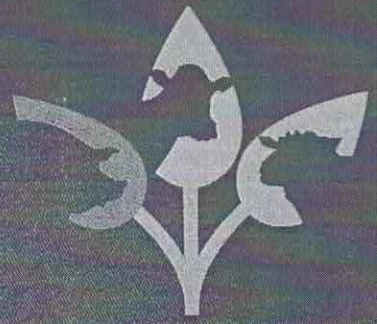
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In tropical grazing conditions, productivity is maximized when the canopy reaches 95% interception of the incident radiation. The aim of this study was to evaluate the methane enteric emission on *Urochloa brizantha* cv. Marandu pasture managed under rotational stocking with a fixed rest period of 30 days or variable stocking to maintain the light interception (LI) of 95% by the canopy. Sixteen multiparous Holstein x Gyr cows of 547.9 ± 60.8 kg body weight and 70.25 ± 18 days in milk were fed according to the milk production with concentrate containing 20% crude protein and 70% TDN. The sulphur hexafluoride (SF6) tracer methodology was used to obtain methane emissions. Sampling of gases was held twice during the experiment, for five consecutive days every 24 hours. The concentration of SF6 and CH4 gases was determined on a gas chromatograph. The experimental design was a randomized block with two grazing replicates and means were analyzed by Tukey's test at 5% probability. The daily CH4 (g/day) production was not significantly ($p > 0.05$) different between treatments averaging 274.57 for the animals subjected to variable grazing interval vs. 281.14 compared to those cows submitted to a strategy of fixed grazing interval. Therefore, the annual CH4 emissions per cow range from 100.22 kg vs 102.62 kg respectively for the two treatments. Furthermore the methane emission (gCH4/kg of BW, gCH4/kg of DMI and gCH4/kg of milk production) was not affected by the treatments ($p > 0.05$) with average 0.513, 0.167 and 14.85 respectively for 95% of LI and 0.501, 0.174 and 15.86 respectively fixed rest period. In this study no effect of grazing management strategy on methane emission was observed.

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