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Repeatability of enteric methane measurements using GreenFeed systems on upland pastures

M. Bouchon[1], M. Coppa[3], Y. Rochette[2], C. Pichon[1], R. Chadaigne[1], B. Martin[2], C. Martin[2]
[1] INRAE, Herbipôle, Theix, 63122 Saint-Genes-Champanelle, France, [2] UCA, INRAE, VetAgro Sup, UMR Herbivores, Theix, 63122 Saint-Genes-Champanelle, France, [3] University of Turin, Dept. Agricultural, Forest and Food Sciences, Via Verdi 8, 10100 Turin, Italy

Plant diversity of mountain pasture has been shown to reduce enteric methane (CH4) production in vitro. In 2023, we set up an in vivo experiment to measure enteric CH4 emission using GreenFeed (GF) systems and dairy performances of 28 grazing dairy cows on mountain pasture. After 3 weeks of being fed fresh grass indoor, they were taken out to extensively managed pasture for 9 weeks. Cows were allowed to graze large areas (from 1 to 3.5 ha), and 2 GF equipped with solar panels were accessible near the water trough. As lower frequency of animal visits to the GF at pasture than indoor was expected, our aim was to determine the minimum number of consecutive CH4 spot measurements (CSM) to achieve a good repeatability of CH4 data. As expected, the average number of visits per animal and per day (d) was 2.6 ± 0.42 vs 0.7 ± 0.24 during indoor vs grazing periods. Five to 20 CSM were randomly chosen within the set of available data per animal per period (indoor vs outdoor) and the draws were repeated 10 times. The analysis was repeated 5 times to evaluate the consistency of the results across draws. Results showed that a minimum of 15 CSM acquired in 12 and 29 d was necessary to achieve a similar repeatability of 0.53 and 0.50 indoor vs at pasture, respectively, with a low variability across repetitions and no effect of the interval between first and last CSM. If performances of GF measurement indoor or in small plots of intensive pasture are documented, it is the first time at our knowledge that their performances were studied under extensive grazing conditions on natural grasslands in Europe.

Quebracho condensed tannins fed to dairy goats: effect on milk fatty acids and their use for CH4 prediction

M. Battelli[1], F. Scicutella[2], G. M. Crovetto[1], A. Buccioni[2], L. Rapetti[1]
[1] University of Milan, Department of Agricultural and Environmental Sciences, via Celoria 2, 20133 Milan, Italy. [2] University of Florence, Dipartimento di Biotecnologie Agrarie sez. Scienze Animali, via delle Cascine 23, 50144 Florence, Italy

The aims of this study were: I) to test the effect of different levels of dietary inclusion (0, 2, 4, 6%) of condensed tannins (CT) extract from quebracho (QE, 71% CT) on goat milk fatty acids (FA), II) develop prediction equations for CH4 emission of goats using milk FA. A repeated 4×4 Latin square design was applied using 8 goats housed in respiration chambers where CH4 emission was measured. The diets were composed by a dry basal ration plus a cereal meal supplement containing the different levels of QE. Milk was analysed for FA by gas chromatography. The effect of QE on FA composition was statistically tested with a mixed procedure, considering as fixed effects the experimental square, period, and treatment, with the animal selected as random effect. Multivariate analysis was performed using the stepwise procedure. Only variables with $P<0.1$ entered the model, and variables with $P<0.05$ were retained in the final model. The inclusion of QE increased polyunsaturated FA and the ratio cis-9 14:1/(14:0 + cis-9 14:1), considered the best proxy of the desaturation activity of mammary Stearoyl Co-A desaturase enzyme. Multivariate analysis resulted in equations: CH4 (g/kg DMI) = 37.7 (±2.97) -2.87 (±1.15) × C6:0 – 129 (±19.3) × trans-6,8 18:1 + 40.6 (±10.1) × trans-12 18:1 + 11.9 (±4.26) × cis-11 18:1 – 7.76 (±1.96) × cis-9, cis-12, cis-15 18:3 – 85.4 (±27.0) × cis-5, cis-8, cis-11, cis-14, cis-17 20:5 (adjR2 = 0.88), and CH4 (g/kg FPCM) = 19.3 (±2.38) – 5.21 (±1.21) × trans-11 18:1 + 19.3 (±6.47) × cis-9 10:1 – 9.54 (±3.76) × cis-11 18:1 (adjR2 = 0.83). Milk FA showed a good potential to predict CH4 emissions in goats.