0549 Comparison of active flux and passive concentration measurements of methane emissions from cattle. P. Huhtanen*[1], E. H. Cabezas Garcia[1], S. R. Zimmerman[2], and P. R. Zimmerman[2], *[1]Swedish University of Agricultural Sciences, Umea, Sweden, [2]C-Lock Inc., Rapid City, SD.*

There are 2 new measurement techniques to measure emitted CH_4 and CO_2 from cattle in production systems, the passive concentration measurement method (PCM) and the active gas capture method (AGC). Both systems estimate cattle muzzle CH_4 and CO_2 emissions for short-term periods (3 to 15 min) while cattle visit a feeding station multiple times daily. The objective was to determine if the 2 techniques yielded comparable results under farm conditions. A GreenFeed (GF) system was used (C-Lock Inc., Rapid City, SD) that measures individual animal emissions over a feed trough. For AGC, an active airflow (2000 L/min) was induced around the animal's muzzle that attracted emissions into a air collection pipe where airflow and CH_4 and CO_2 concentrations were measured and the average flux was calculated for each visit. For PCM, a concentration sampling intake (at 1 l/min) was placed inside the feed trough, no active airflow was used, and the average CH_4 and CO_2concentrations for each visit were calculated. 32 Swedish Red dairy cows (BW 664 ± 72 kg, MY 30.2 ± 6.3 kg/d, and DMI 20.1 ± 2.8 kg/d) housed in a free-stall barn had an access to 2 separate GF units. The diets were fed ad libitum as TMR (60% forages, 40% concentrates on DM basis). The GF were configured for 10-d sampling periods using PCM and AGC repeated twice. The data was analyzed with linear mixed models using the MIXED procedure in SAS (SAS Inst. Inc., Cary, NC). Repeatability (R) was calculated as $R = \delta^2_{Animal}/(\delta^2_{Ánimal} + \delta^2_{Residual})$. The cows visited GF on average 2.85 ± 0.95 times per day. For CH_4, the between animal coefficient of variation (CV) was greater (11.0 vs. 17.6%) with PMC compared with AGC. Comparing CH_4 results for individual animals to determine if ranking was consistent between AGC and PCM, a weak correlation was found between CH_4 concentration with PCM and CH_4 flux with AGC:CH_4 Flux (g/d) = 363 ± 30.5 + 0.058 ± 0.0214 × CH_4 (ppm; R^2 = 0.13; RMSE = 52.1). For CH_4/CO_2 ratio, CV values were similar (6.4 and 6.6%) but averaged CH_4/CO_2 ratio was greater (P = 0.001) with PMC (0.107) compared with AGC (0.094). The repeatability for AGC and PCM were high (0.72 to 0.74). It is concluded that PCM methods are not sufficient for ranking animal's emissions on farms. Measuring concentration passively is not the same as measuring fluxes.

Key Words: methane, cattle, emissions

0550 Methane emission intensities by Holstein and Holstein × Jersey crossbreed lactating cows in two Brazilian grazing systems. A. Berndt, A. P. Lemes, L. A. Romero, T. C. Alves, A. M. Pedroso*, A. D. F. Pedroso, and P. P. A. Oliveira, *EMBRAPA, São Carlos, Brazil.*

The aim of this study was the evaluation of methane emissions from pure Holstein and half Jersey, half Holstein high-producing lactating cows grazing 2 different forages. The study was conducted at EMBRAPA's (Brazilian Agricultural Research Corporation) experimental station located in São Carlos city, in the Southeast region of Brazil. Treatments were a combination of 2 factors: 2 breeds (Holstein, HOL; and 1/2half Jersey half Holstein, JH) and 2 grazing systems (extensively grazed pastures with low stocking rate, ELS, or irrigated pastures under intensive management and high stocking rate, IHS). A total of 24 dairy cows were used (2 breeds × 2 grazing systems × 3 animals per paddock × 2 replicates), grouped according to age, stage of lactation, and level of milk production. Cows were kept on pasture and supplemented with minerals and concentrates in accordance with milk yield (1 kg of concentrate/3 kg of milk produced). The IHS pasture was rotationally managed and both IHS and ELS were managed under variable stocking rates ("put-and-take"). Forage production and animal performance variables were measured to determine environmental, technical, and economic assessments. Methane emission evaluation took place in May 2013 using the SF6 tracer technique. Each animal received 2 permeation tubes (average load of 1431.0 ± 76.2 mg of SF6 with an average emission rate of 1.74 ± 0.18 mg/d) 5 d before collection. Samples were collected every 24 h for 5 consecutive days. Gases were measured on a Shimadzu GC 2014. Data were analyzed using the MIXED procedure of SAS (SAS Inst. Inc., Cary, NC) and averages were compared using Tukey's test with significant differences at $P < 0.05$. No interactions were observed between breed and grazing system. Crossbred JH presented lower ($P < 0.05$) methane emission intensity than pure Holstein (11.26 ± 1.11 vs. 14.62 ± 1.11 gCH_4/L milk) regardless of grazing system. Crossbreed JH cows emitted less ($P < 0.05$) methane per day than pure HOL (275.1 ± 20.8 vs. 337.2 ± 20.8 gCH_4/d) and produced the same amount of milk (25.11 ± 1.11 vs. 23.76 ± 1.11 L/d). Efficiency of milk production can be a mitigation strategy when less methane is emitted per liter of milk.

Key Words: dairy cows, emission intensity, methane emission