Characterization of the Number of Visits Required for Quantification of Gas Fluxes and Metabolic Heat Production using a GreenFeed

Elizabeth A. Dressler, Jennifer M. Bormann, Robert L. Weaber, and Megan M. Rolf
Dept. of Animal Sciences and Industry, Kansas State University, Manhattan, KS

Background

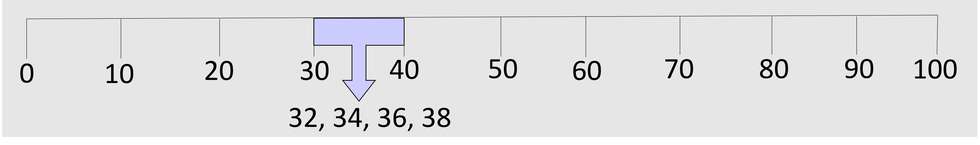
- 27% of U.S. CH_4 emissions were produced from enteric fermentation of livestock species, making it the 2nd largest source of CH_4 (US EPA, 2022).
- Enteric fermentation is a part of the natural digestive process of ruminants that produces CH_4.
- One way to quantify gas fluxes from cattle is with a GreenFeed (C-Lock, Inc.)
- Collection protocol for the GreenFeed is very important for the accuracy of emission estimates.
- One aspect of the collection protocol is the total number of visits from an animal during the trial period.

Objective

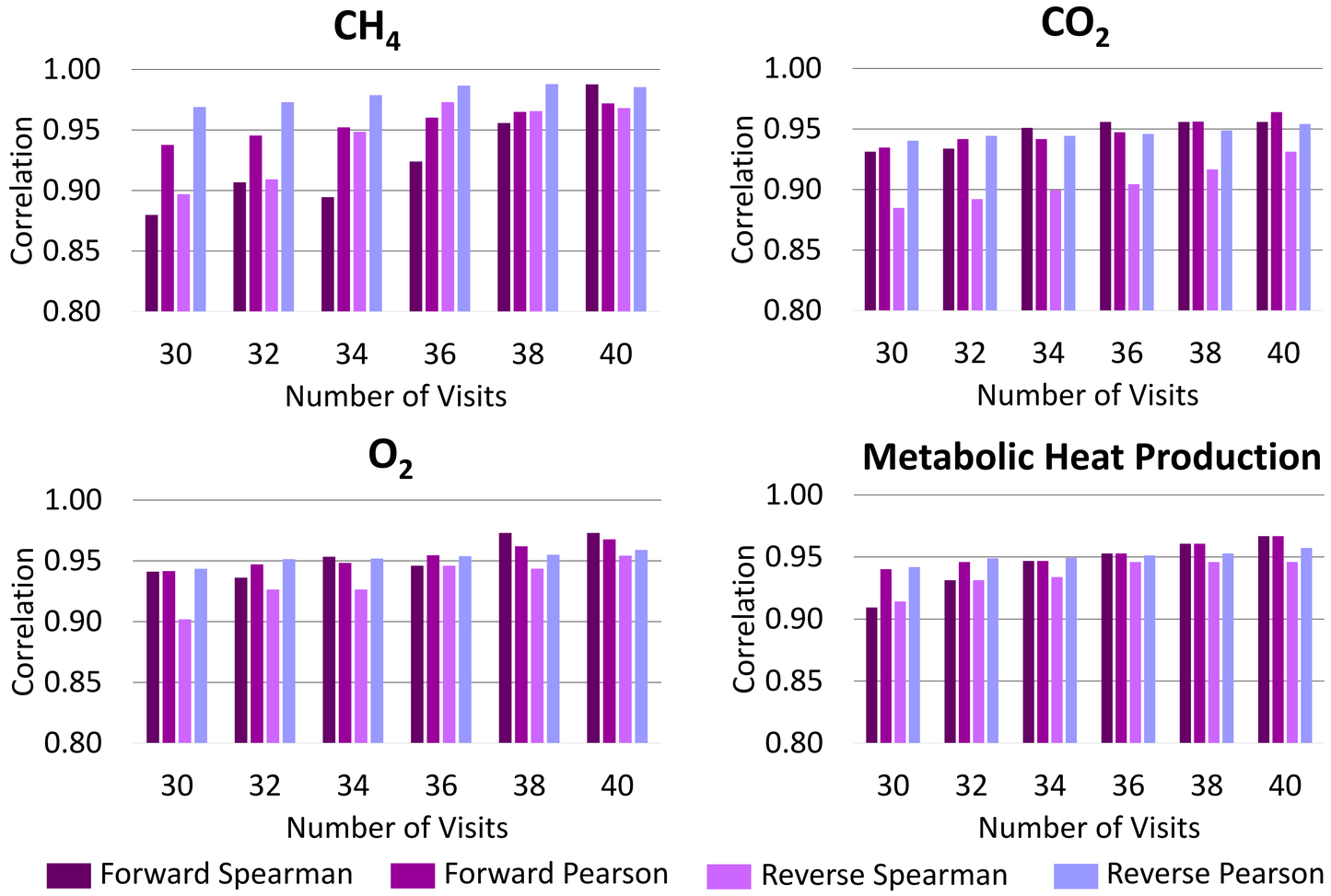
To determine the minimum number of visits required from a GreenFeed to accurately estimate CH_4, CO_2, and O_2 gas fluxes and metabolic heat production from an individual grazing beef cow.

Methods

- 100 visits from 17 grazing Angus cows were collected with the GreenFeed.
- Mean gas fluxes and metabolic heat production were computed for intervals that increased by 10 visits starting from the first 10 visits (forward) and the last 10 visits (reverse).
- The 30 to 40 visit interval was split further into intervals that increased by 2 visits.
- Pearson and Spearman correlations were calculated between the full 100 visits and each shortened interval.
- The recommendation for minimum number of visits was reached when correlations were greater than 0.95.



Results



- The minimum number of visits needed for accurate quantification of CH_4, CO_2, and O_2 gas fluxes and metabolic heat production are 36-38, 40, 38-40, and 36, respectively.
- Animals met the required number of visits for quantification of CH_4, CO_2, and O_2 gas fluxes and metabolic heat production in 29.5±8.7, 31.8±9.2, 30.5±9.1, and 29.5±8.7 days, respectively.

Conclusion

- A minimum of 40 visits is recommended to simultaneously quantify all gasses with the GreenFeed.
- GreenFeed collection protocols should include the minimum number of visits rather than a test duration (days).
- An established protocol will allow data collection for a genetic evaluation of gas fluxes.