



Repeatability of enteric methane measurements using GreenFeed® systems on upland pastures

Take home message

Compared to barn, despite lower frequentation at the GreenFeed® (GF) on pasture, we achieved similar repeatability of methane (CH₄) measurement, but it needs twice more time for data collection

Context

- CH₄ emissions in large areas of grassland extensively managed are difficult to estimate
- GF could be a good tool as they are already widely used in more constrained environments (barn, intensive rotational grazing...)
- Need to validate if GF can be used on extensively managed mountain pastures

Objective

Determining the minimum number of consecutive CH₄ spot measurements (CSM) and the minimum time required to acquire them in order to achieve similar repeatability between barn and pasture



Material and methods

- 2 groups of 14 grazing dairy cows allowed to graze either a 1ha or a 3.5ha permanent grassland paddock of (1100 m a.s.l.) during 9 weeks after a 3 week-period in barn
- 2 GF in the barn and then 1 GF per paddock on pasture, delivering beet pulp and equipped with solar panels, batteries and 4G network access, placed near water troughs (up to 400 m from grazing spots)
- Study of repeatability (REP; Coppa et al. 2021) performed within each period:

$$\left(\left[\begin{matrix} 5 \text{ CSM} & \text{to} & 20 \text{ CSM} \\ \text{Randomly chosen per animal} \end{matrix} \right] \times 10 \text{ draws} \longrightarrow \text{Repeatability analysis} \right) \times 5 \text{ repetitions}$$

Results

	GF frequentation	Best model (stepwise selection)	R ²	Nb of CSM	Duration
				to achieve min REP of 0.5	
Barn	2.6 ± 0.42 visits/day	breed, parity, week, hour of visit, DIM, MY, BW & calving date + random(ID)	0.39	15	12 days
Pasture	0.7 ± 0.24 visits/day	breed, parity, week and calving date + random(ID)	0.51	15	29 days

- Low variability across the 5 repetitions of the analysis
- At pasture, no improvement of repeatability by increasing number of CSM or duration (consistent with Dressler et al. 2023)



Conclusion

Similar repeatability at pasture compared to barn makes it possible to study the effects of the pasture botanical composition, provided that data can be acquired over a sufficiently long period