

Methane emissions from grazing dairy cows: comparison of data using the sulphur hexafluoride tracer technique and the GreenFeed system

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Introduction

- Enteric methane (CH₄) emissions:
 - energy loss to the cow
 - 2-12 % of gross energy intake
- Need to evaluate measurement methods on pasture
 - mitigation strategies
- 2 methods were assessed:
 - 1) Sulfur hexafluoride (SF₆) tracer technique:
 - established method
 - labour intensive
 - 2) GreenFeed system (GF):
 - possible alternative
 - measures respiration gas automatically
 - still some uncertainties

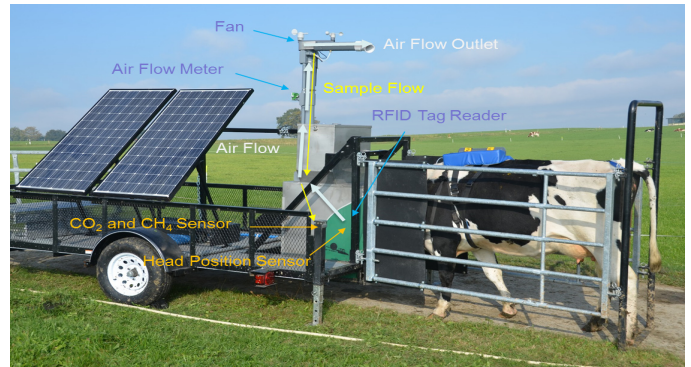


Image 2: GreenFeed system on pasture

Objective

- Determine extent to which data obtained from GF reflect those from SF₆ technique
- Calculate relationships and differences from the two methods

Results

Item	Technique		SEM	p-value	Correlation coefficient	p-value
	GF (g/d)	SF ₆ (g/d)				
Period 1 (5 d)	331	245	13	<0.001	0.57	0.042
CV (%)	17.2	9.5				
Period 2 (7 d)	318	245	10.2	<0.001	0.59	0.036
CV (%)	16.6	9.5				
Period 3 (11 d)	311	245	10.3	<0.001	0.62	0.025
CV (%)	17.3	9.5				

Significant correlations and differences between the methods (P<0.05), CV = coefficient of variation

Materials and Methods

- 13 Holstein cows grazed as single herd
- GF measurements over 11 d
- SF₆ technique measurements:
 - within the 11 d of GF measurements
 - over 5 d simultaneously
 - averaged per cow over 5 d
- Daily CH₄ emissions from GF averaged per cow over 5 d (Period 1), 7 d (Period 2) and 11 d (Period 3)
- GF data compared with data from the SF₆ technique

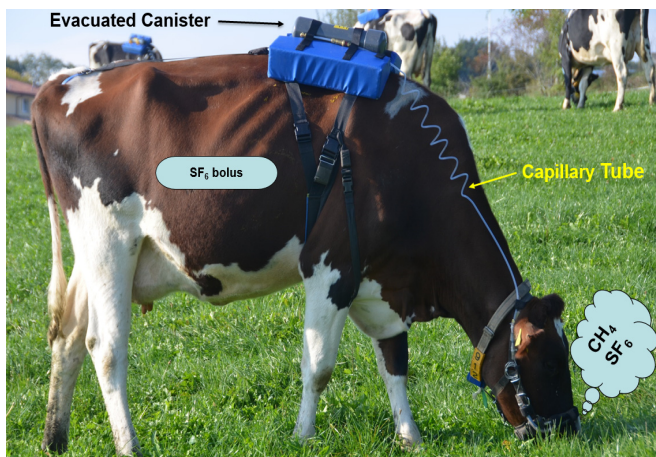
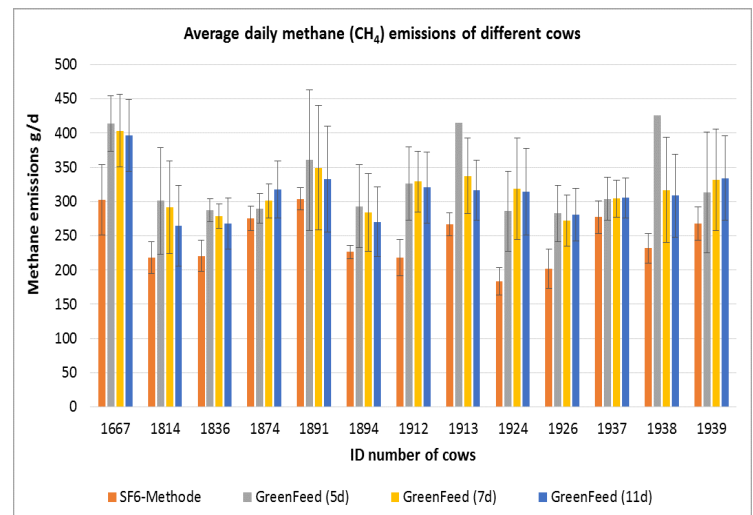


Image 1: SF₆ technique device mounted on the cow



Conclusions

- Overall, CH₄ emissions estimated by GF were higher than those obtained using the SF₆ technique.
- Number and temporal distribution of GF spot measurements relative to patterns of CH₄ may partly explain this.
- Correlations got slightly stronger when GF measurement period was extended from 5 d to 11d.
- Further studies have to show whether there is a systematic overestimation of CH₄ emission with GF on pasture.