

# Reducing Carbon Dioxide Equivalent Emissions by Finishing Beef Cows on Perennial Legume Pastures



Lance R. Pitcher<sup>1</sup>, Jennifer W. MacAdam<sup>1</sup> and Thomas C. Griggs<sup>2</sup>

<sup>1</sup>Department of Plants, Soils and Climate, Utah State University, Logan, Utah, USA and

<sup>2</sup>Division of Plant and Soil Sciences, West Virginia University, Morgantown, West Virginia, USA

## Introduction:

- Enteric methane (CH<sub>4</sub>) produced by ruminant livestock represents one quarter of US methane emissions due to anthropogenic activities [1]
- 90% of CH<sub>4</sub> emissions from ruminants is discharged through the nose and mouth [2]
- The sulfur hexafluoride (SF<sub>6</sub>) tracer gas technique is the most widely used to determine CH<sub>4</sub> emission rates of individual ruminants in grazing systems [3]
- Dairy cows grazing birdsfoot trefoil (BFT; *Lotus corniculatus* L.), a condensed tannin-containing legume, produced less CH<sub>4</sub> than cows grazing perennial ryegrass (*Lolium perenne* L.) [4]



Fig. 1. Enteric methane measurement of cow grazing BFT pasture.

## Objective

To determine the relative enteric CH<sub>4</sub> production of cows grazing BFT, cicer milkvetch (CMV; *Astragalus cicer* L.) and meadow brome (MB; *Bromus riparius* Rehm) pastures.

## Materials and Methods

A permeation tube with a known release rate of SF<sub>6</sub> was placed in the rumen of each cow. An evacuated collection canister continuously sampled exhaled gases for four successive 24-h periods via tubing attached to a halter. Sampled gases were analyzed by gas chromatography to quantify CH<sub>4</sub> and SF<sub>6</sub> and determine daily enteric methane emissions. Control canisters collected background air samples in each pasture treatment on each sampling date.



Fig. 2. Control canister used to collect background pasture samples.

## Results

Enteric CH<sub>4</sub> emissions on a dry matter intake basis was less when cattle grazed BFT and CMV pastures compared with cows grazing MB.

Treatment	Intake kg/d	Methane emission g/kg DM Intake
Cicer milkvetch	15.96	14.44
Birdsfoot trefoil	14.60	22.17
Meadow brome	9.30	44.42

## Discussion

Discussions of the greenhouse gas emissions associated with beef production, even in the scientific literature, usually consider the high methane emissions of cows on low quality grasses and the poor conversion of concentrate grains such as corn by ruminants, but neither of these diets are optimal for ruminants. This study demonstrates the reduction in enteric methane emissions achievable when cows graze high-quality legume pastures.



Fig. 3. Cow grazing meadow brome pasture.

## References

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