Economic Development,
Jobs, Transport
and Resources

Can concentrations of *trans* octadecenoic acids in milk fat be used to predict methane yields of dairy cows ?

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Background

- Cows eructate 6.5% of dietary energy intake as methane
- Methane is a potent greenhouse gas
- Simple methods are required to estimate methane emissions, yields and intensities of cows to verify mitigation strategies and for inventory purposes
- Concentrations of specific fatty acids in milk fat have been shown to be related to methane emissions and methane yield
- The concentration of *trans*-10 plus *trans*-11 C18:1 has been shown to have potential to predict methane yields when cows are fed TMR based on corn silage
- There has been limited research with non-TMR diets and diets not containing corn silage.

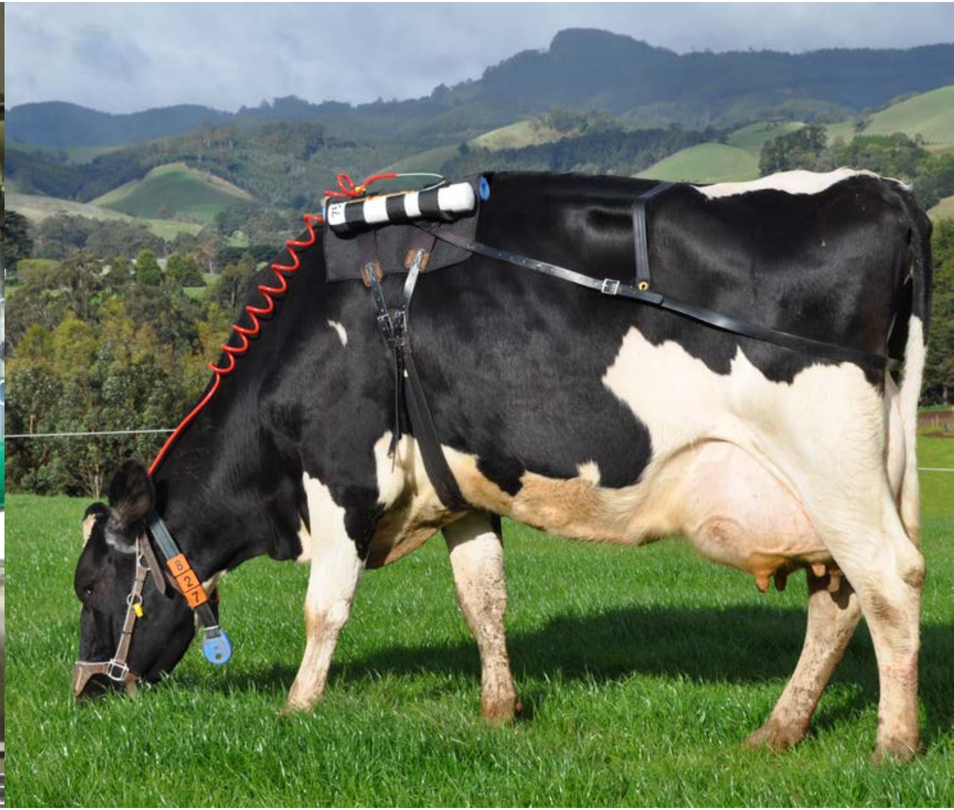
Aim

To quantify the relationships between methane emissions, yields and intensities, and the concentrations of individual *trans* isomers of C18:1 and of *trans*-10 plus *trans*-11 C18:1 in milk fat

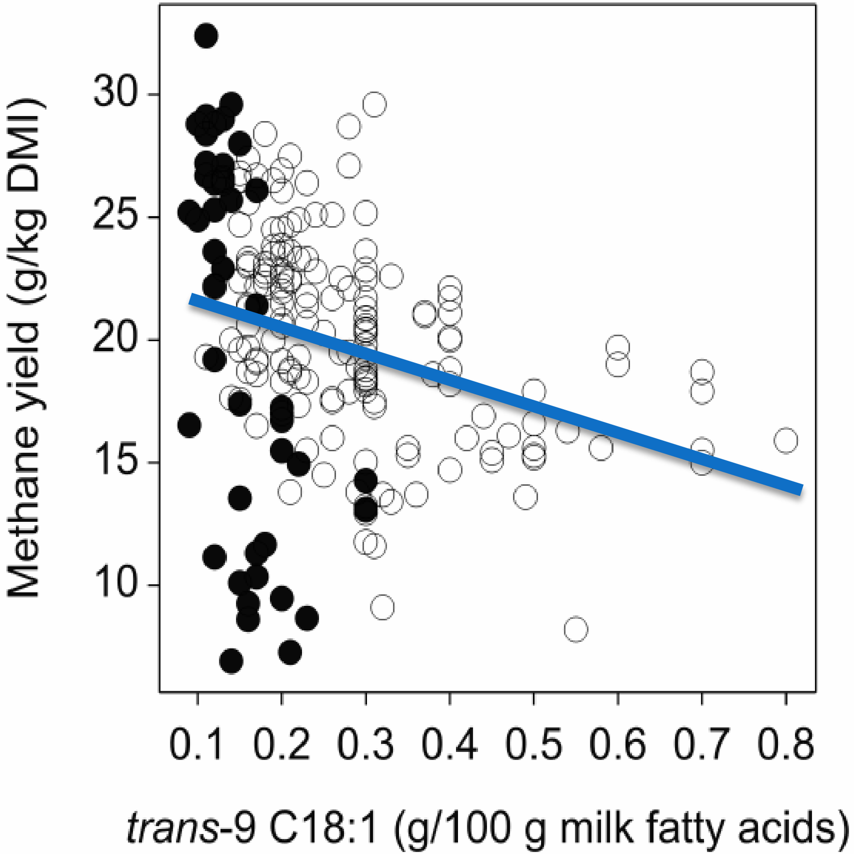
Methods

- Data from seven indoor feeding experiments conducted at Ellinbank
- 23 dietary treatments
- Diets were non-TMR and none included silages
- Diets consisted of either lucerne hay, of freshly harvested perennial ryegrass pasture and usually a concentrate supplement (wheat, barley, corn) and some diets contained either forage brassica, chicory, almond hulls, citrus pulp of grape marc.
- 220 Holstein dairy cows, DIM 51 -206, DMI 8.0 – 22.8 kg/d,
- Milk yields 12.3 – 40.1 kg/d
- Methane 156 – 616 g/d

Methods



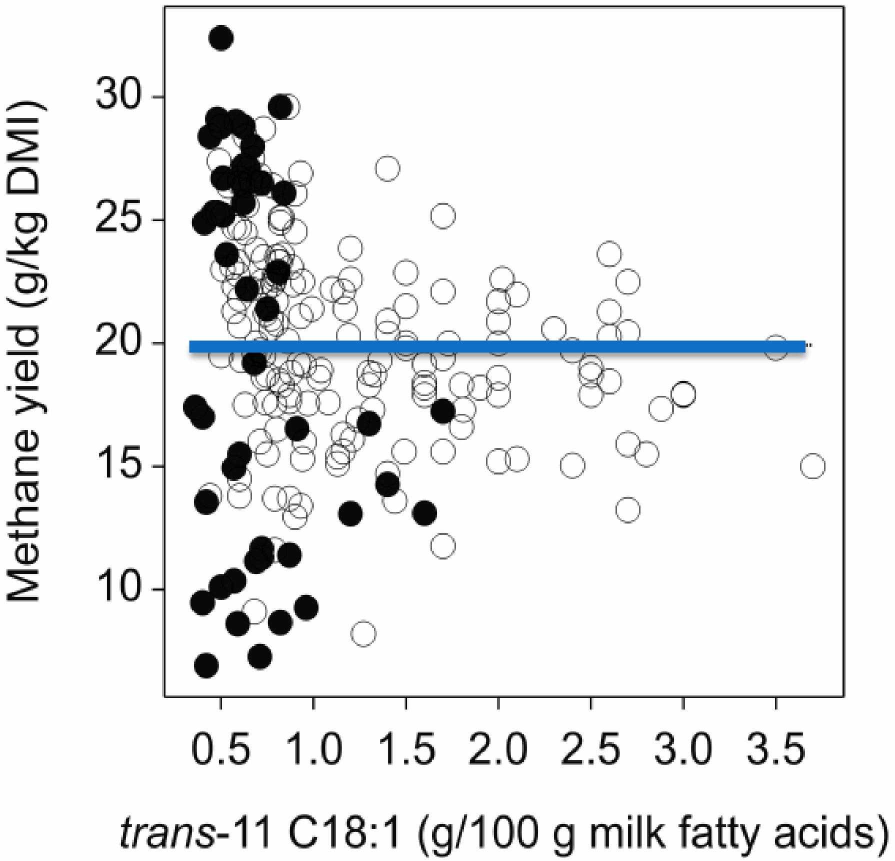
Results



MY = 22.7 – 10.9 x *trans*-9 C18:1

R^2 = 0.080

(●) cows fed diets containing > 33% DMI as wheat



MY = 19.9 – 0.0 * *trans*-11 C18:1

$R^2 = 0.0$

(●) cows fed diets containing > 33% DMI as wheat

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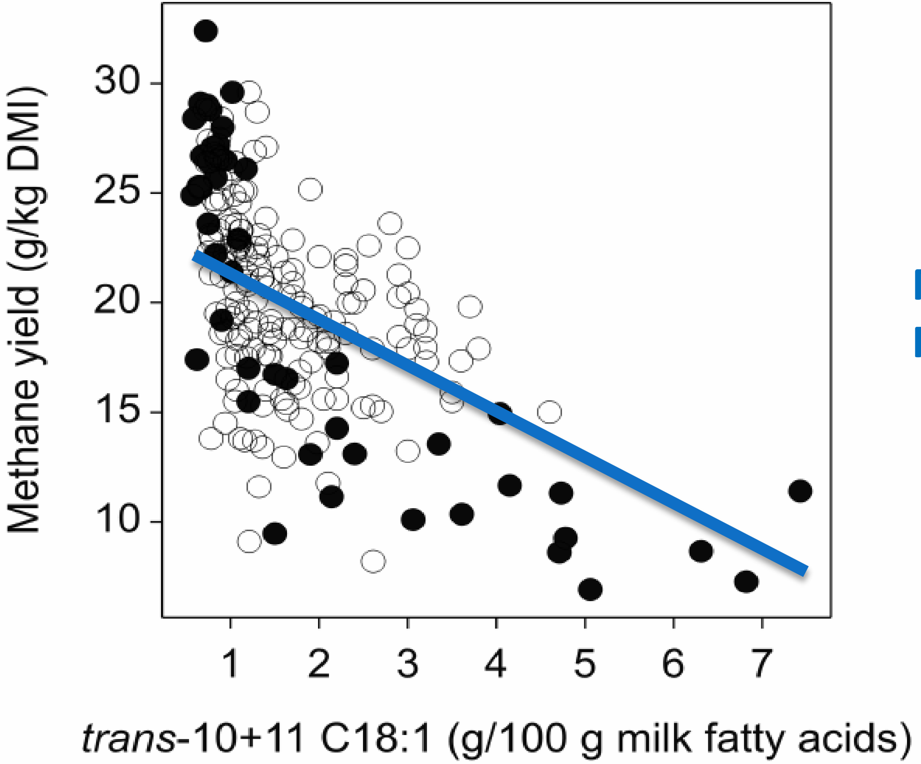
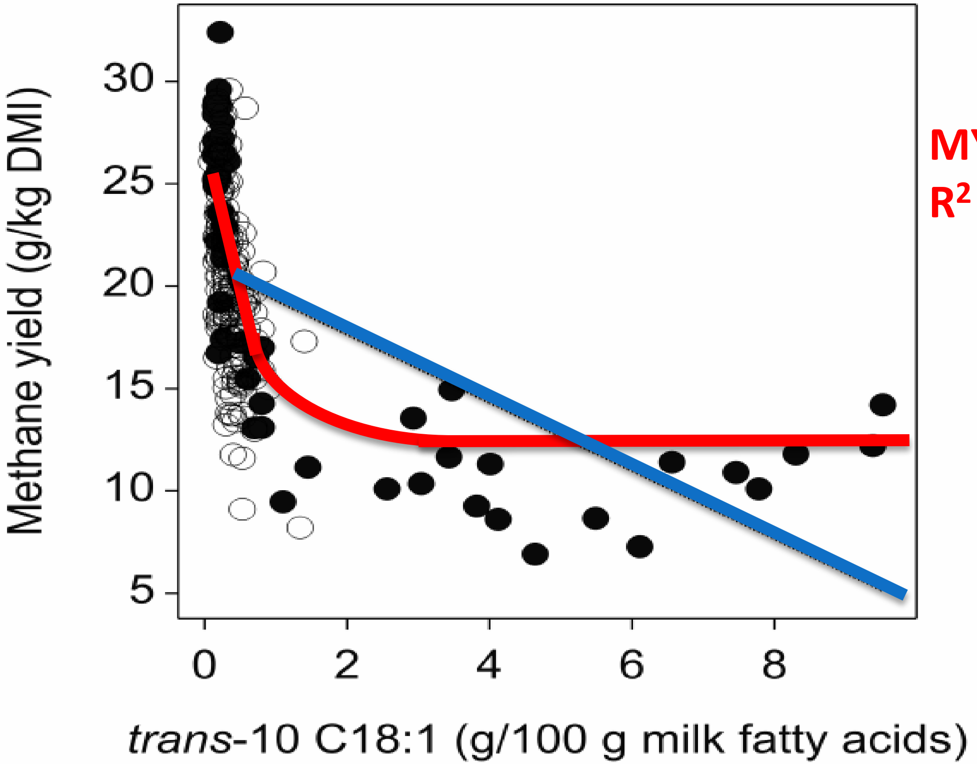


MY = 23.7 – 2.22 * *trans*-10+11 C18:1

R^2 = 0.24

(●) cows fed diets containing > 33% DMI as wheat



MY = 12.4 + 13.2 exp{-1.40* *trans*-10 C18:1}

R^2 = 0.340

MY = 21.6 – 2.92 * *trans*-10 C18:1

R^2 = 0.265

(●) cows fed diets containing > 33% DMI as wheat

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Conclusions

- There were wide ranges in concentrations of individual isomers of *trans*-C18:1 and poor relationships between these and methane emissions, methane yields and methane intensities
- It is unlikely concentrations of *trans* isomers of C18:1 will be suitable to be used for accurately predicting methane emissions, yields or intensities of individual cows or herds of cows