

## Effect of red and white clover added to a rye grass-based diet on intake, fibre digestion and methane release of dairy cows

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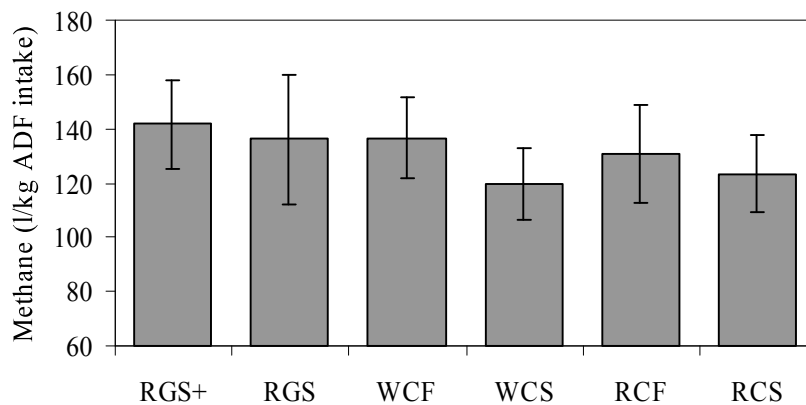
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**Introduction** Forage legumes like white and red clover are widely grown in association with grass, with the intention to improve the quality of grass-based diets. However little is known about the effect of either white or red clover added to a grass-based diet on methane release, and existing studies are not conclusive. The objective of this study, applying the respiratory chamber technique, was to determine the effect of red and white clover added to a rye grass-based diet on intake, fibre digestion and methane release of dairy cows.

**Material and methods** Thirty-six Holstein Friesian and Brown Swiss dairy cows, weighing on average  $637 \pm 55$  kg and yielding  $25.7 \pm 3.7$  kg milk/day, were allocated to one of six experimental diets. These consisted of rye grass (60%, DM basis; fresh or ensiled) (*Lolium perenne* L., cultivar 'Fennema') either mixed with red clover (40%) (*Trifolium repens*, cultivar 'Pirat') in fresh (RCF) and ensiled form (RCS) or with white clover (40%) (*Trifolium pratense*, cultivar 'Klondike') in fresh (WCF) and ensiled form (WCS). Control diets consisted of rye grass-silage diets either unsupplemented (RGS) or supplemented with maize gluten (RGS+) as a control for the potential protein supply by the clovers. All diets were supplemented with barley to meet each cow's calculated extra energy requirement for milk production. Feed and faeces were collected individually. Open-circuit respiratory chambers were used to quantify methane emission from the individual cows.

**Results** Total feed intake was similar in all groups with  $18.8 \pm 0.9$  kg DM/d as was milk yield. Fibre content of the white clover and red clover silage diets were higher compared to the other diets (ADF, g/kg: 266 and 261 vs. 235, 232, 243 and 246 for diets WCS vs. RCF, WCF, RGS+, RGS and RCS, respectively). The corresponding ADF intakes were 5.4, vs. 4.5, 4.2, 4.6, and 4.3, and 4.8 kg/d ( $P < 0.05$ ). Digestibility of organic matter ( $0.72 \pm 0.01$ ) was quite similar for all diets. Digestibility of ADF was slightly higher for WCF and WCS (0.65 and 0.64, respectively) compared to groups RCF, RGS+, RGS, and RCS (0.60, 0.61, 0.63, and 0.61). Methane emission relative to fibre intake (Figure 1) was higher with the ensiled rye grass diets compared to the legume silage diets ( $P < 0.05$ , contrast analysis). Methane (l) per kg of DM intake was higher with the pure rye grass diets compared to all legume diets with 34.5 and 33.5 for RGS+ and RGS vs. 30.6, 31.7, 31.4, and 32.2 for RCF, WCF, RCS and WCS.



**Figure 1** Effect of diet on methane release per kg ADF ingested

**Conclusion** These results suggest methane emissions from dairy cows fed ensiled herbage containing white or red clover may be lower than that of dairy cows fed a pure ensiled rye grass-based diet. This may be related to the chemical composition of the diets (Hindrichsen *et al.*, 2004).

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### References

Hindrichsen, I.K., H.-R. Wettstein, A. Machmüller, C.R. Soliva, K.E. Bach Knudsen, J. Madsen & M. Kreuzer (2004). Effects of feed carbohydrates with contrasting properties on rumen fermentation and methane release in vitro. *Canadian Journal of Animal Science*, 84, 265-276.