

Reducing saturated fats in dairy products: the **consequences for** milk fat composition and **the environment**

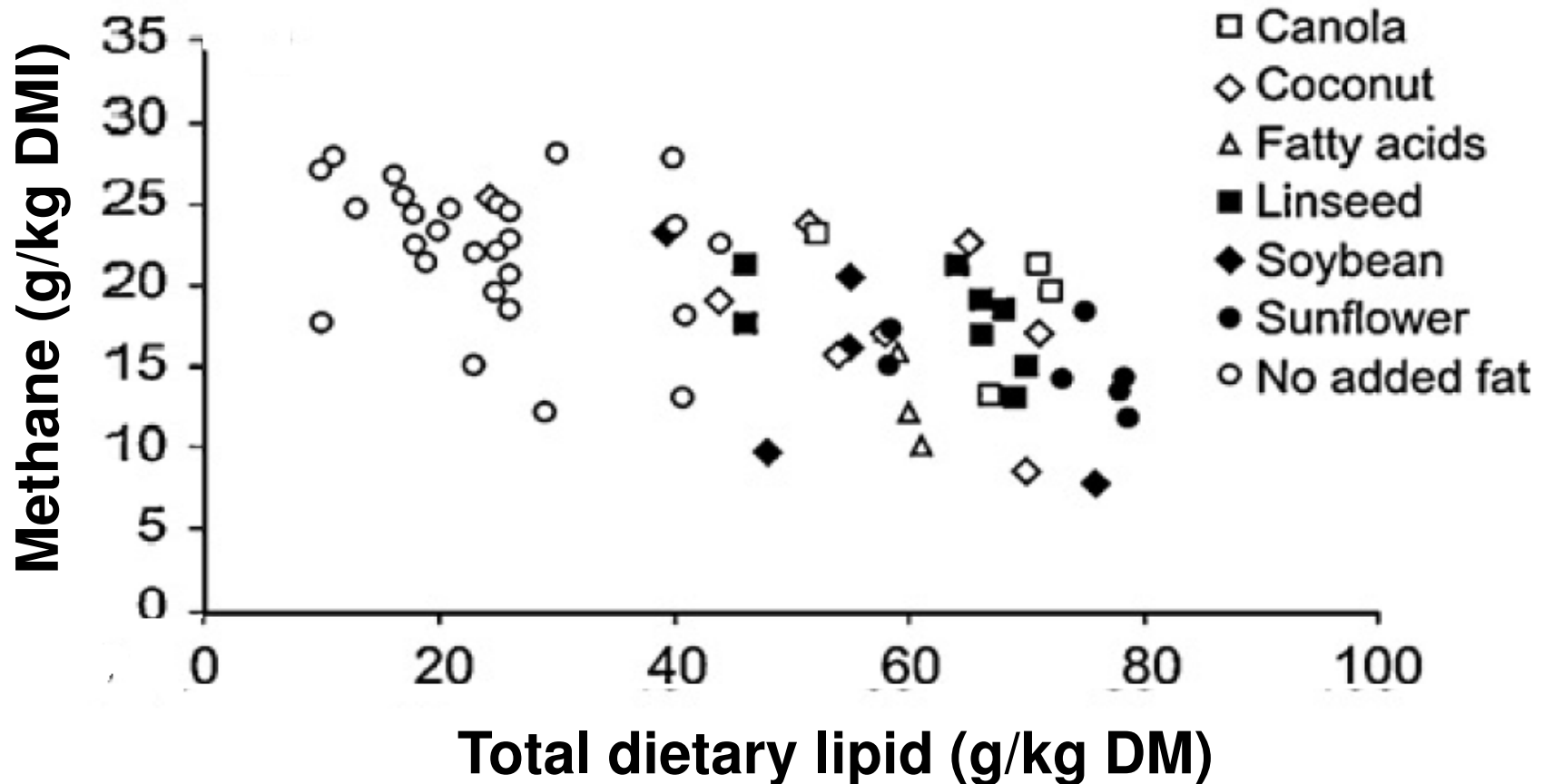
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Milk and Dairy Products in Health and Disease

Introduction

- Lipid as energy supplement
- Manipulation of dietary fatty acid composition
- Ameliorating effect of dietary lipid on methane
 - Non fermentable ME
 - Direct effect on methanogens/protozoa
 - Unsaturated lipids hydrogen sink

Effect of dietary lipid on methane production



Methane

- Greenhouse gas ~25 x GWP of CO₂
- Waste of feed energy – 2 to 12%
- Agriculture accounts for ~40% of UK CH₄ emissions
- Concern for the ‘carbon footprint’ of milk



Objective

To determine effects of feeding milled rapeseed on milk fatty acid composition and methane production by lactating dairy cows

Methods

- Multiparous Holstein-Friesian dairy cows
- 4x4 balanced Latin square with 35 day periods
- Milk fatty acid composition
- Measurements of respiratory exchange
 - Open-circuit respiration chambers
- Treatments - Control diet fed twice daily versus
 - Rapeseed diet fed twice daily (RS x2)
 - Rapeseed diet fed once daily (RS x1)
 - RS x1 with daily oscillations in forage:conc ratio (RS4/5 x1)

Diet ingredients

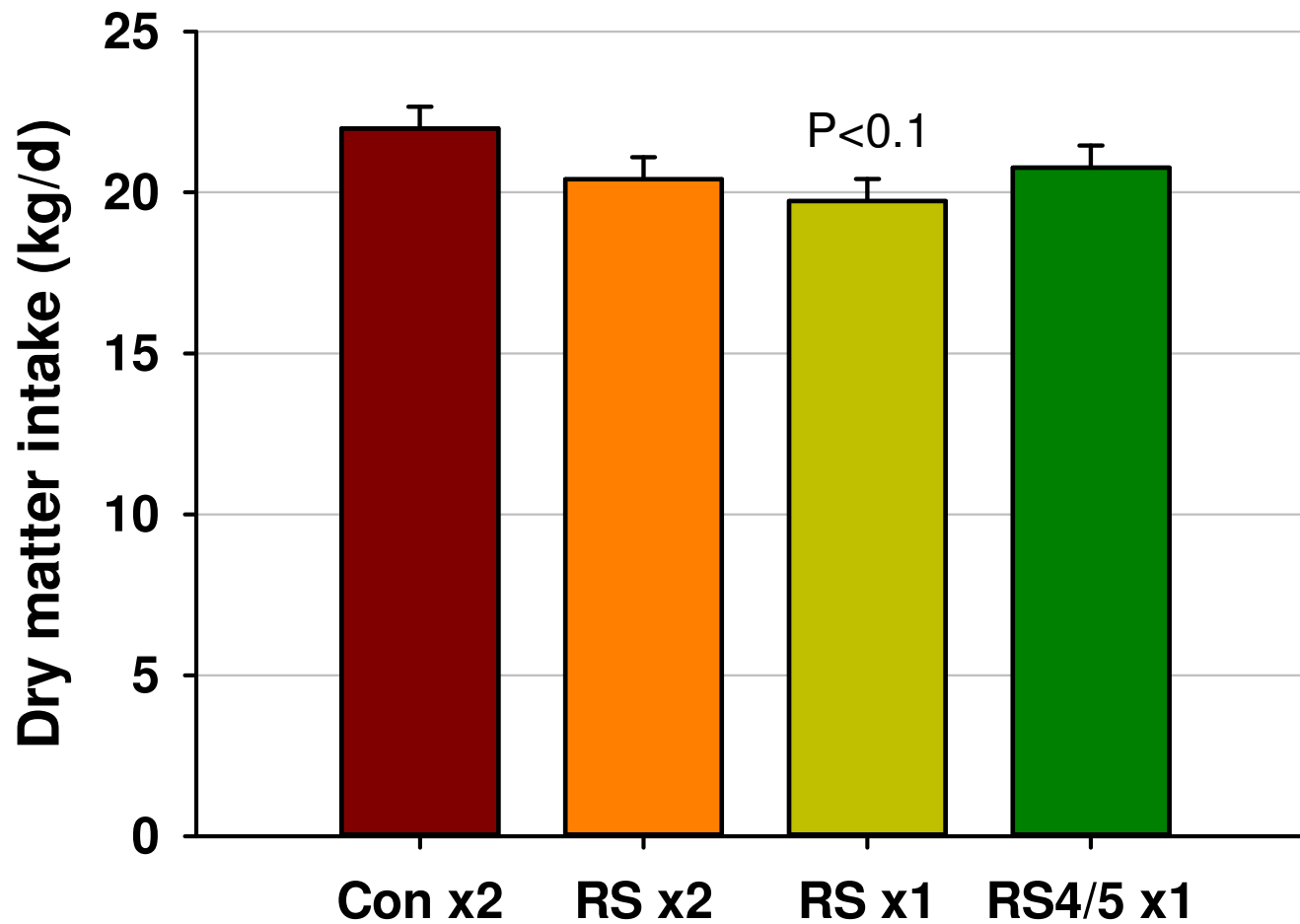
	Control	Rapeseed
Maize silage	375	375
Grass silage	125	125
Milled RS/cracked wheat	0	128
Control blend	500	0
Rapeseed blend	0	372

- Commercial varieties of rapeseed
- 1000 kg rapeseed + 750 kg wheat
 - Crushed on site with hammer mill, roller mill fully closed up
- 35 g/kg DM of lipid from milled rapeseed

Diet composition

	Control	Rapeseed
Gross energy (MJ/kg)	18.2	18.5
Crude protein	149	151
NDF	325	313
ADF	226	220
Starch	220	235
Ether extract	29	60
Ash	67	70

Effect of milled rapeseed on dry matter intake of lactating dairy cows

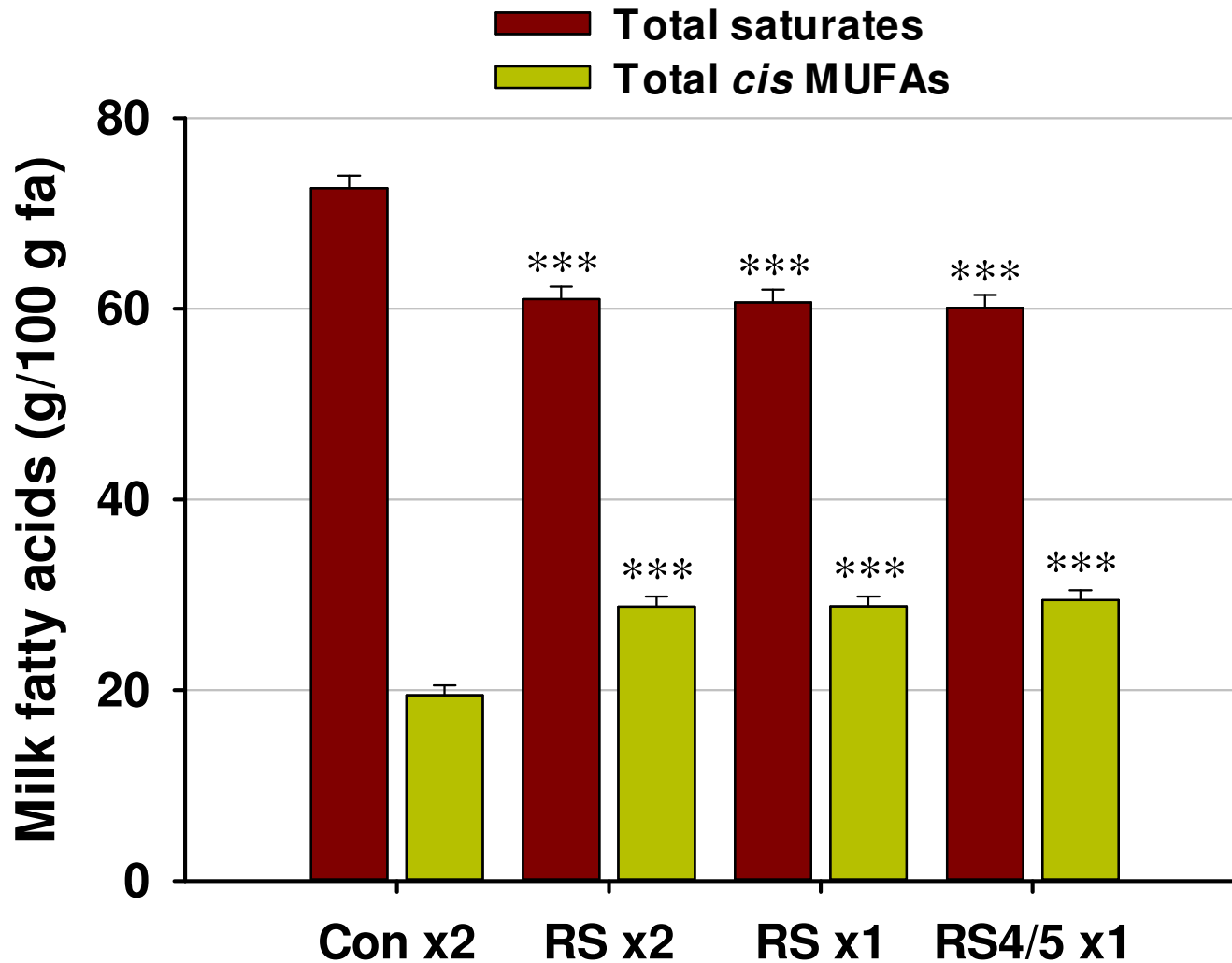


Effect of milled rapeseed on milk yield and composition by lactating dairy cows

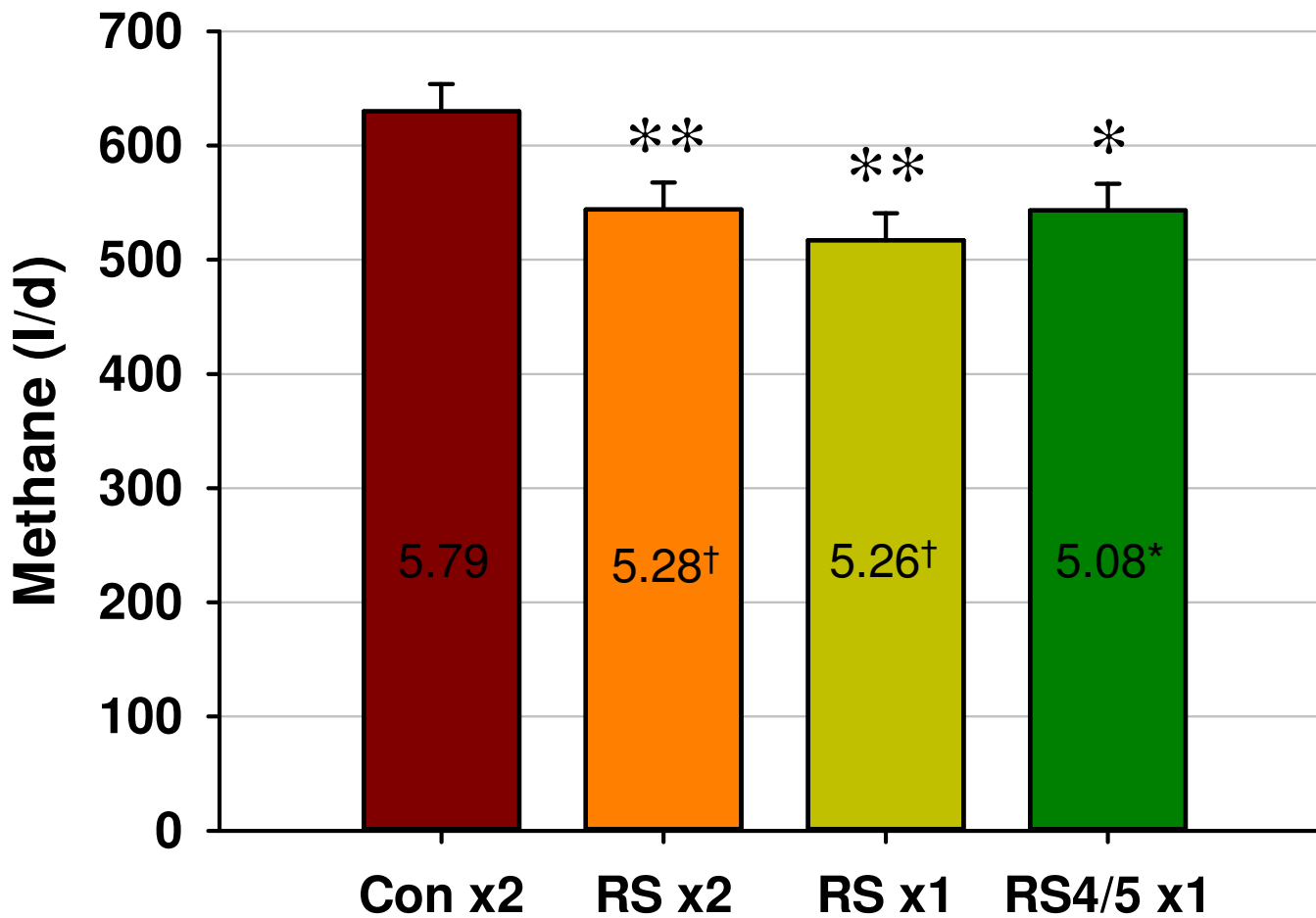


	Con x2	RS x2	RS x1	RS4/5 x1	SED	P =
Milk yield (kg/d)	32.4	36.4	33.9	35.0	1.52	0.166
Milk composition (g/kg)						
Fat	39.2	38.1	40.3	38.3	1.29	0.372
Protein	34.0	31.5*	32.2	32.7	0.68	0.046
Lactose	44.3	45.5**	44.1	44.3	0.23	0.003
Milk component yield (g/d)						
Fat	1269	1376	1368	1326	45.4	0.174
Protein	1101	1144	1087	1128	31.1	0.330
Lactose	1441	1657†	1499	1556	68.1	0.083

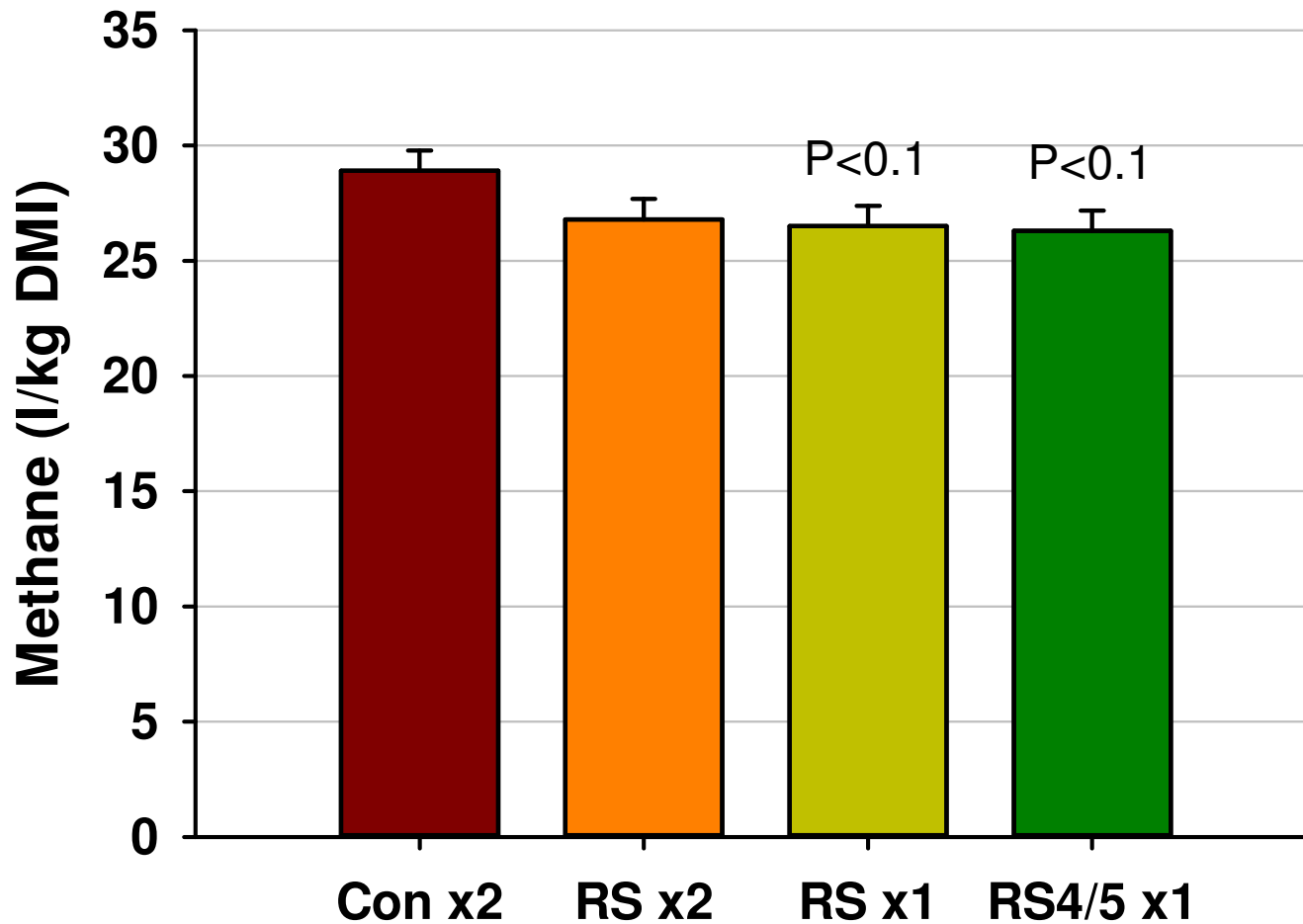
Effect of milled rapeseed on milk fatty acid composition of lactating dairy cows



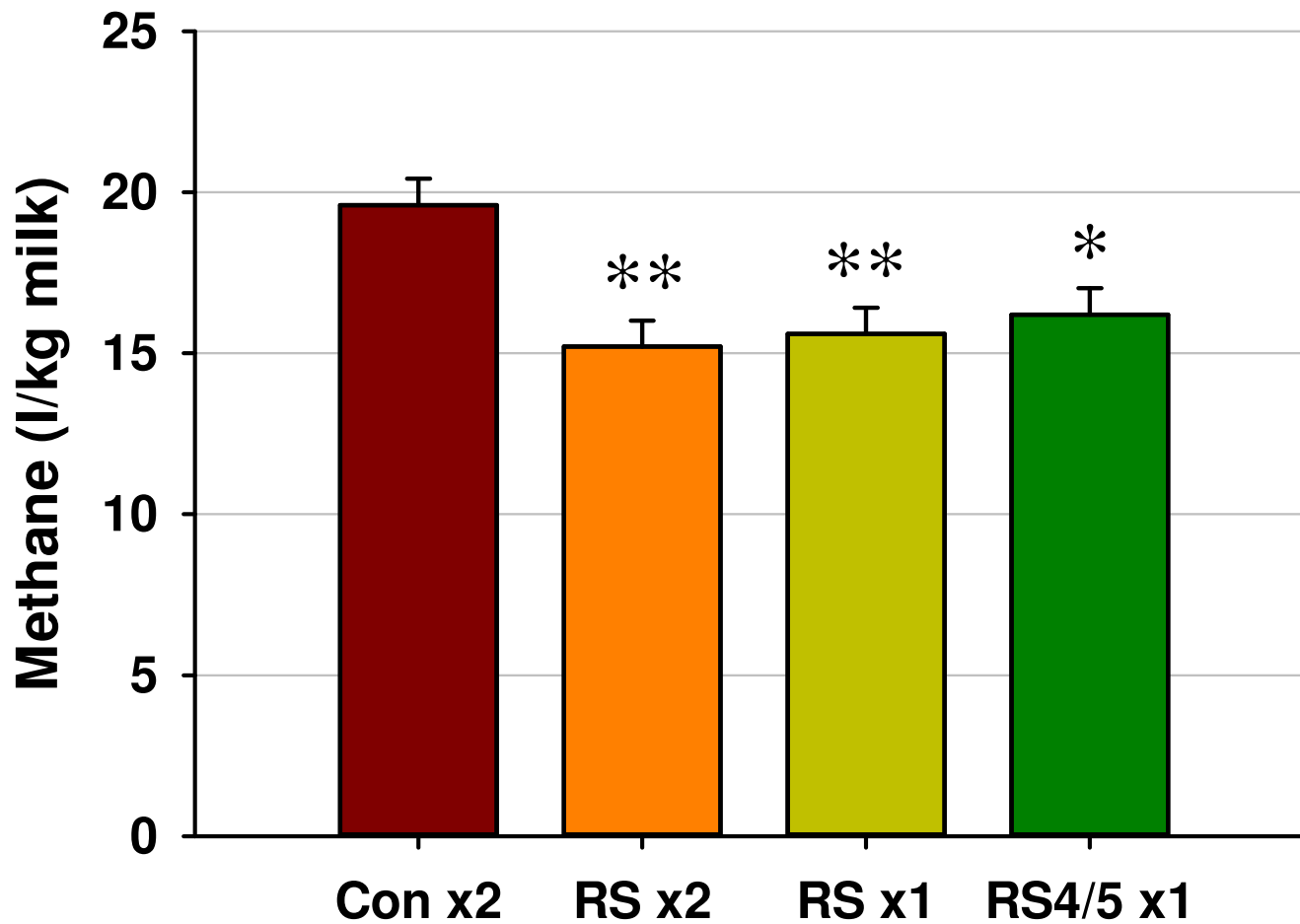
Effect of milled rapeseed on methane production by lactating dairy cows



Effect of milled rapeseed on methane production by lactating dairy cows



Effect of milled rapeseed on methane production by lactating dairy cows



Application

- Milled rapeseed ~ £400/t
- Per kg of lipid ~5% more expensive than Ca Salts of Palm Oil
- Include rapeseed protein ~20% cheaper

- Additional cost of RS diet ~20 pence/d
- Average milk response 2.7 litres/d
 - Longer term trials significant yield response
- Potential profit ~48 pence/d
- Home grown



Summary

- Feeding milled rapeseed improved milk composition by reducing saturates and increasing MUFAs
- Rapeseed reduced methane emissions per day, per unit of feed DM intake and per unit milk yield
- Potential profitable additive for dairy cow diets to manipulate milk fat composition and methane production
- Rapeseed home grown lipid and protein source

Acknowledgements

- Jon Mills, Kirsty Kliem, Chris Reynolds
- Dave Humphries, Paul Kirton and staff at CEDAR

- Defra project LS3656



- Thank you