

EFFECT OF RAPESEED AND PALM KERNEL OIL DIETARY INCLUSION LEVELS ON MILK PRODUCTION, FEED EFFICIENCY, METHANE AND ECONOMY

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DIETARY FAT



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Methane production and digestion of different physical forms of rapeseed as fat supplements in dairy cows

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Agriculture, Ecosystems & Environment
Volume 112, Issues 2-3, February 2006, Pages 107-114

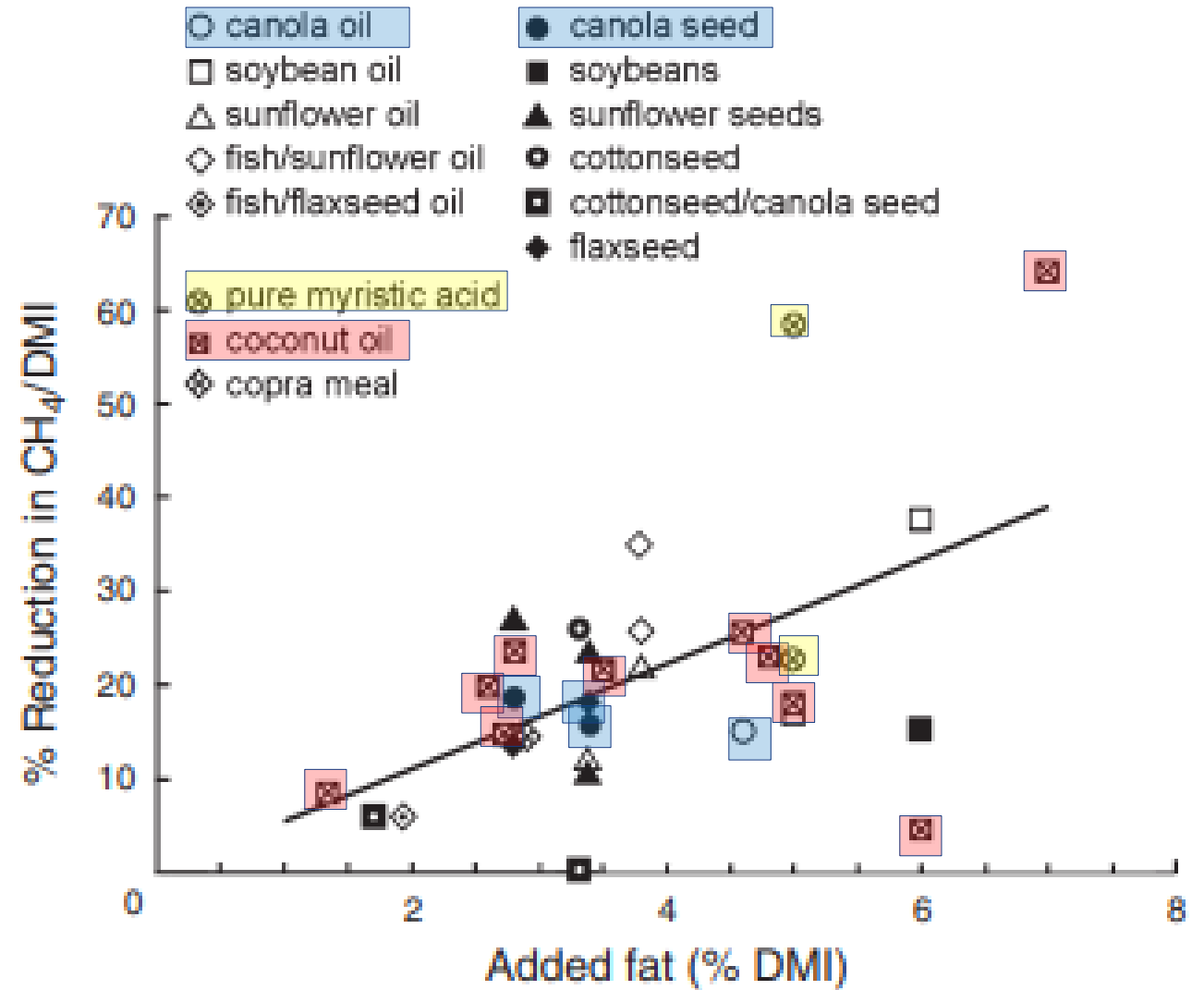


Medium-chain fatty acids and their potential to reduce methanogenesis in domestic ruminants

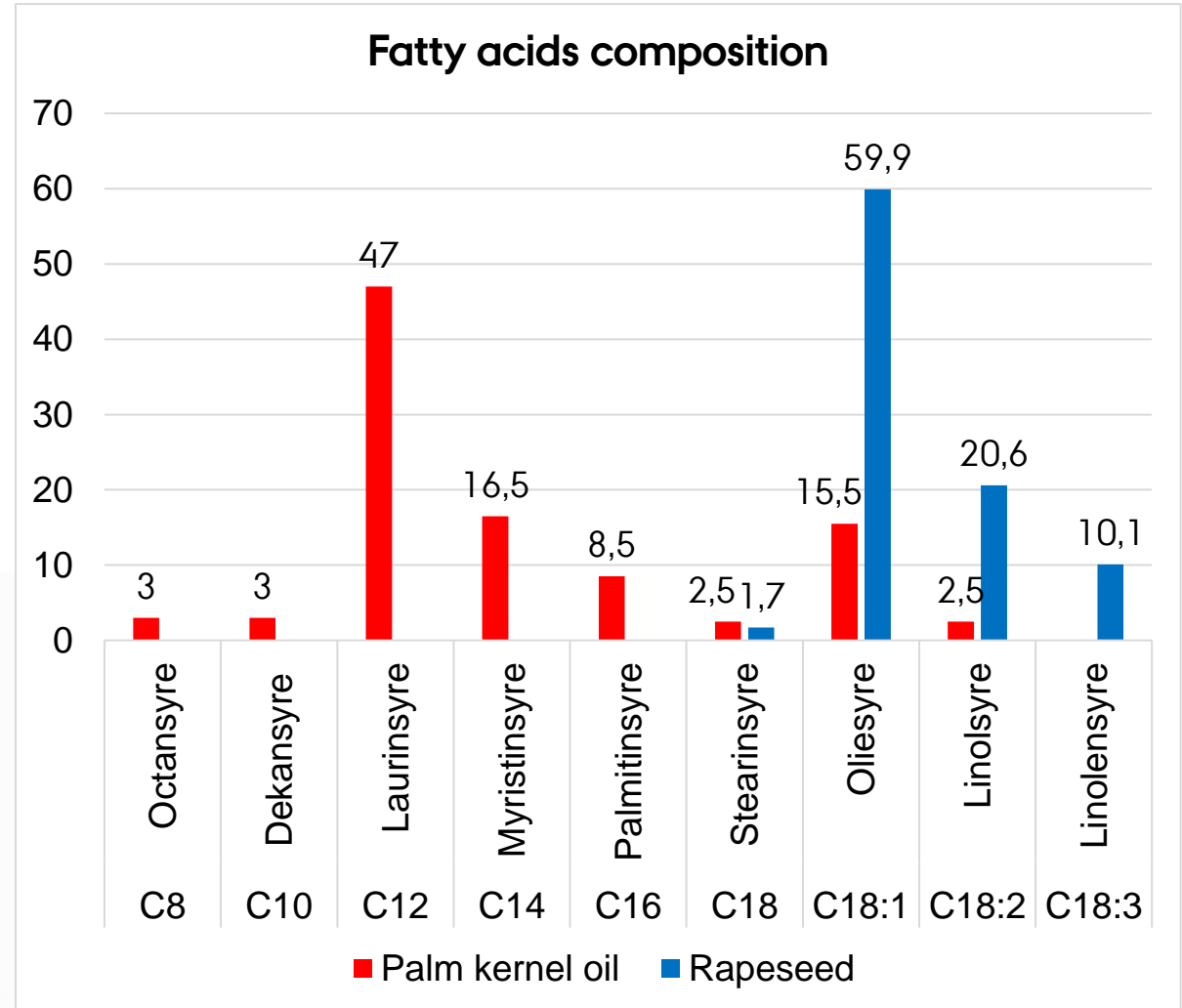
Andrea Machmüller , 

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Beauchemin et al., 2008



FATTY ACIDS PROFILES



METHANE PRODUCTION IN THE RUMEN

Research questions about dietary fat:

- Effect on methane emission when fat is fed at different **inclusion rates**.
- Effect of different **fatty acids profiles**.

Hypotheses:

- Methane emissions is decreased progressively as the dietary fat is increased.
- Palm kernel oil has stronger effect rapeseed for methane reduction.

DIETS

	1.9% FA 3.1% fat	3.0% FA 4.4% fat	4.2% FA 5.6% fat	5.4% FA 6.9% fat
		Rapeseed	Rapeseed	Rapeseed
Control		Palm kernel oil	Palm kernel oil	

Ingredient, % DM	Basal diet
- Spring barley	19.5
- Grass-Clover Silage	39.0
- Maize silage	31.2
- Beet pulp, dried	7.80
- Sodium bicarbonate	1.63
- Mineral and vitamins	0.65

DIETS

Cracked seed

Oil mixed with a part of the rapeseed meal

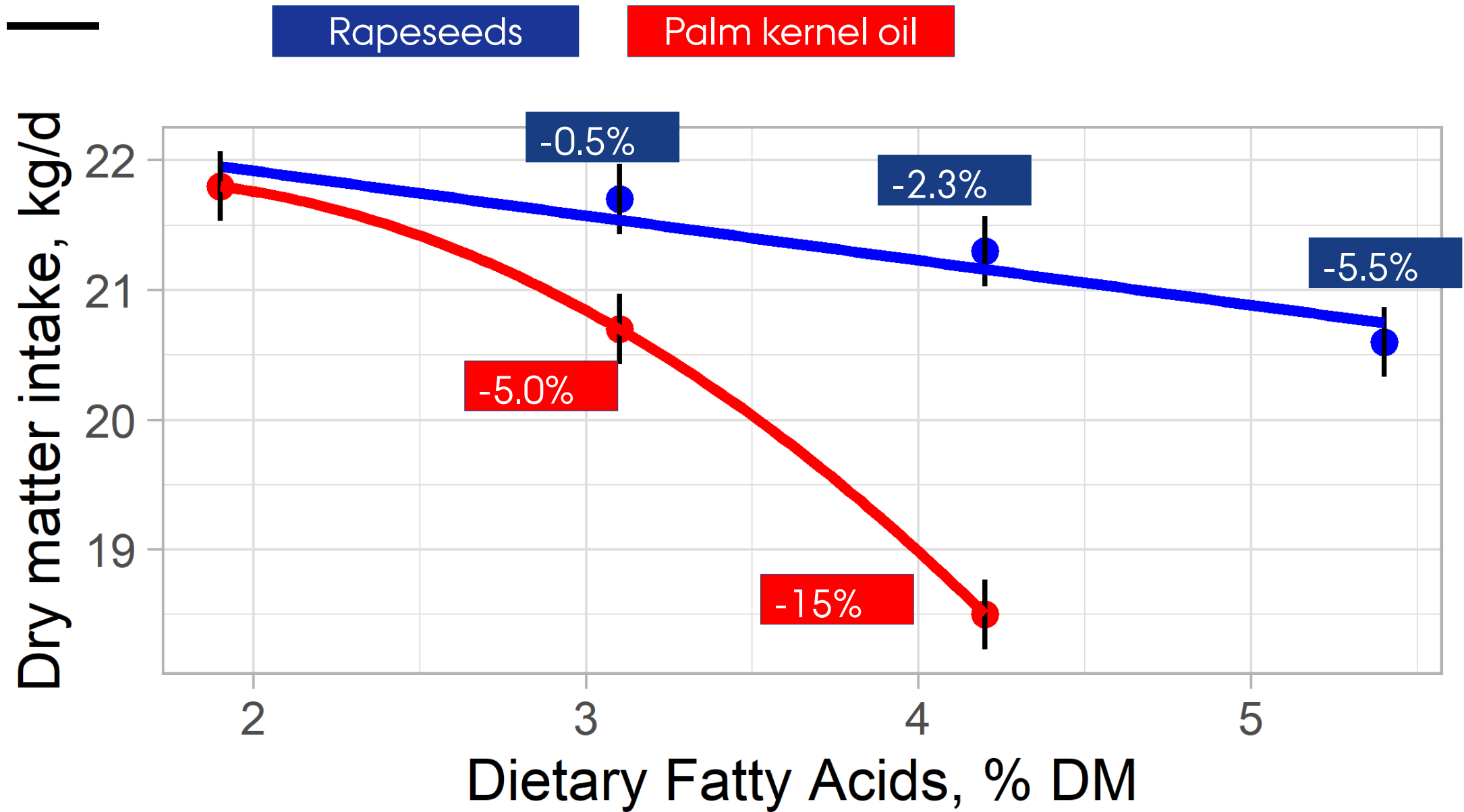
Ingredient, % DM	CO	LR	MR	HR	LP	MP
- Rapeseeds		2.97	5.93	8.90		
- Rapeseed meal	22.0	20.3	18.6	17.0	22.0	22.0
- Palm kernel oil					1.27	2.54
- Basal diet	78.0	76.7	75.4	74.2	76.7	75.4

THE EXPERIMENT

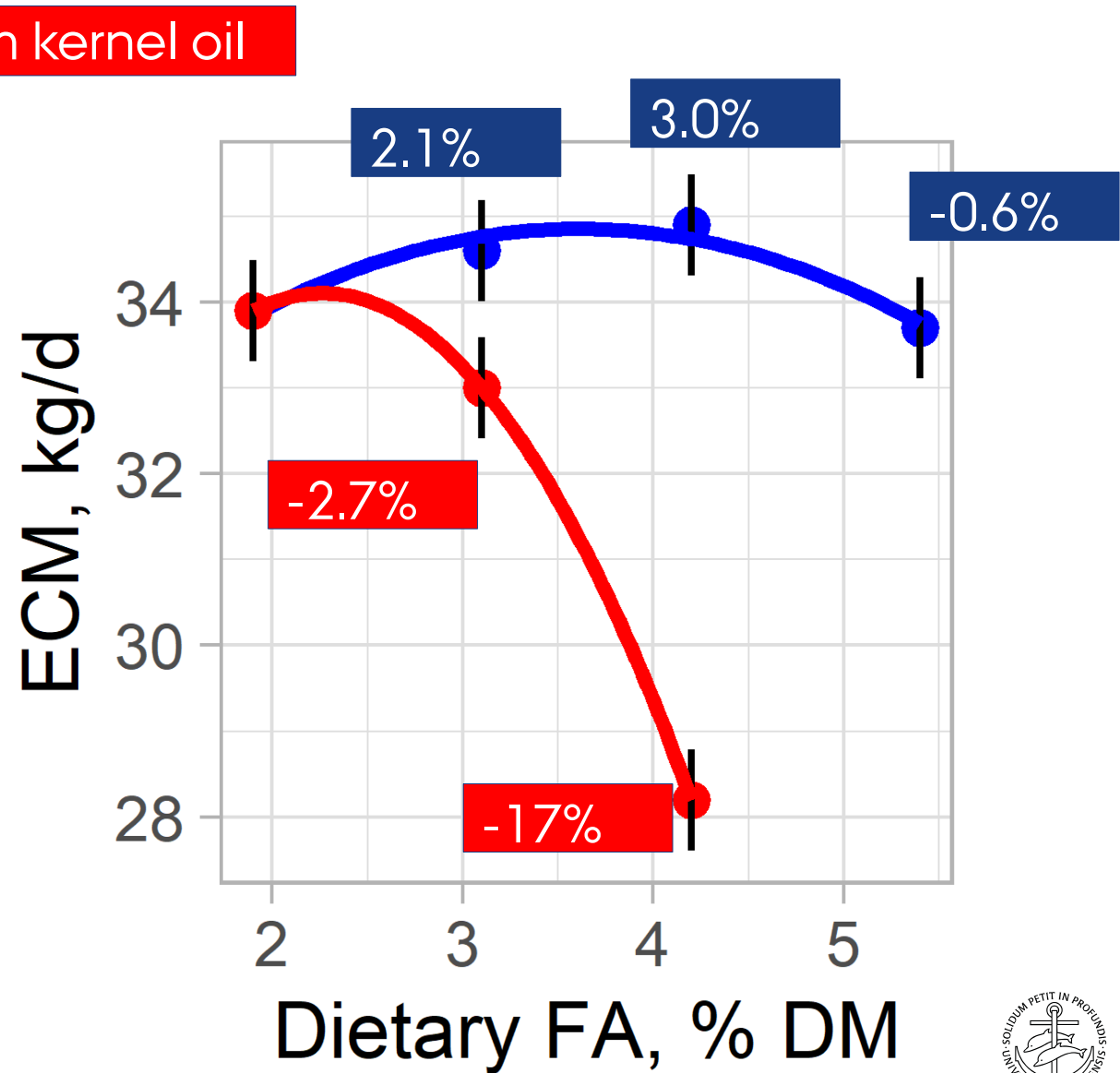
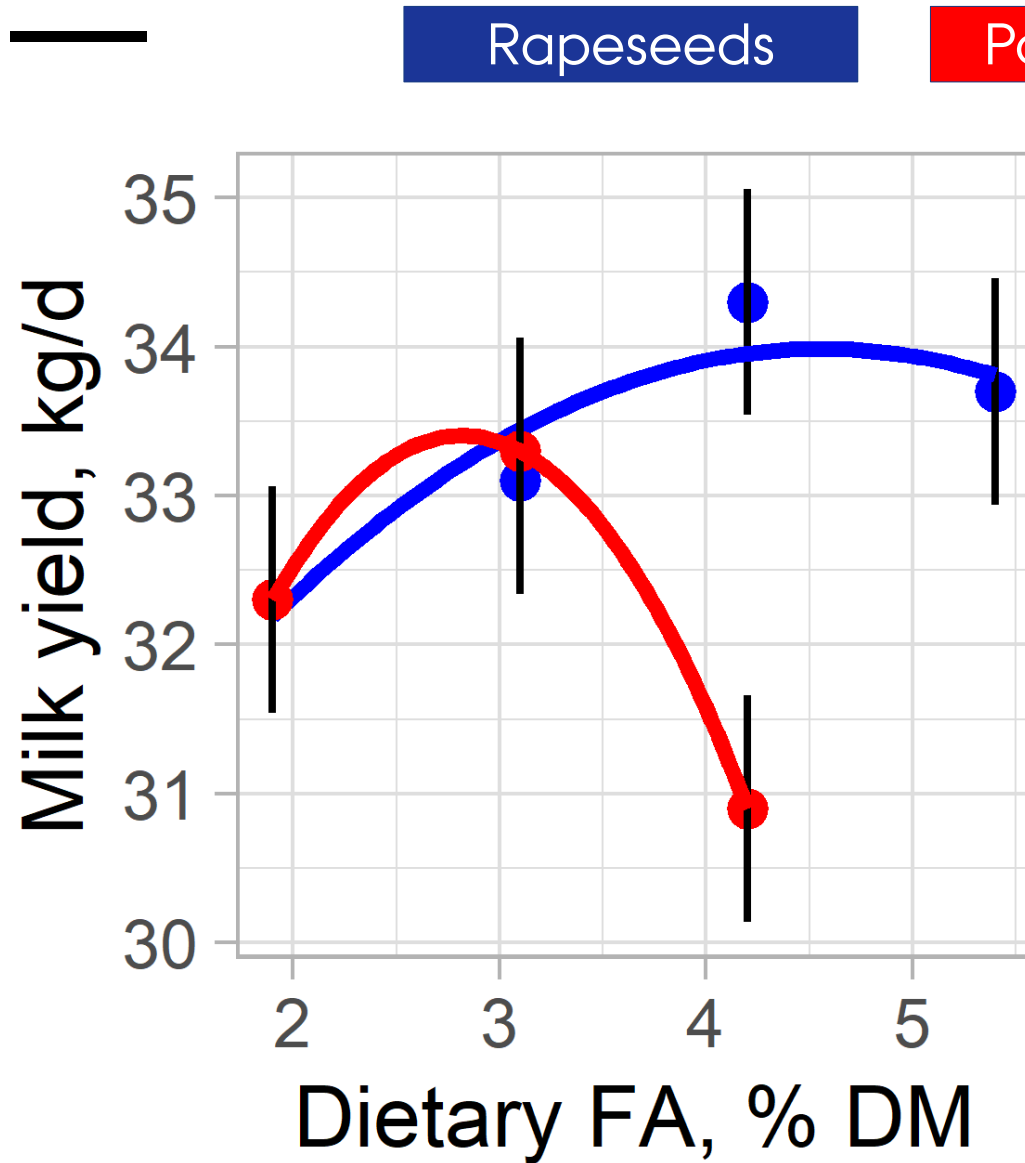
- 48 cows
 - Half primiparous, half multiparous
 - 6 diets
 - 6 periods (21 days each): total of 126 days.
 - Balanced Latin square (6 x 6).
-
- **Feed intake**
 - **Milk samples**
 - **Methane**



RESULTS - FEED INTAKE



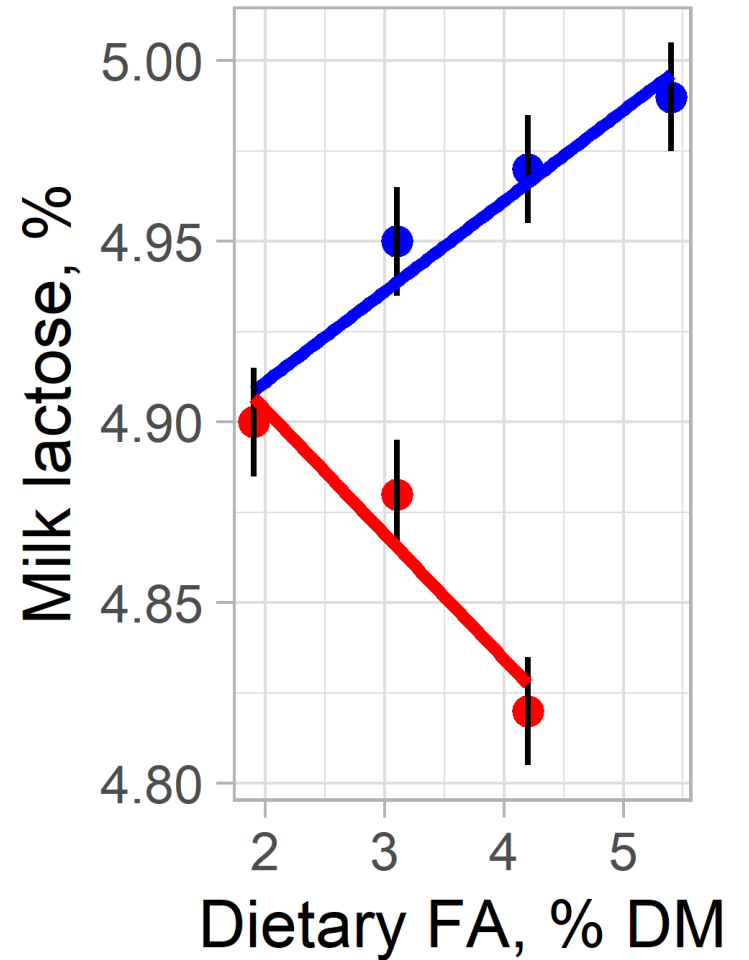
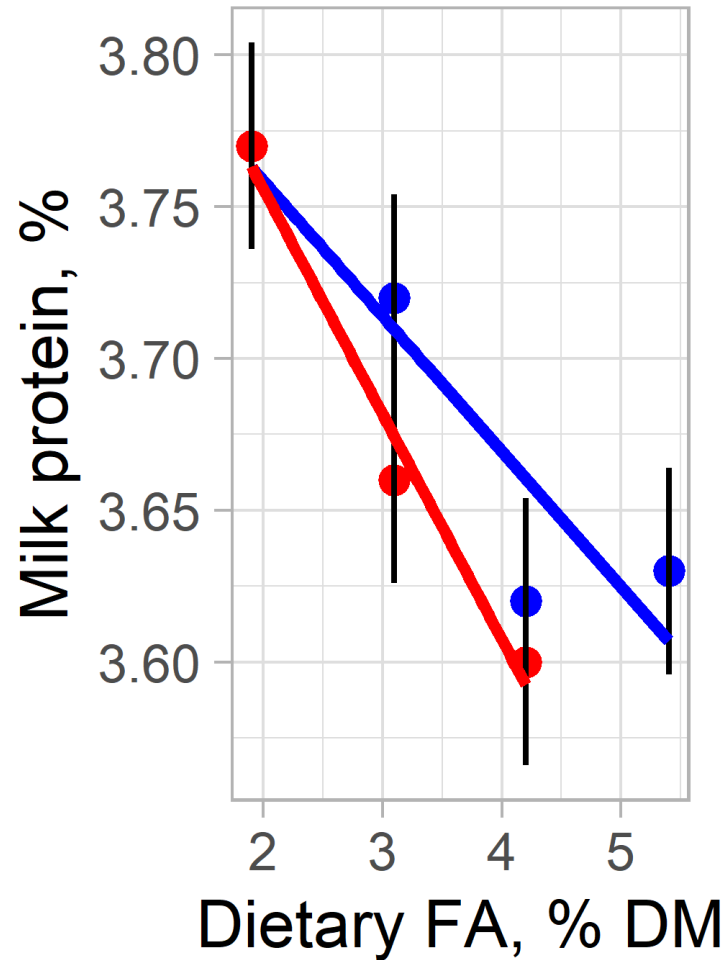
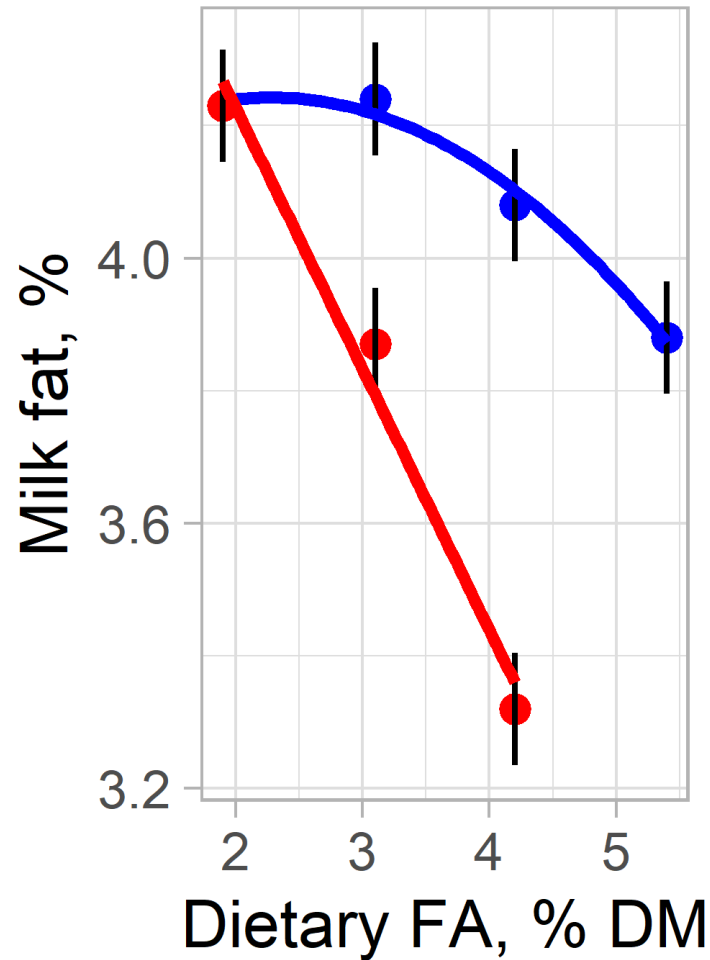
RESULTS - MILK PRODUCTION



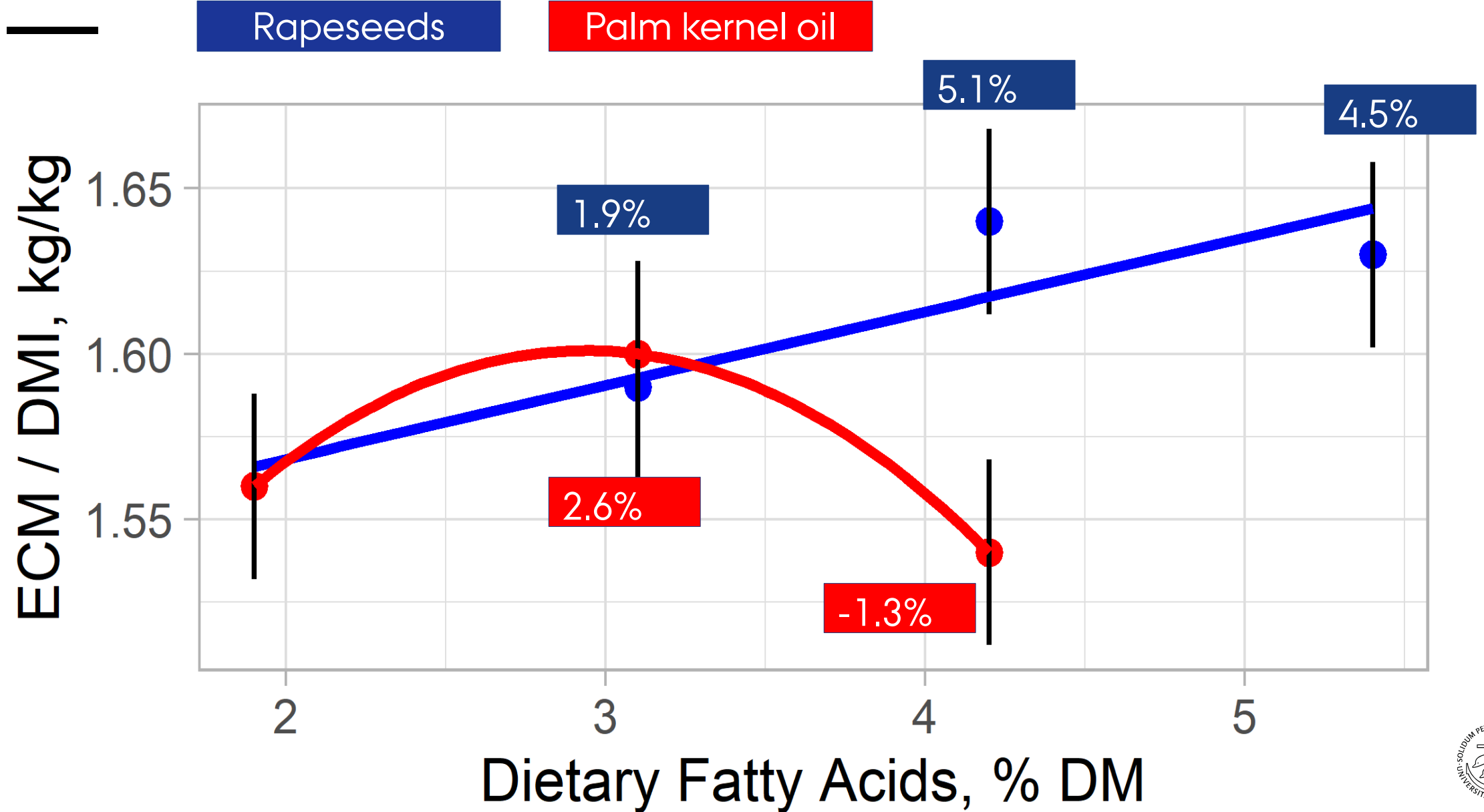
RESULTS - MILK NUTRIENTS

Rapeseeds

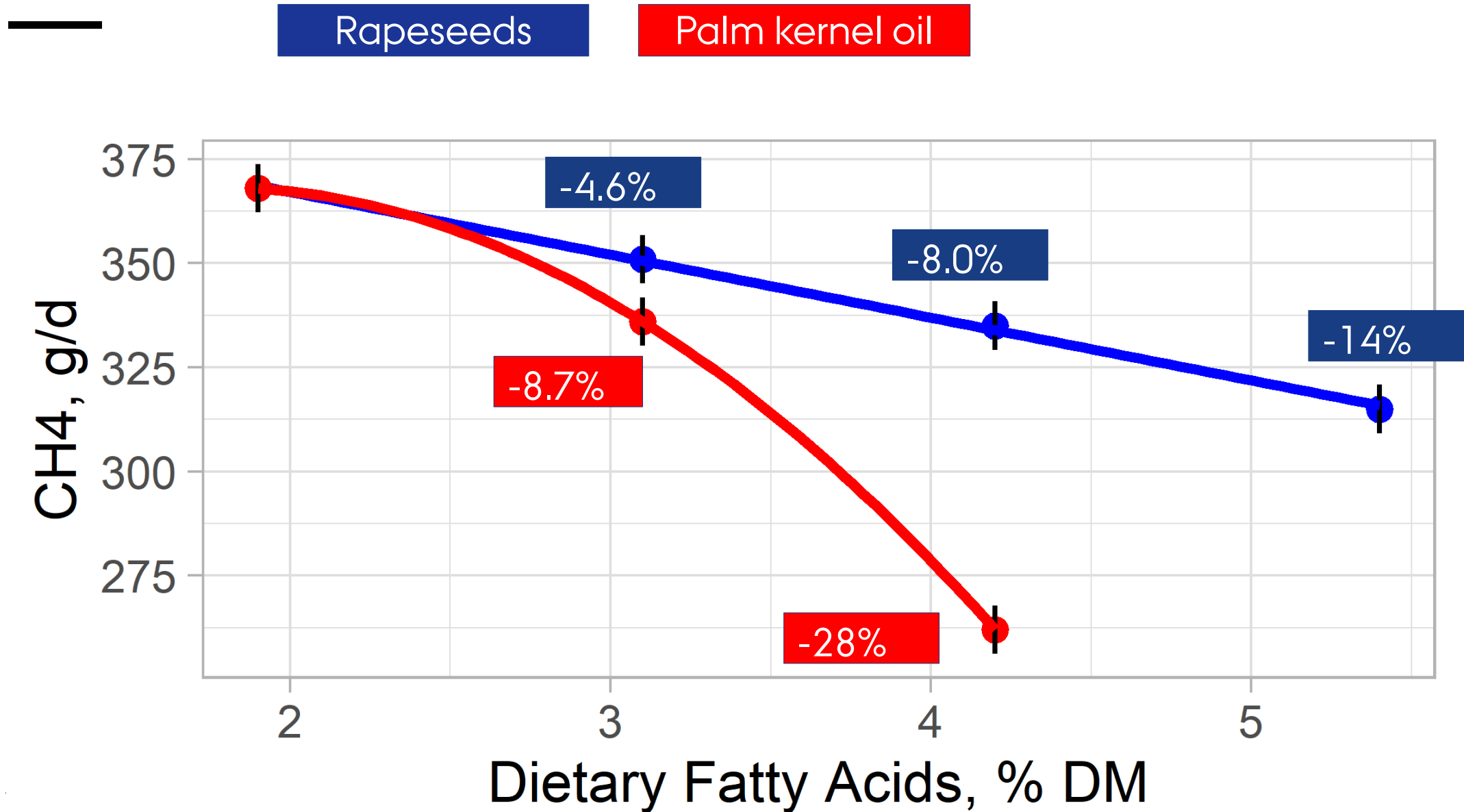
Palm kernel oil



RESULTS – FEED EFFICIENCY



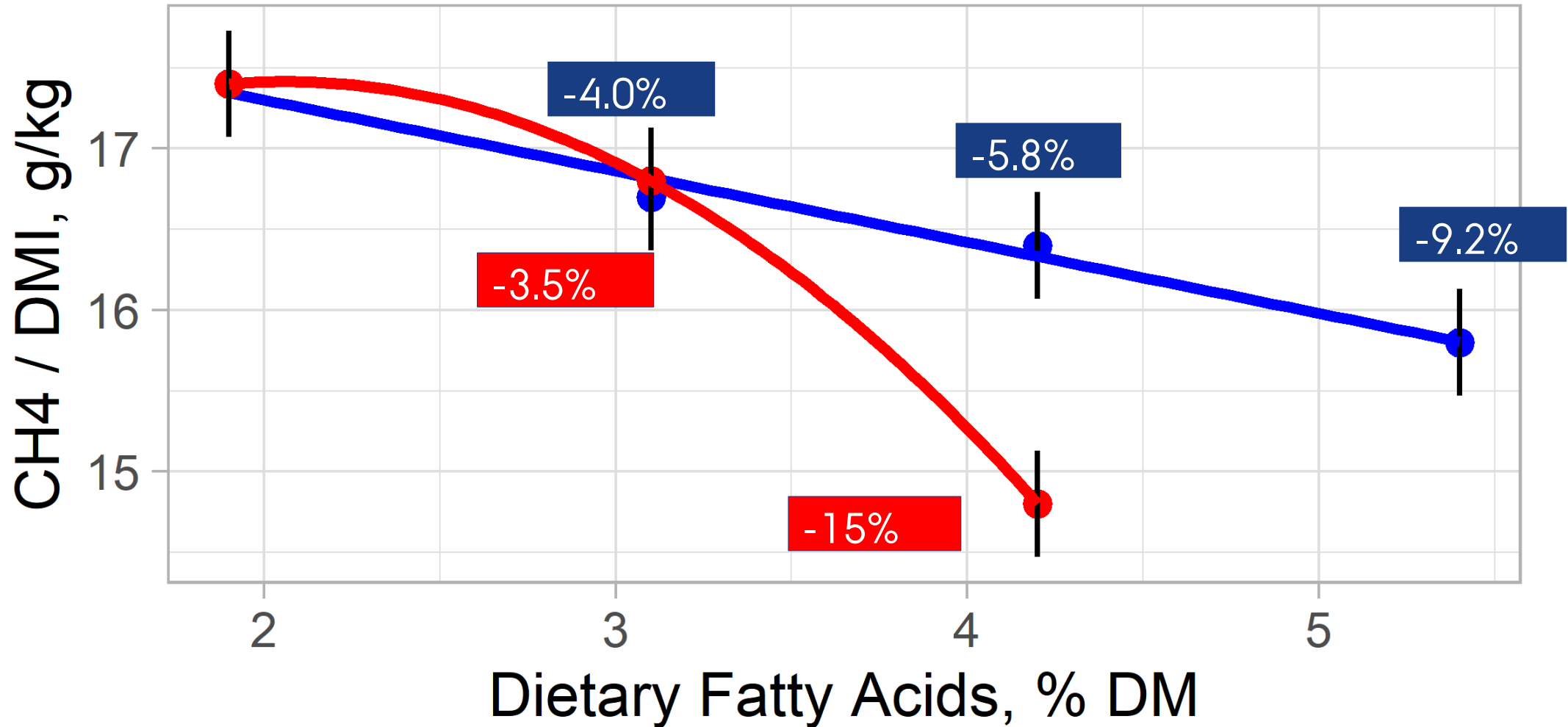
RESULTS - METHANE EMISSIONS (CH₄)



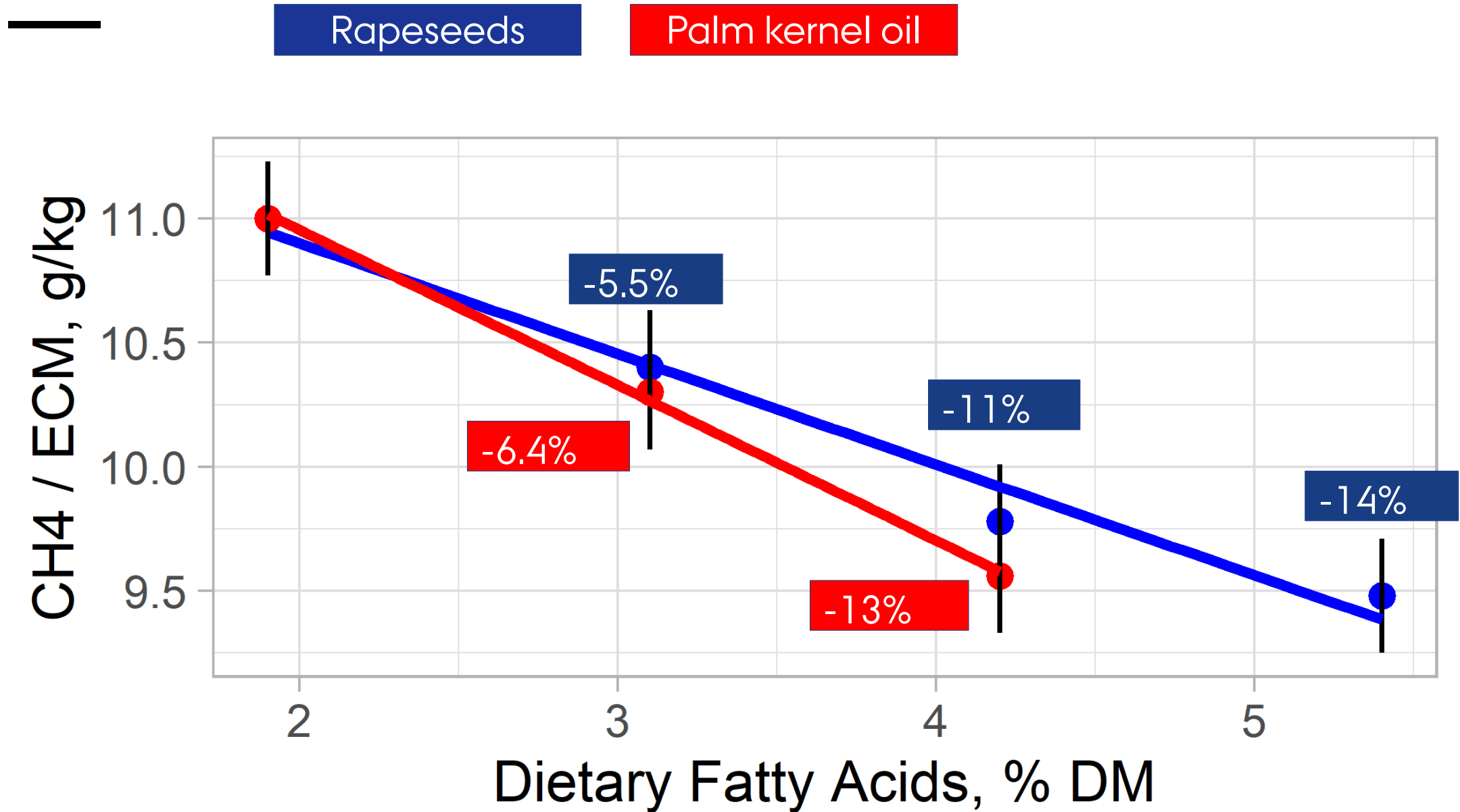
RESULTS - METHANE EMISSIONS / DMI

Rapeseeds

Palm kernel oil



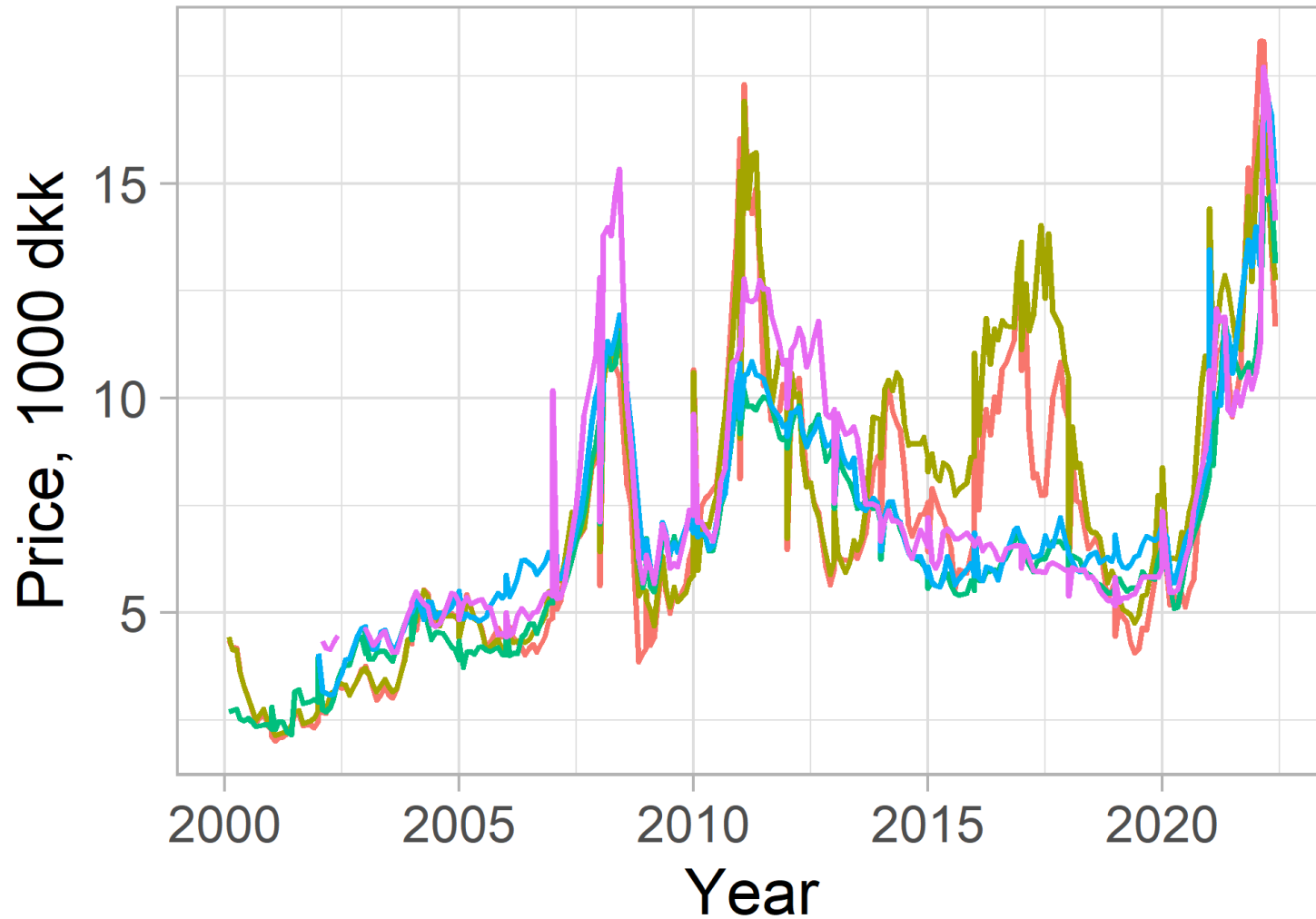
RESULTS - METHANE EMISSIONS / ECM



PRELIMINARY CONCLUSIONS

- **Rapeseeds tended to be positive for ECM at low and mid supplementations.**
- **Palm kernel oil was negative for ECM and at medium supplementation.**
- **Both reduced methane, palm kernel oil had a stronger effect than rapeseed, but this was not enough to counterbalance the reduced ECM.**

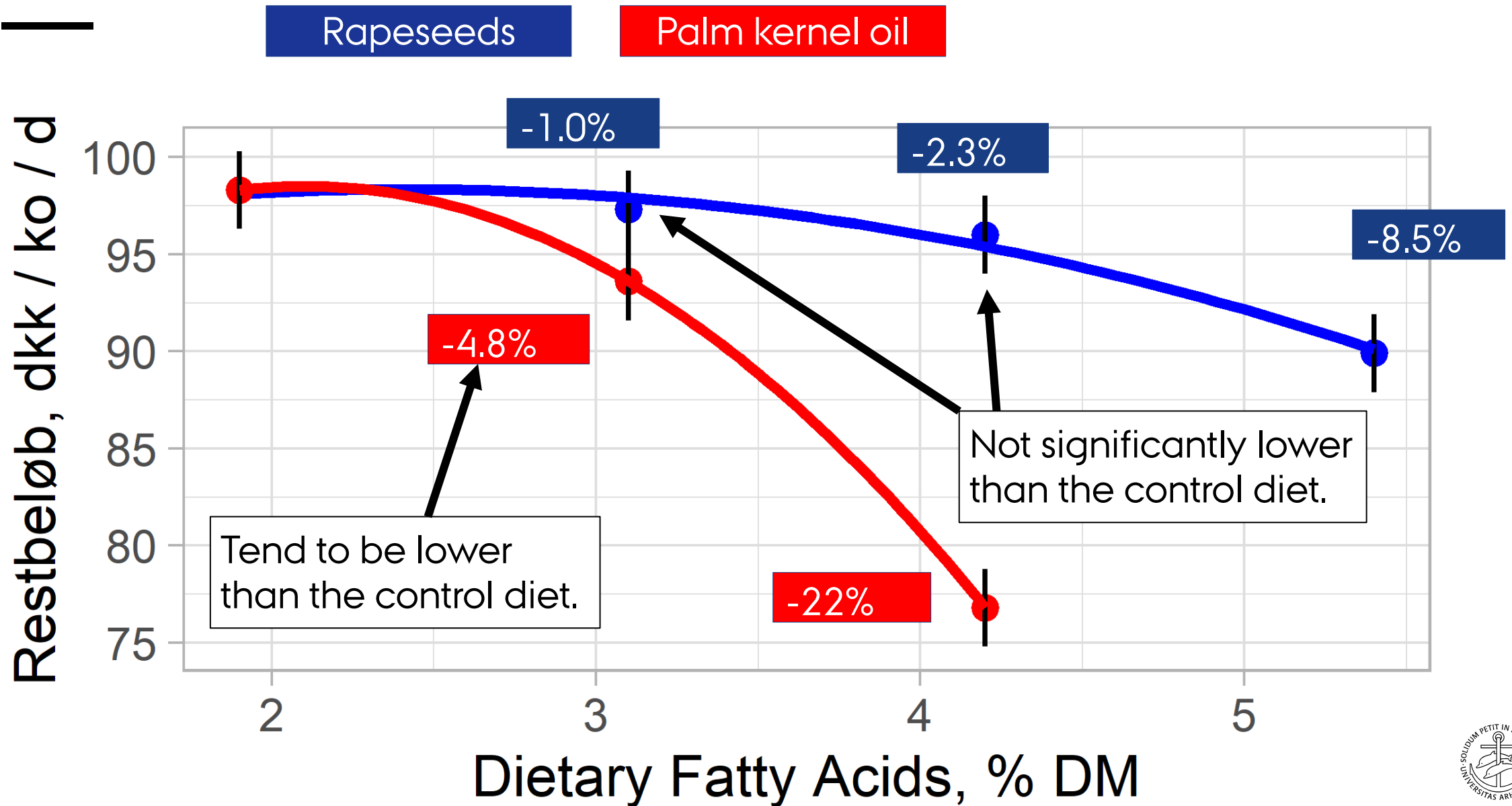
FAT SOURCES PRICES



Fat source

- Palm kernel oil
- Coconut oil
- Soybean oil
- Rapeseed oil
- Sunflower oil

INCOME OVER FEED COST (RESTBELØB)



PRELIMINARY CONCLUSIONS

Methane reduction (CH ₄ /DMI)		-5%	-10%	-15%
Restbeløb difference	Rapeseeds	-1.8%	-8.8%	-23.2%
	Palm kernel oil	-7.0%	-14.5%	-21.9%

Assumptions:

- Fixed milk price (June 2022)
- Rapeseed and palm kernel oil have the same price per kg of fat.
- Rapeseed and palm kernel oil price 90 dkk/kg of fat.
- Prices from stock market in June 2022, year with high volatility.

ACKNOWLEDGEMENT

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Cargill and **Carsten Brogaard, NLM Vantinge A/S**, for providing the palm kernel oil.

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