

Persistency of the effect of a whey protein emulsion gel on the proportion of poly-unsaturated fatty acids in milk

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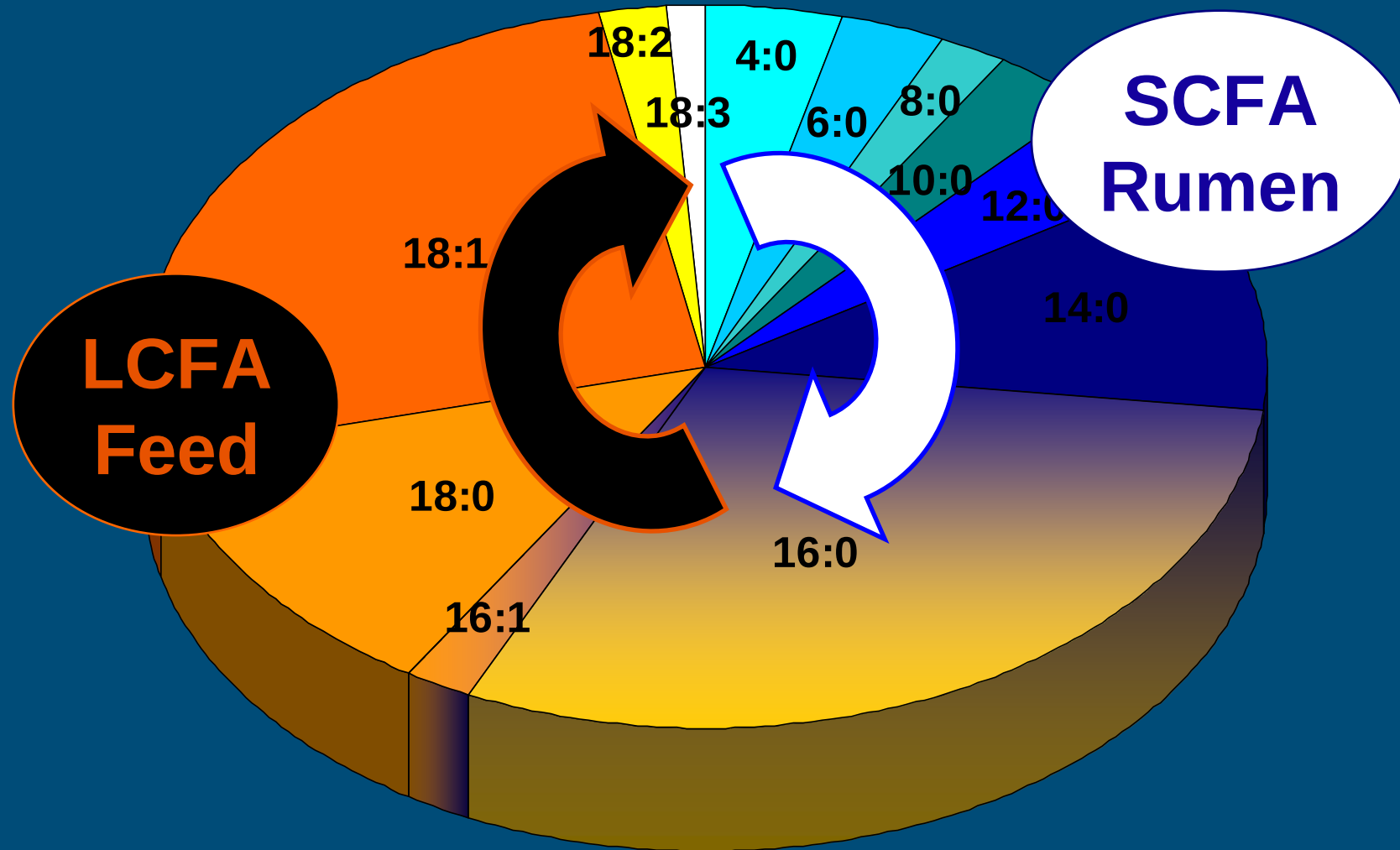
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Dietary fatty acids and human health

- Unsaturated fatty acids
- Omega 3 fatty acids
- Conjugated fatty acids



Fatty acids in milk



Unsaturated fatty acids in rations for dairy cows

- Hydrogenated in rumen
- Inhibit cell wall digestion
→ reduce feed intake
- Reduce milk fat concentration / yield



Fat protection

- Heat treatment
- Formaldehyde treatment
- Gelatinisation

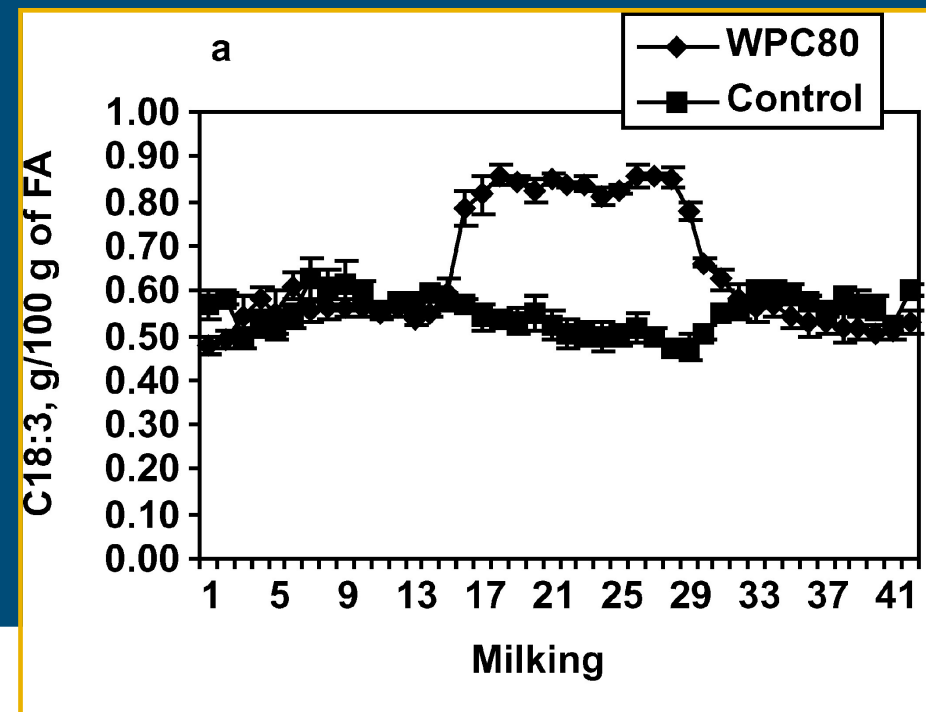
- Soap
- Acyl-amides



Effect whey-protein oil gel on milk fatty acids

- Emulsion of fat, water and protein
- Heated to form a gel
- Heat-treated protein is slowly degraded:
fat protected

- **Whey soybean oil gel:**
doubling milk linoleic acid
doubling milk linolenic acid
(Carroll, et al., 2006)



Effect whey-protein oil gel on milk fatty acids

Questions

- Effect on long term (> 1 week)?
- Supplementation of C18:2 and C18:3?
- Effect of basal diet:
fresh grass *versus* silage-based TMR?



Effect whey-protein oil gel on milk fatty acids

Experimental design

- Gel with soybean and linseed oils
(21% C18:1, 35% C18:2, 32% C18:3)
- Week 1 to 5: restricted grazing
Week 6 to 10: silage-based TMR
- 2 Treatment groups (16 dairy cows / group)
 - Control (no supplementation)
 - **WPEG 1.5 kg/d**





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Effect whey-protein oil gel on milk fatty acids

Measurements

- Feed intake and milk yield, daily
- Milk fat, protein and lactose, weekly
- Milk fatty acids, weekly

Statistical analyses

- Mixed model, random RA



Effect basal diet and **WPEG** on feed intake

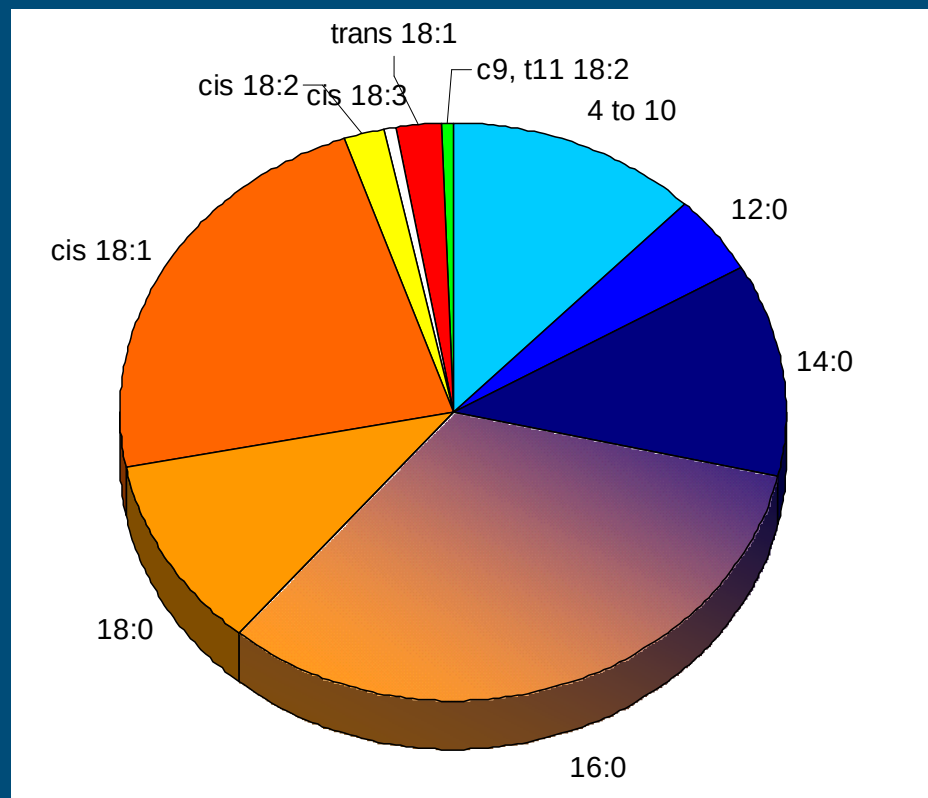
Parameter	Feeding regimen		Treatment	
	Restricted grazing [§]	TMR	Control	WPEG
Dry matter, kg/d	14.1	22.4	19.1	18.6
Crude fat, kg/d	0.2	0.5	0.4 ^b	0.8 ^a
DVE, kg/d	1.2	2.0	1.7	1.6
DVE balance	0.62	0.99		
NEL, MJ/d	97	148	127	131
NEL balance	0.64	0.98		
[§] Grass intake excluded!				



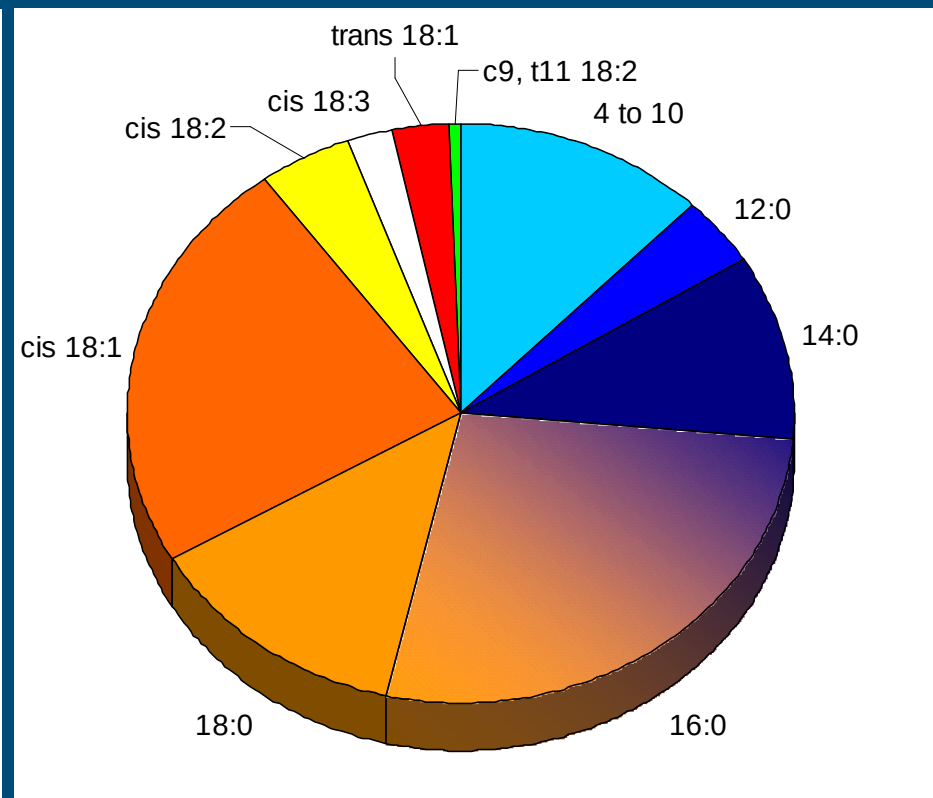
Effect WPEG on milk yield and composition

Parameter	Treatment		P	LSD
	Control	WPEG		
Milk yield, kg/d	34.9	35.0	0.90	1.93
Fat conc., g/kg	41.6	41.5	0.94	2.85
Protein conc., g/kg	33.6	33.8	0.62	1.51
Lactose conc., g/kg	44.9 ^b	46.6 ^a	< 0.01	1.00

Effect of WPEG on FA profile in milk fat



Control



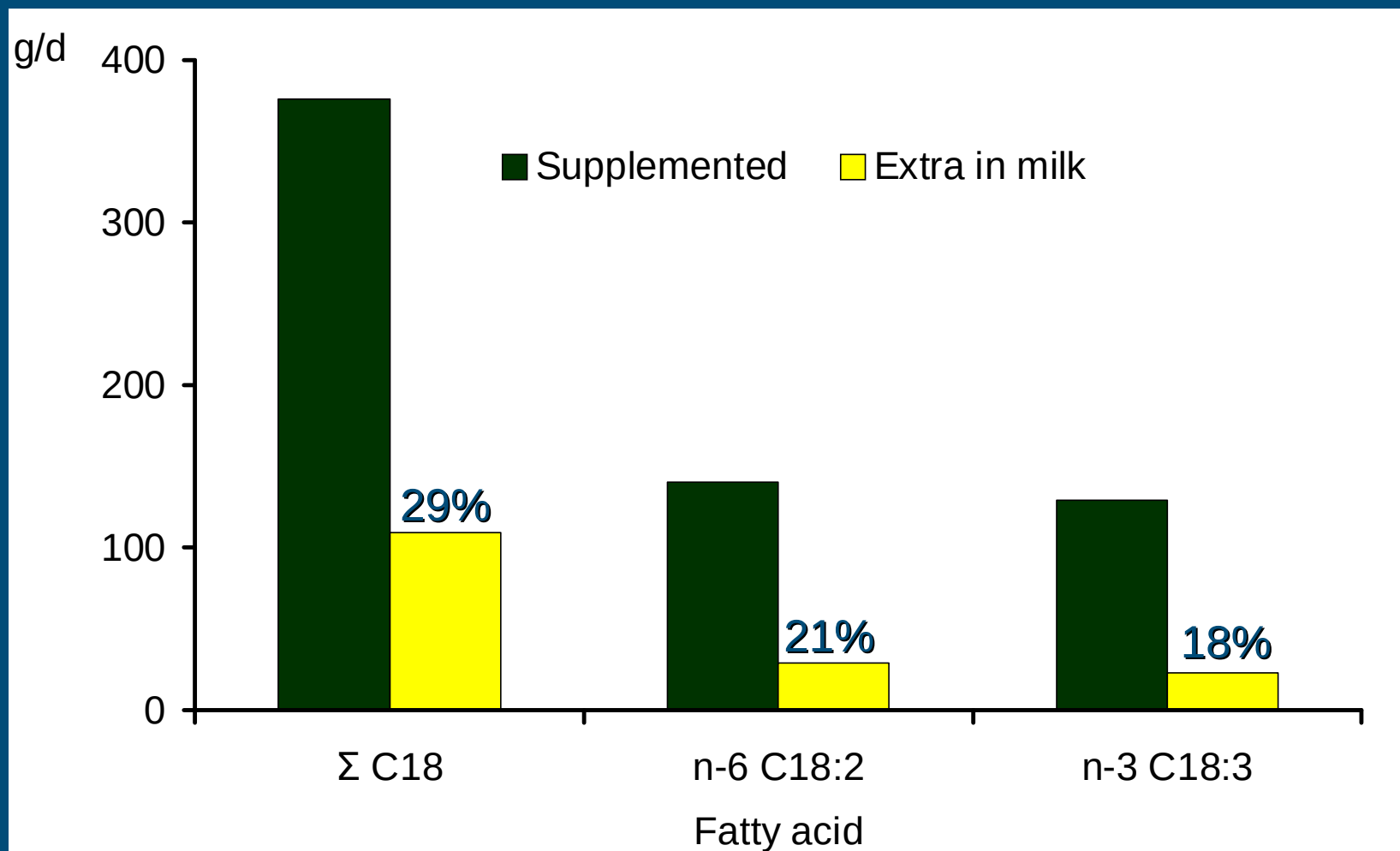
WPEG

All FA $\geq 12:0$: $P < 0.05$

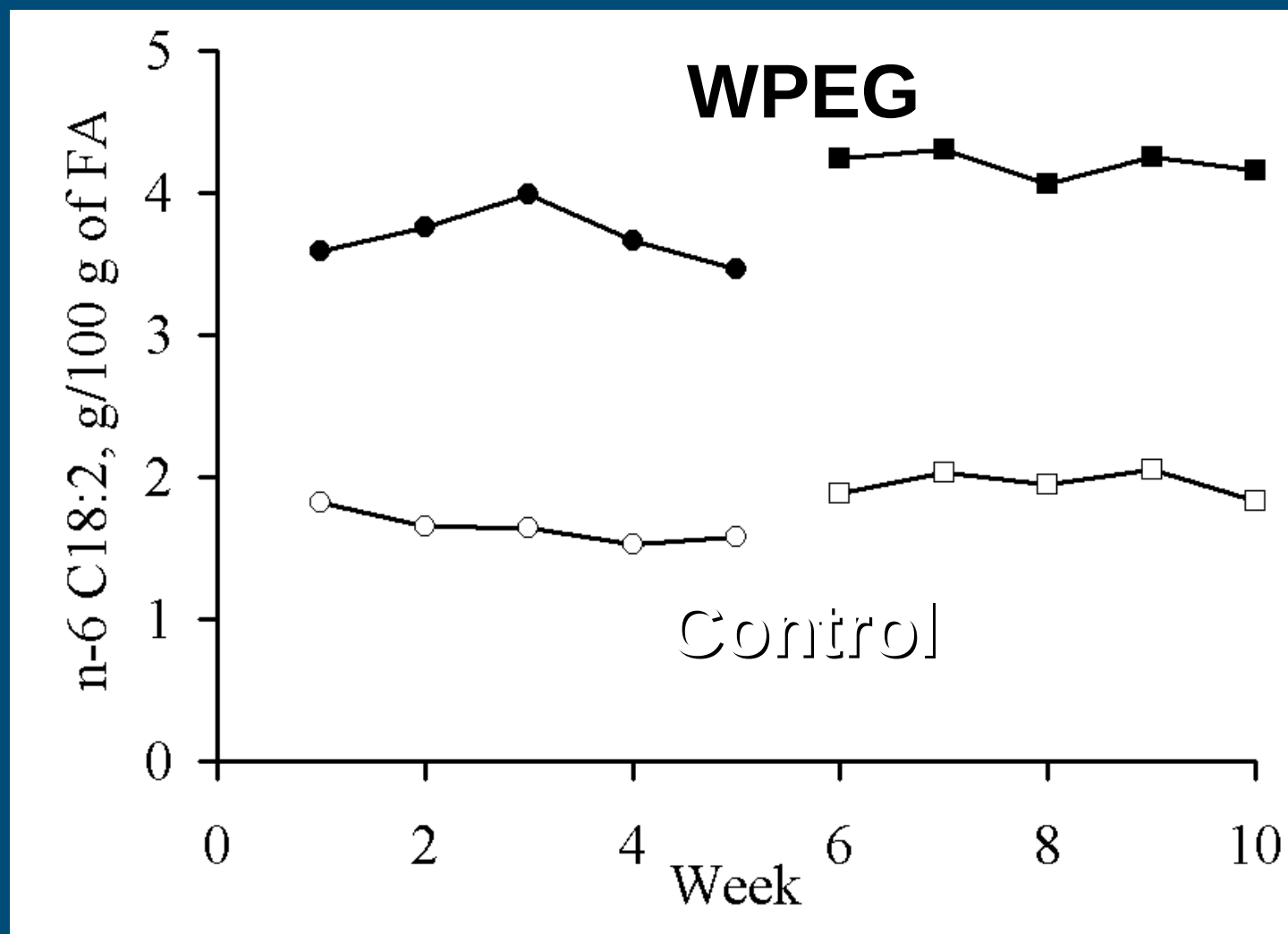


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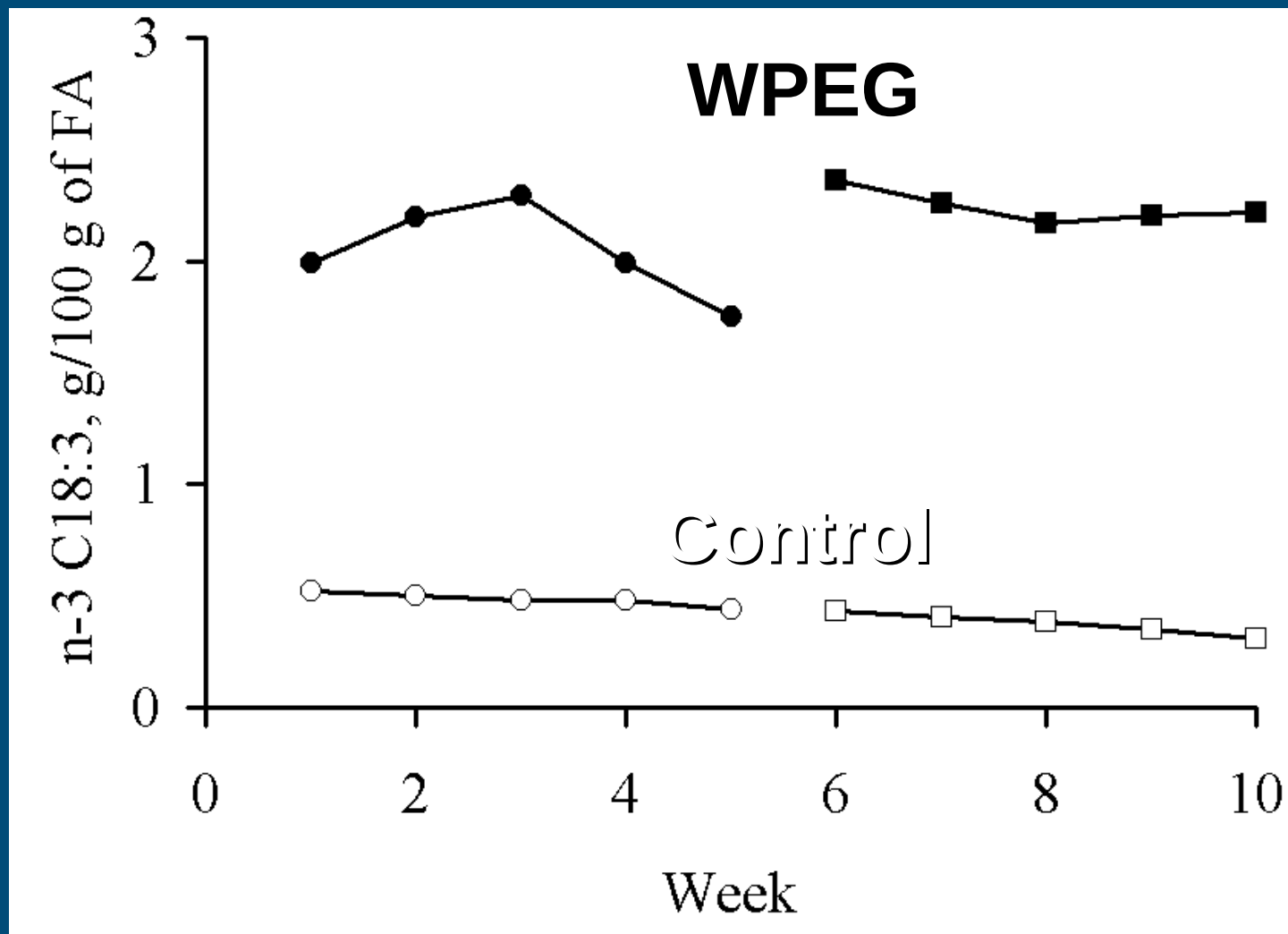
“Recovery” of supplemented FA



Effect WPEG on proportion of linoleic acid



Effect WPEG on proportion of linolenic acid



Conclusion

WPEG

- Persistent during 5 / 10 weeks
- Effective technology
- Not yet appropriate for practical application



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