# Fatty acids in sheep milk related to diet and season

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# Outline

- Introduction on fatty acids (FA) in sheep milk
- Farm survey in The Netherlands
- Relation milk FA – feeding regime
- Scope for affecting milk FA through feeding management

# Introduction

- Fatty acids are important for consumer health
- Ruminant products: a major source of FA in the human diet
- Data on FA in sheep milk are limited

- Categories of FA:
  - Saturated / unsaturated
    - **Mono-unsaturated (MUFA)**
    - **Poly-unsaturated (PUFA)**
  - Omega-3, omega-6, ratio omega-3:omega-6
  - CLA: conjugated linoleic acid

# Lipids in forage

- Forages for ruminants:
  - Summer: fresh grass, herbs
  - Winter: silage (grass, maize, other), hay
- Herbage lipids: mostly in green leaves
  Gradient in canopy horizons
- Fatty acid composition of grass: mainly unsaturated fatty acids

# Lipids in forage

- Low quantities of fat in DM, but intake is significant:
  - At 15 kg DM intake and 3 % fat in forage DM: 450 g fat/d
  - With 70% C18:3, 315 g C18:3/d is ingested with fresh grass
  - With15% C18:2, 68 g C18:2/d is ingested with fresh grass
  - Total 383 g PUFA ingested per day from forage
- C18:3 and C18:2 are substrates for microbial bio-hydrogenation in the rumen and precursors for PUFA in milk

# Farm survey in The Netherlands

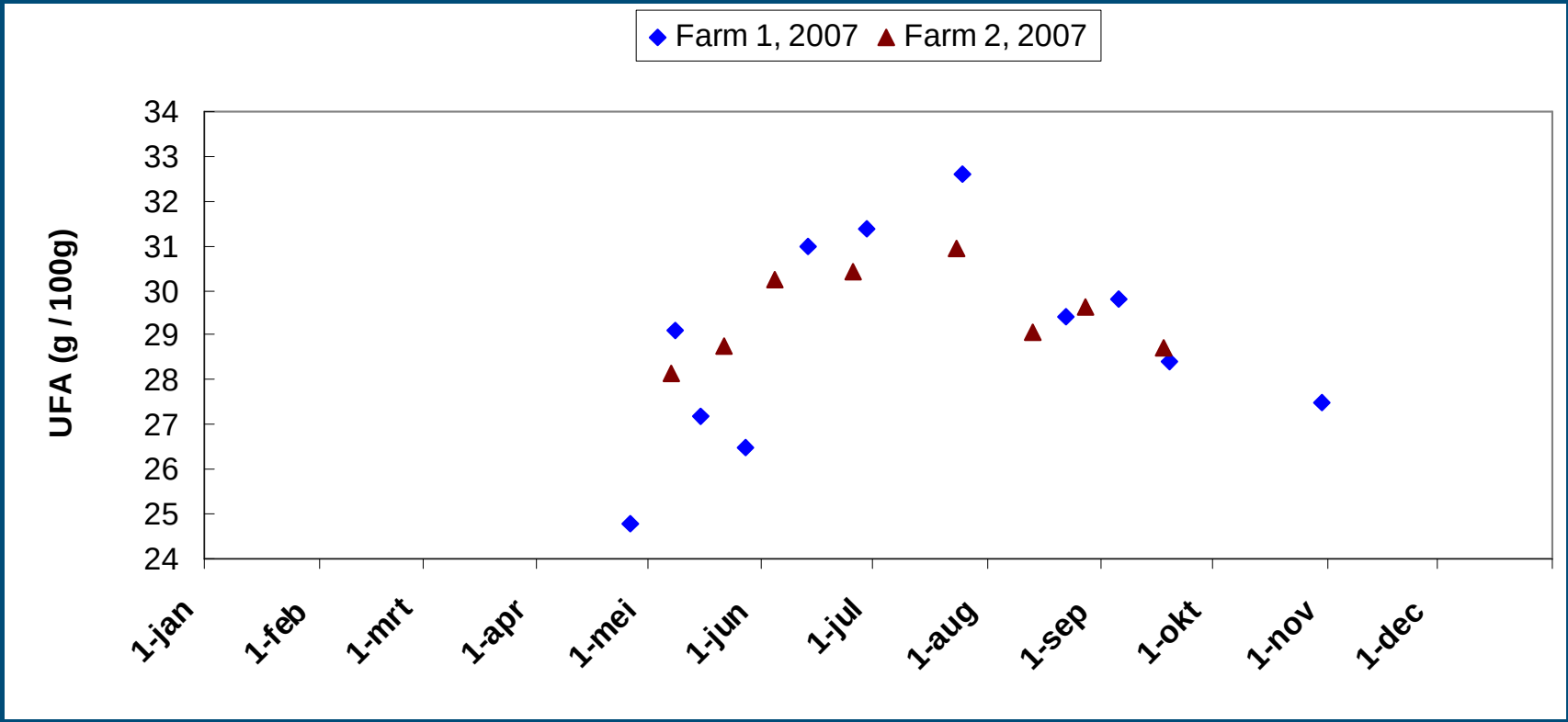
- Tank milk of 10 commercial dairy sheep farms in The Netherlands was sampled periodically in 2008/09.
- Management details and diet information were provided by the farmers.
- Fatty acid (FA) analyses were carried out
- FA profiles in milk were related to the rations fed in the weeks preceding samplings.

# Seasonal pattern in milk unsaturated fatty acids (UFA)

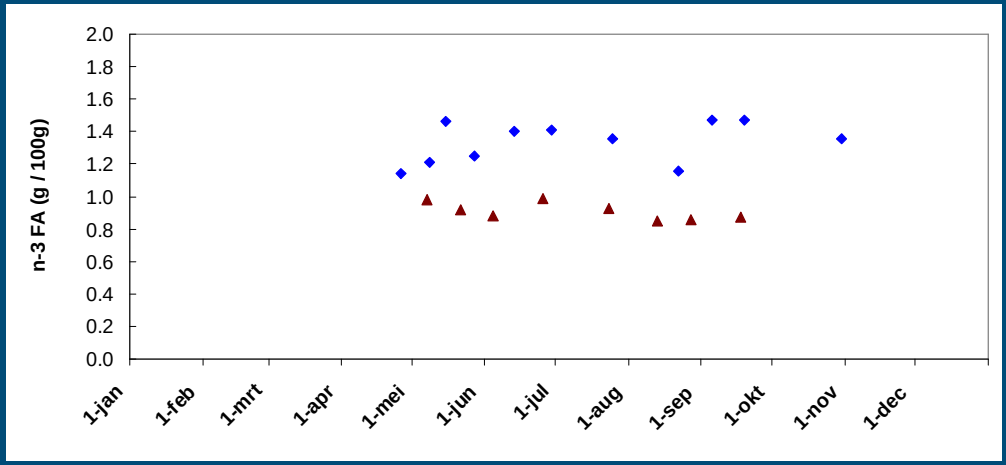
Grass-fed sheep grazing on pasture : highest UFA levels in summer

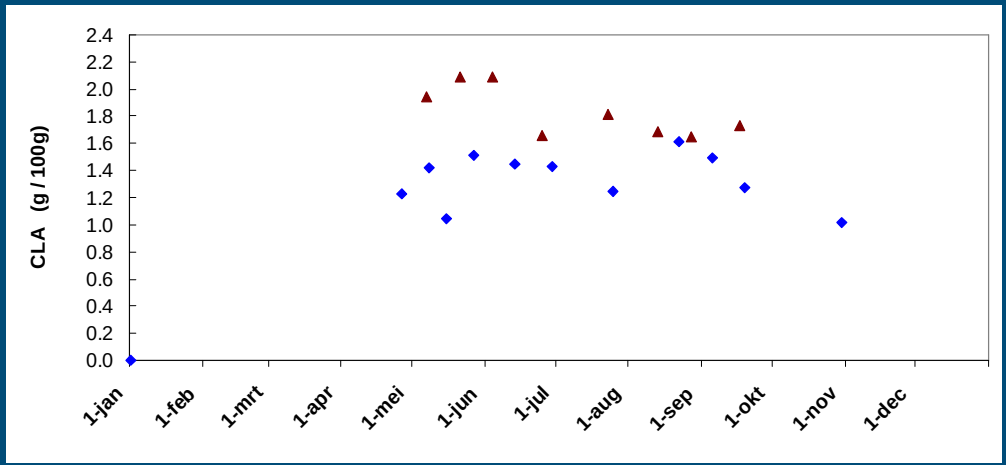
Farm 1: seasonal lambing (Feb), outdoor grazing apr-nov, 2 kg grass silage + 1.5 kg concentrate

Farm 2: seasonal lambing (Feb), outdoor grazing apr-nov, 1 kg concentrate



# Seasonal pattern in milk CLA and n-3 UFA




**Differentiation in UFA compounds:**

**Higher n-3 FA levels in farm 1**

**Lower CLA levels in farm 1 (with 2 kg grass silage and more concentrate)**

**Less seasonal fluctuation for n-3 or CLA than for UFA**

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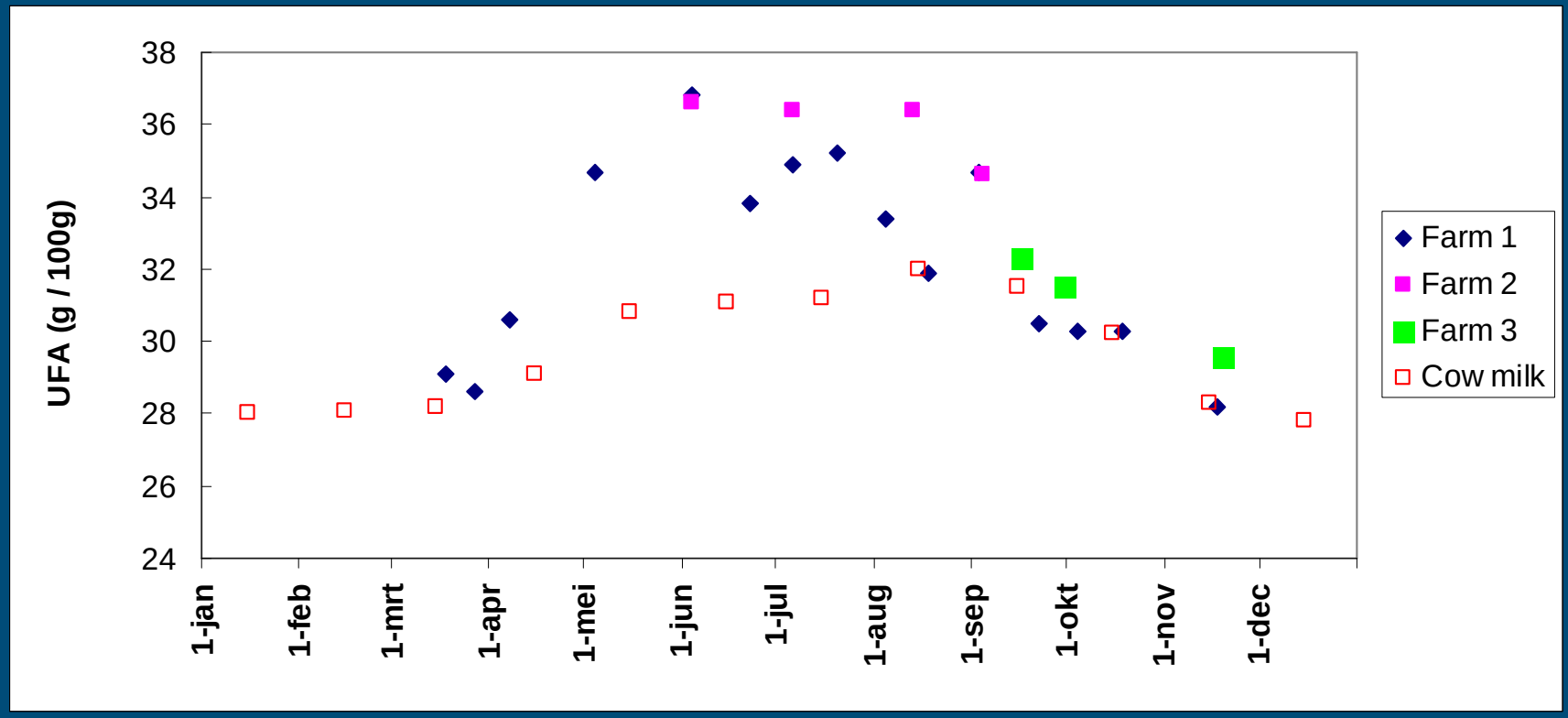
# Seasonal pattern in milk UFA of sheep and cows

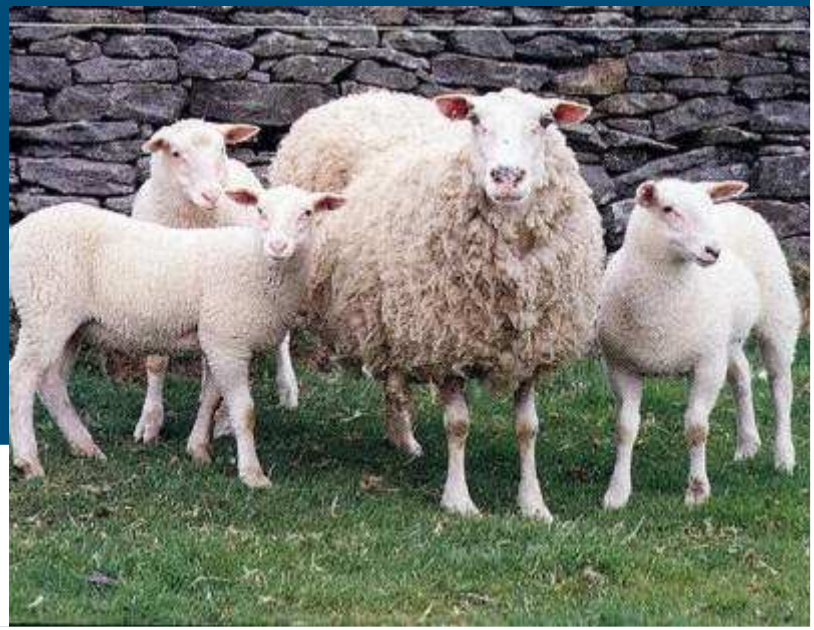
Grass-fed sheep – high UFA levels in summer

Higher levels in grass-fed sheep milk than in cow milk in 2008



# Sheep breeds

Most common breed on these farms: Friesian milksheep



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# Effect of days in milk on UFA in indoor kept sheep

Two breeds: Lacoune and Zwartbles

Lacoune

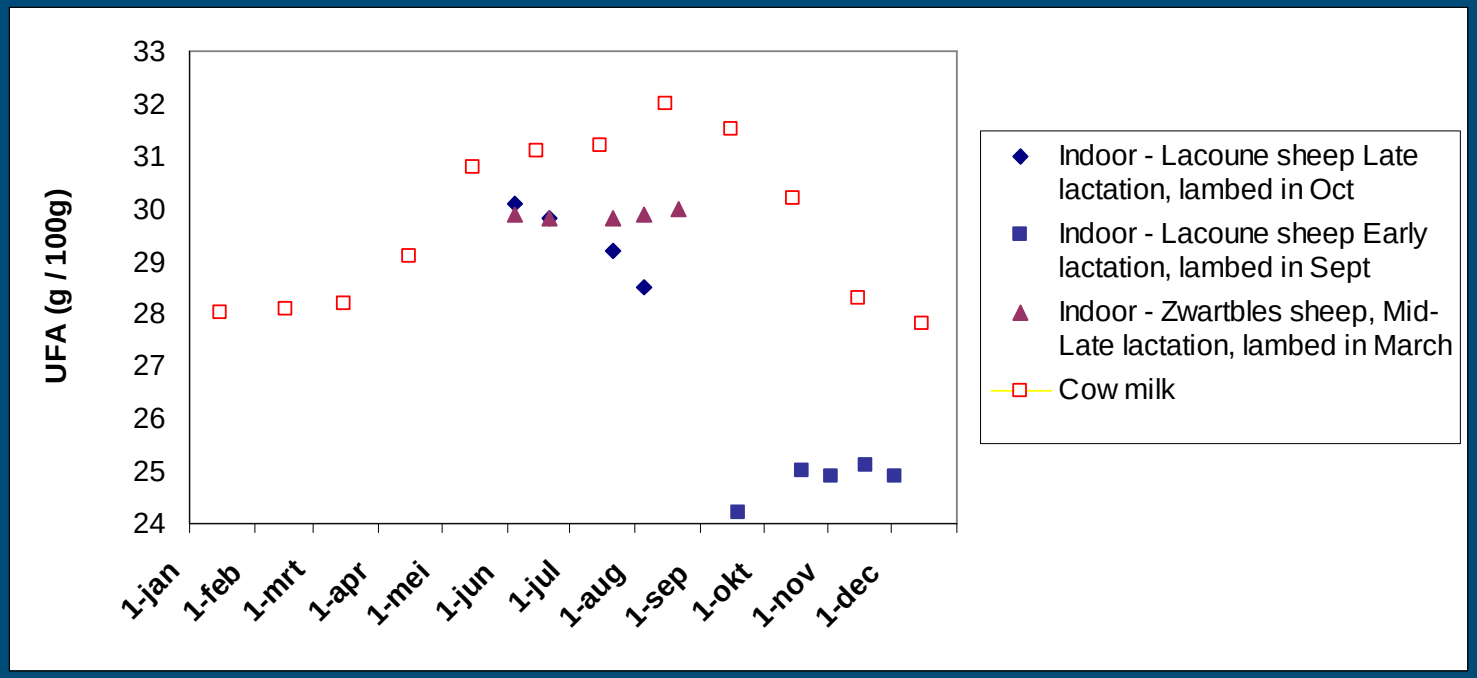
Zwartbles

# Effect of days in milk on UFA in indoor kept sheep

Two sheep breeds: Lacoune and Zwartbles

Diet: grass silage and concentrate; low UFA levels

Lower UFA content in milk after lambing

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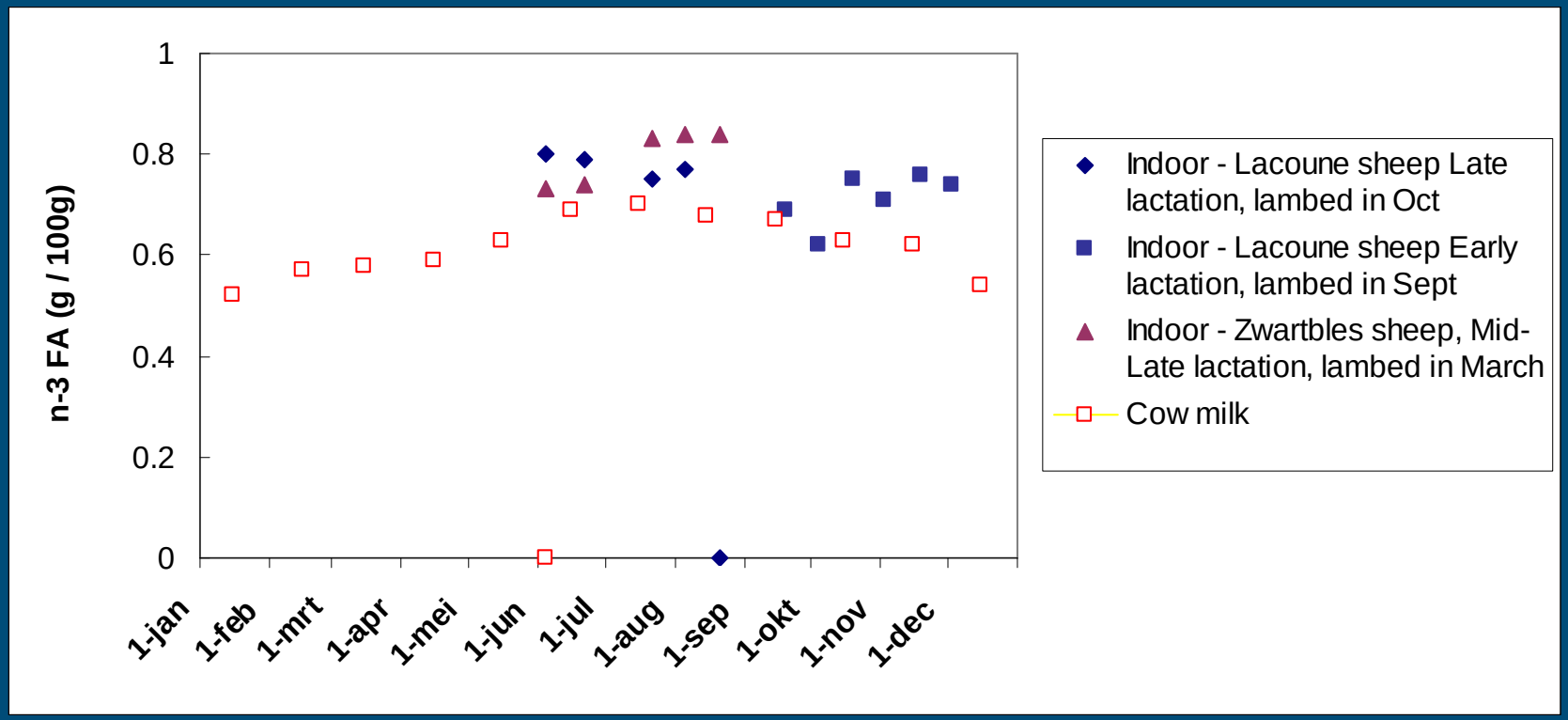
# Effect on omega-3 (n-3) FA in indoor kept sheep

Two sheep breeds: Lacoune and Zwartbles

Slightly higher n-3 FA levels in sheep than in cow milk

Slightly lower n-3 FA in milk after lambing



# Conclusions

- Grass-fed sheep – seasonal pattern: high UFA levels in summer, reflecting high fresh grass intake

- Higher UFA levels in milk of grass-fed sheep than in cow milk
- Lower UFA levels in milk of indoor-fed sheep than in cow milk

- Effect of days in milk: lower UFA content in milk after lambing
- Slightly lower omega-3 FA content after lambing
- No clear effect of breed with Lacoune or Zwartbles sheep

# Thank you for your attention

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