

Components in the milk which may become important in the future.

Detailed milk fatty acid profiling of the Danish dairy cattle population.

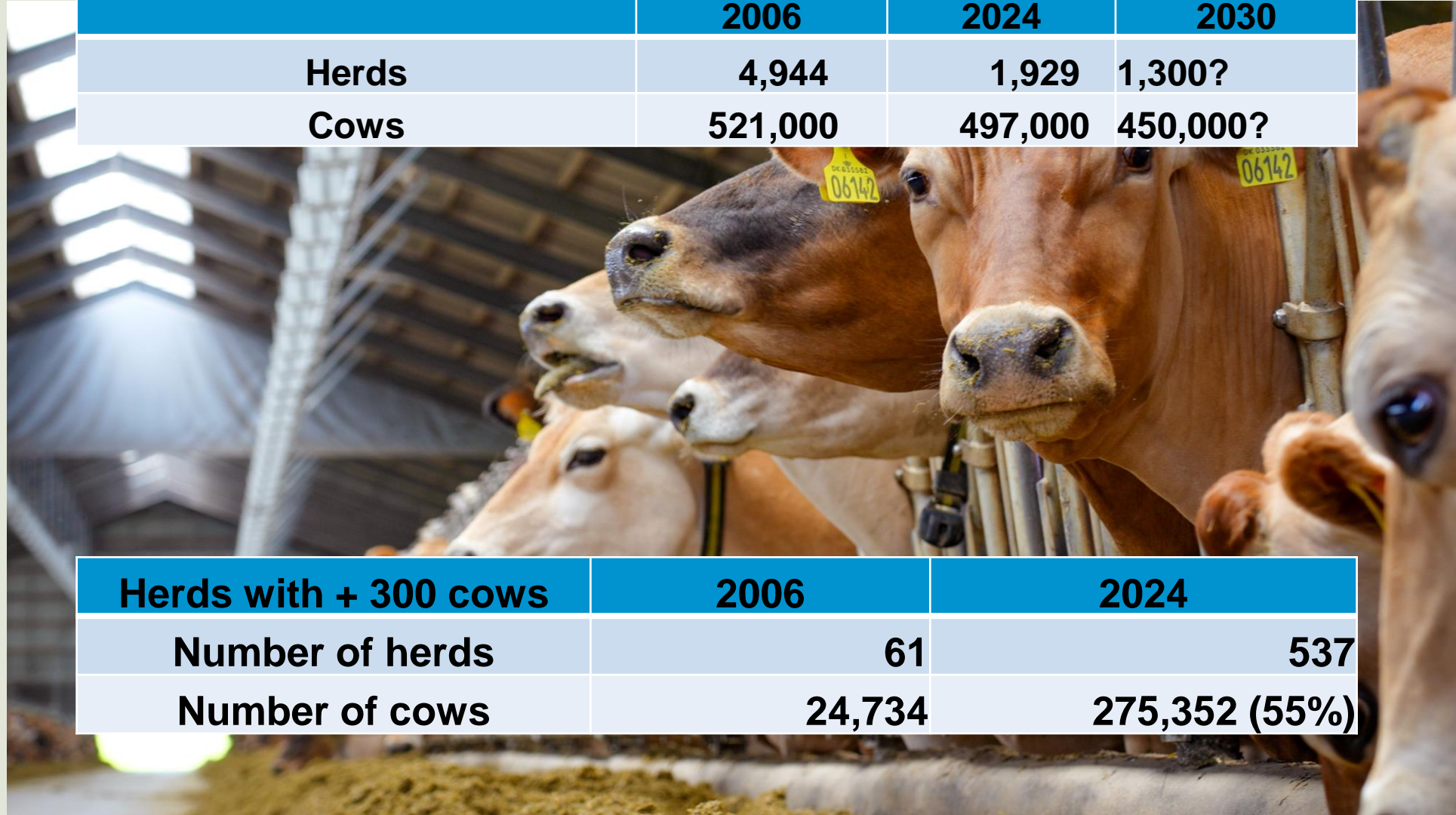
World Jersey  
Conference  
May 18th.  
Niels Henning Nielsen  
nhn@vikingdanmark.dk



# Number of DHI herds and cows

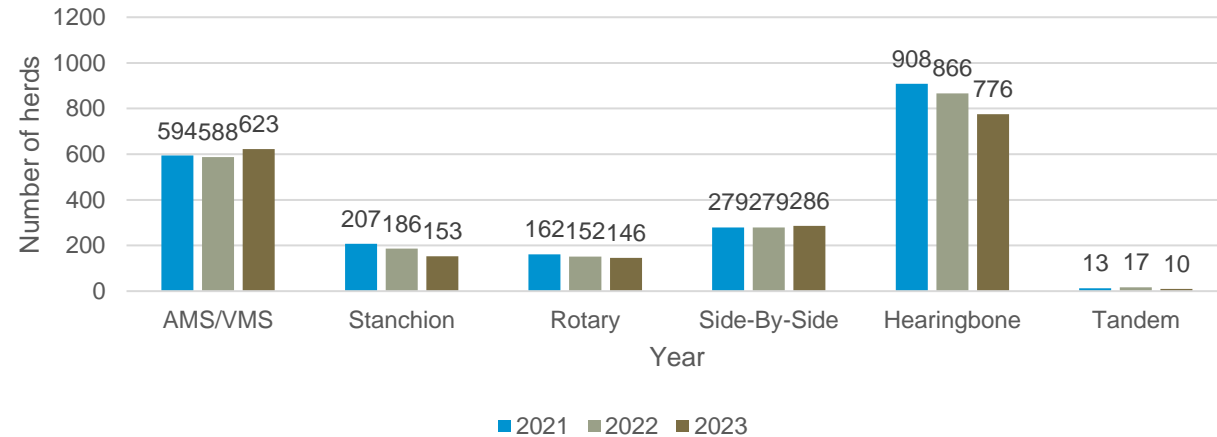
	2006	2024	2030
<b>Herds</b>	4,944	1,929	1,300?
<b>Cows</b>	521,000	497,000	450,000?

<b>Herds with + 300 cows</b>	2006	2024
<b>Number of herds</b>	61	537
<b>Number of cows</b>	24,734	275,352 (55%)

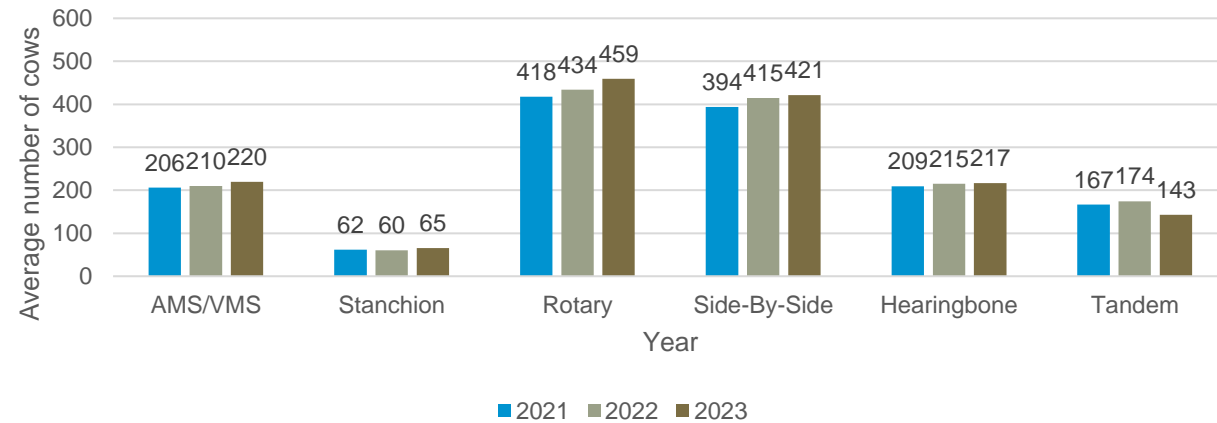


# Milking system 2021-2023

Number of herds and milking system



Average number of cows and milking system



## KEY IS THE SAMPLE

### Standard

Fat

Protein

Cell count

BHB

Urea

Fatty Acid

### Additional

Johnes

Salmonella Dublin

Pregnancy (PAG)

PCR (16 pathogens)



# Why Fatty Acids in Milk is Interesting

- Benefits from a healthier FA profile of milk
  1. Improved diets and reduced associated health risk
  2. Reduced use of non-sustainable palm oils for cows
  3. Reduced harmful greenhouse gas emission
  4. Increased sales and enhanced reputation (retailer)
  5. Increased payment to dairy farmers

Source: Case study, University of Reading, UK

# Why FATTY Acid is interesting? Others will say..

- Is milk an important dietary source of omega-3 fatty acids? Not really. Not to criticize milk – it is valuable source of protein, Vitamin D, Riboflavin, Vitamin B12, Phosphorus and Calcium, and my family drink a lot of milk with every day.
- . . . .According to the USDA standard reference database, ... You get more than 20 times the omega-3 fatty acids from a serving of salmon that I get from a glass of milk, and they are the long-chain varieties. And if the milk is non-fat or skim the amount goes down to [0.0049 grams](#) of omega-3s, because – well they removed the fat!

# Miracle milk will cut fat in a pinta

(Express Oct 11, 2011)

A NEW “super healthy” milk which promises to slash 84 tons of saturated fat a year from the nation’s diet goes on sale this week.



Healthy option, the new M&S milk

**The revolutionary pinta comes from cows fed only a natural diet, reducing the amount of harmful fat**

Slashing the amount of saturated fat in our diet could drastically reduce the toll of Britain’s biggest killer, heart disease, and save the NHS up to £3billion a year. And reducing intake to around 20g a day can cut cholesterol by up to 10 per cent.

- **The aim of SOBcows: Investigate opportunities to develop organic cowlines producing milk with a healthier FA profile**
- Runs 2014-2018
- More than 3,5 million milk samples (organic and conventional), .
- Routine milk recording scheme applied.
- Using milk infrared spectroscopy MilkoScan™ FT+/FT6000.
- Foss Application Note 64.
- 11 FA categories (seven FA groups and four individual FA).



# Milk fat

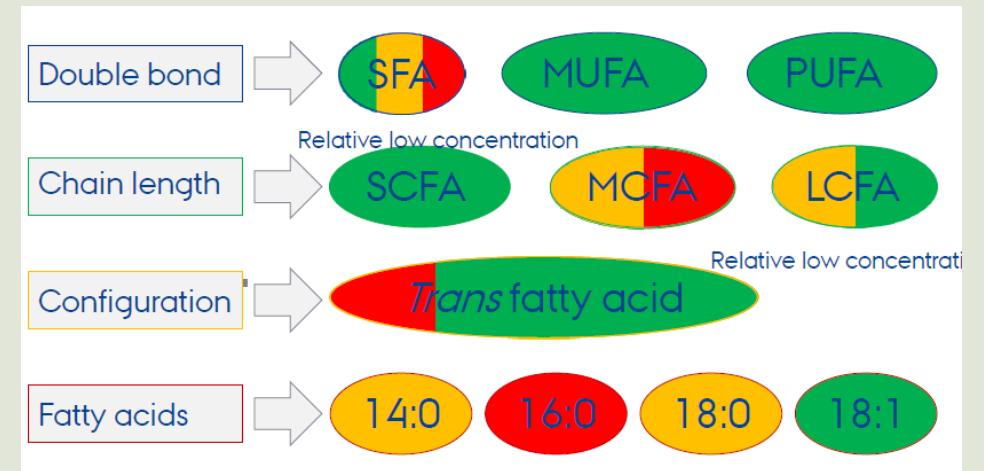
De Novo

Mixed

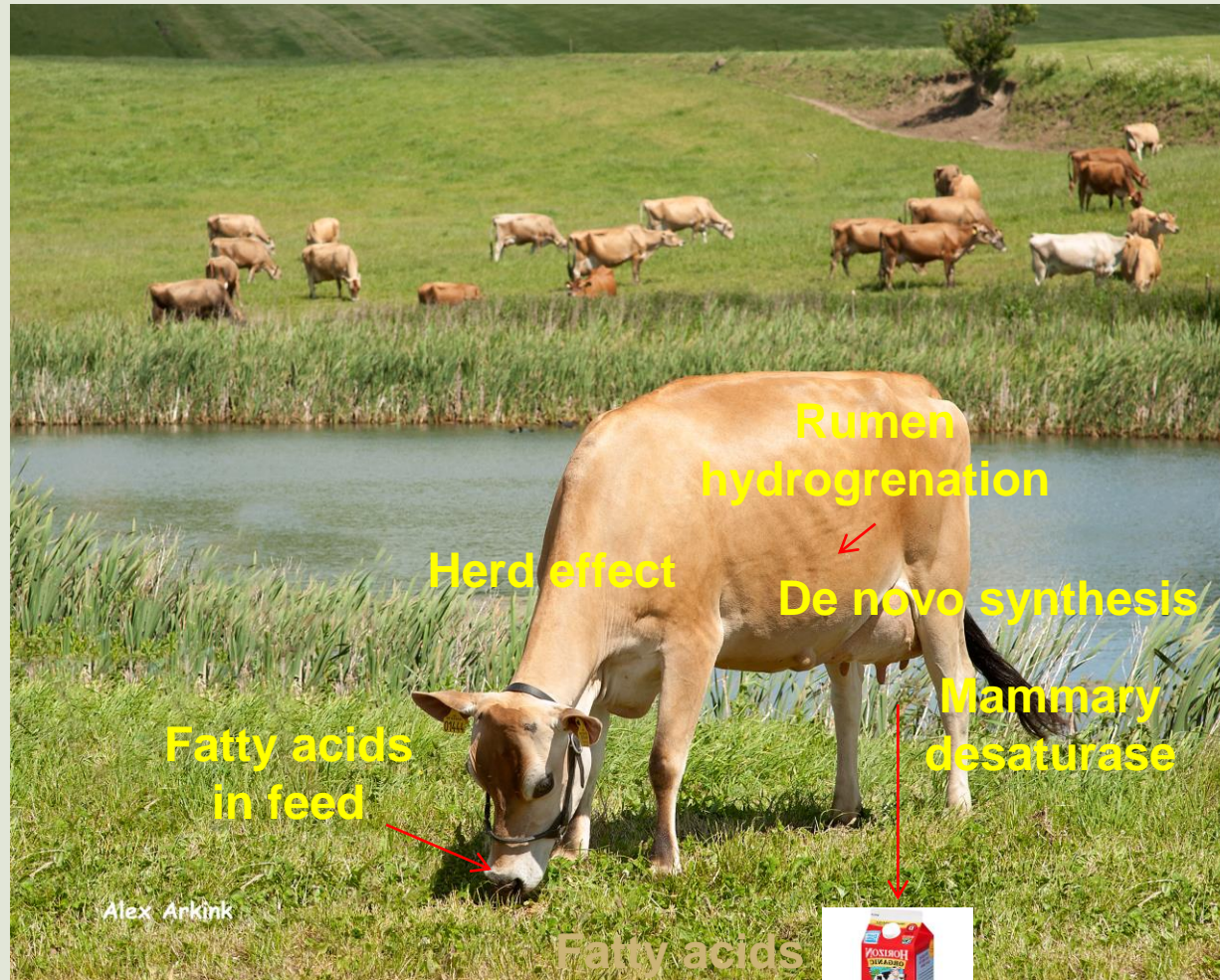
Preformed

FA	% in milk
C4-C14 Saturated	10-20
C16:0	22-45
C18:0	6-12
MUFA Mainly 18:1	15-30
PUFA 18:2 and 18:3	2-5

## Fatty Acid Prediction based on Milkoscan: FOSS application note 64



# Sources of Fatty ACIDS in Milk

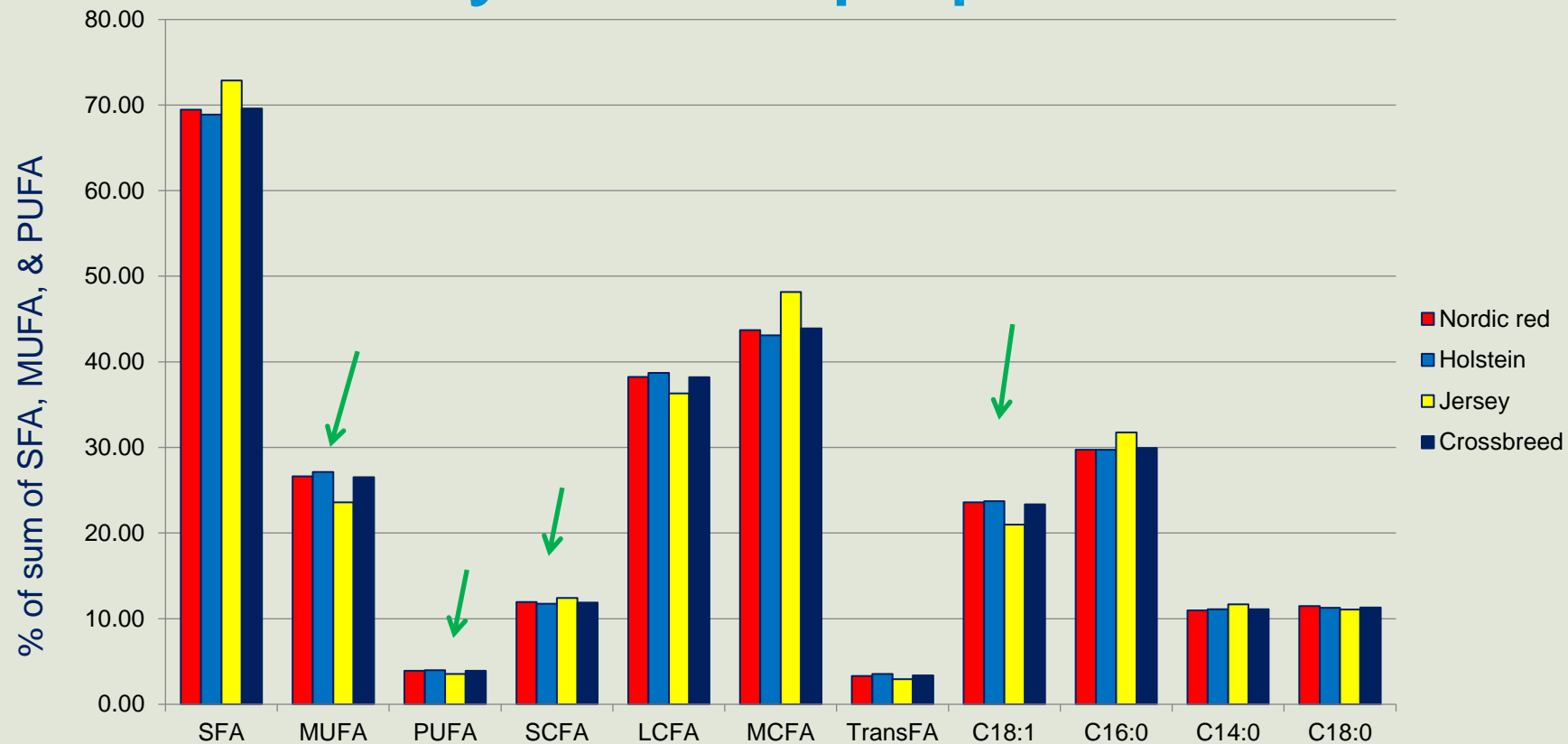


Alex Arkink

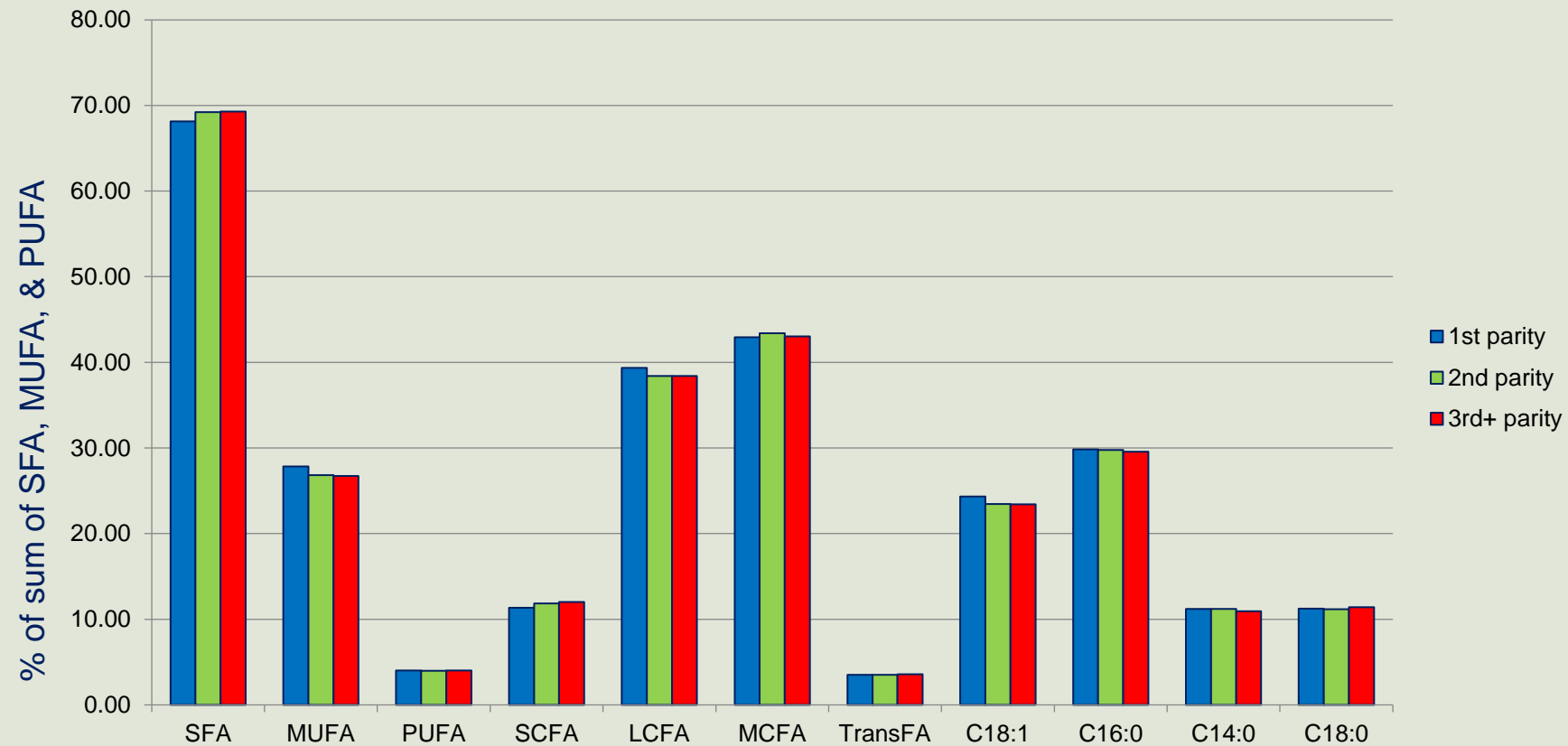
Fatty acids  
in milk



# Effect of breed on fatty acid composition of danish dairy cattle population

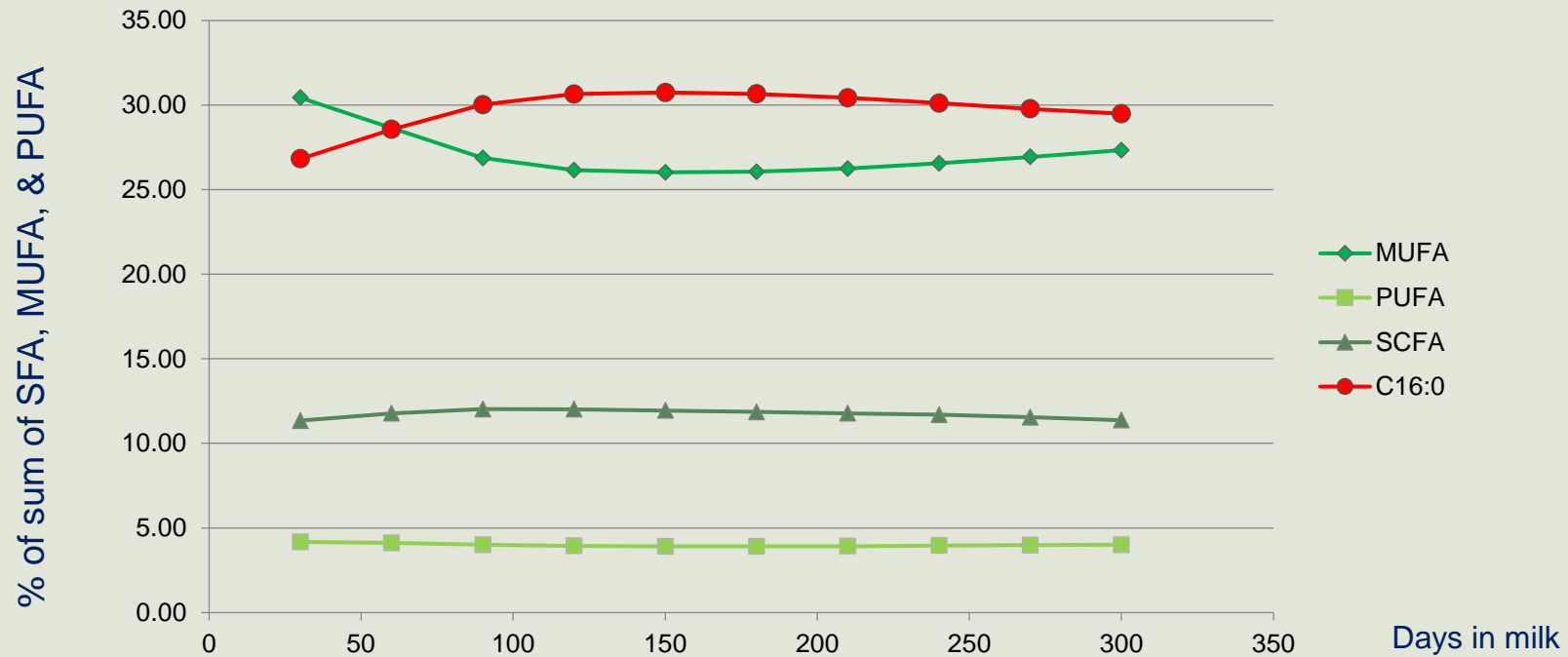


The effect of Parity (DH only) on FA composition was significant for All FA and parity Levels



Effect of parity on fatty acid composition of Danish Holstein milk.

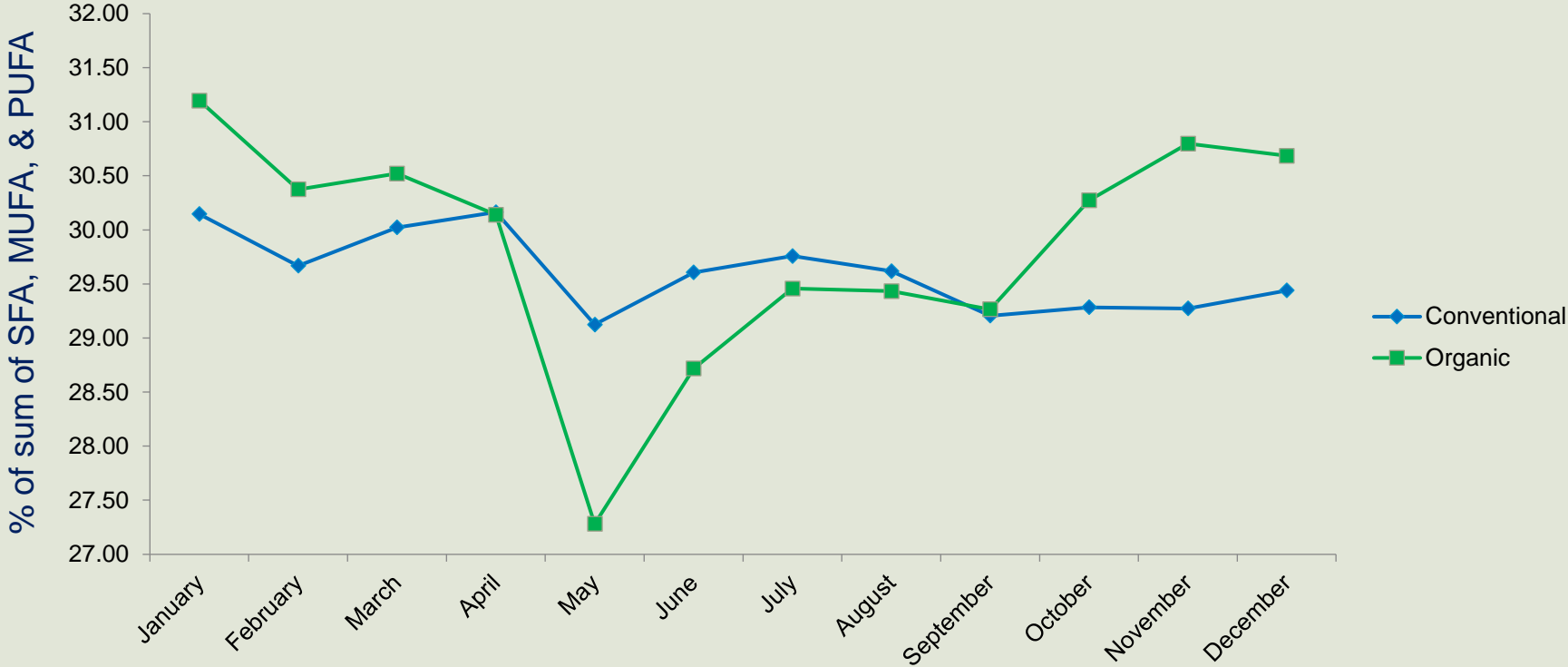
# Effect of lactation stage of Fatty acid (MUFA, PUFA, SCFA, C16:0)



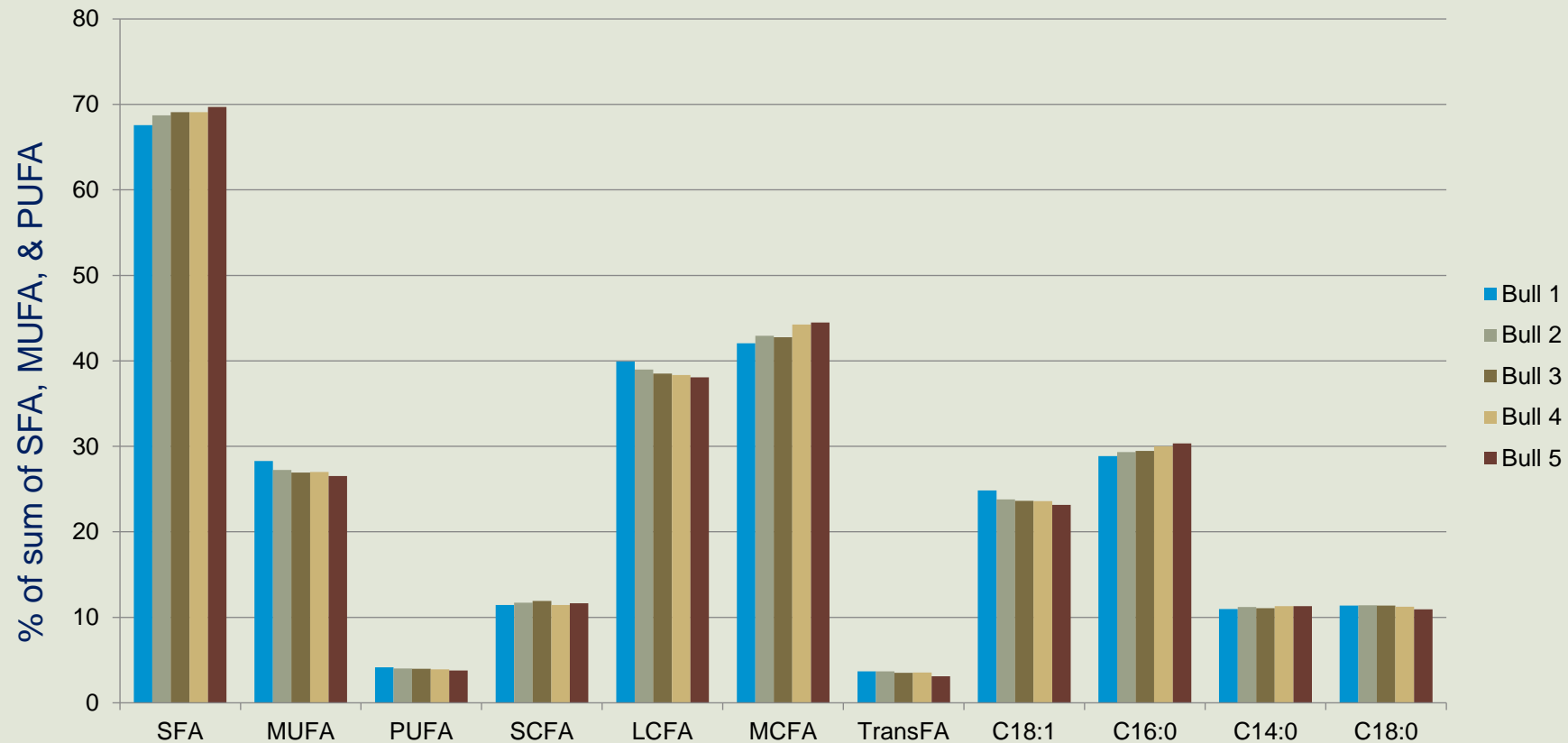
Effect of lactation stage on fatty acid composition of DH milk

# Effect of production system x season on the proportion C16:0

C16:0



## Genetic effects on FA composition from five bulls (with the most daughter observation in the data set)



# Detailed milk fatty acid profiling Conclusion from SOB-Cow project

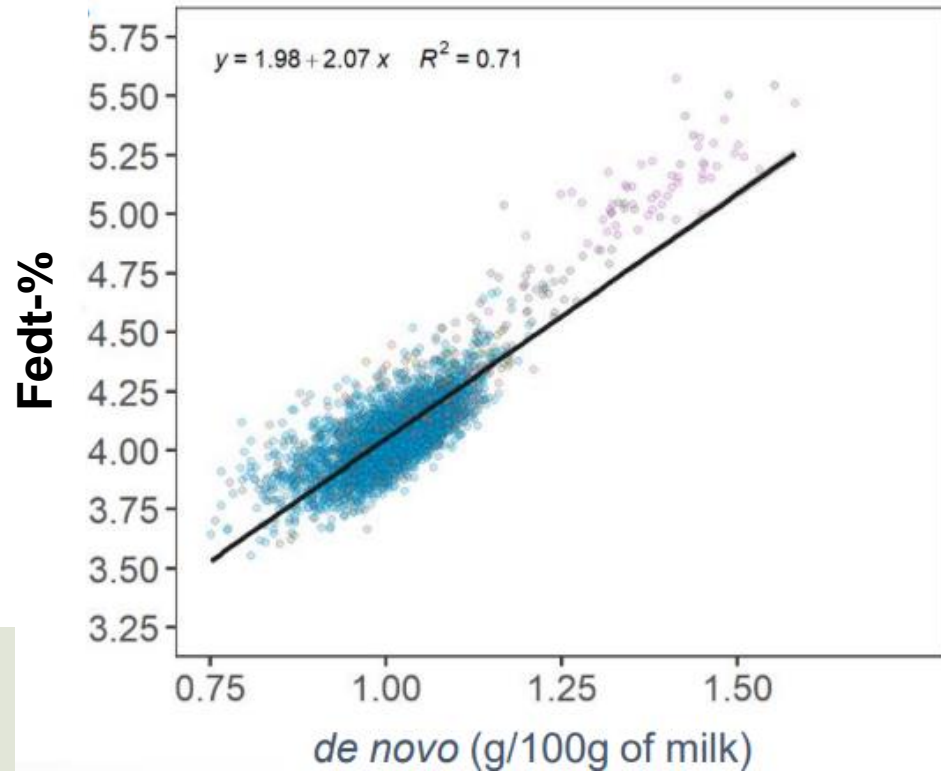
## Effect of:

- ✓ Race
- ✓ Production systems (Organic/Conventional)
- ✓ Parity
- ✓ Lactation stage
- ✓ Season
- ✓ Genetic variation between bulls
- ✓ Feed – Yes

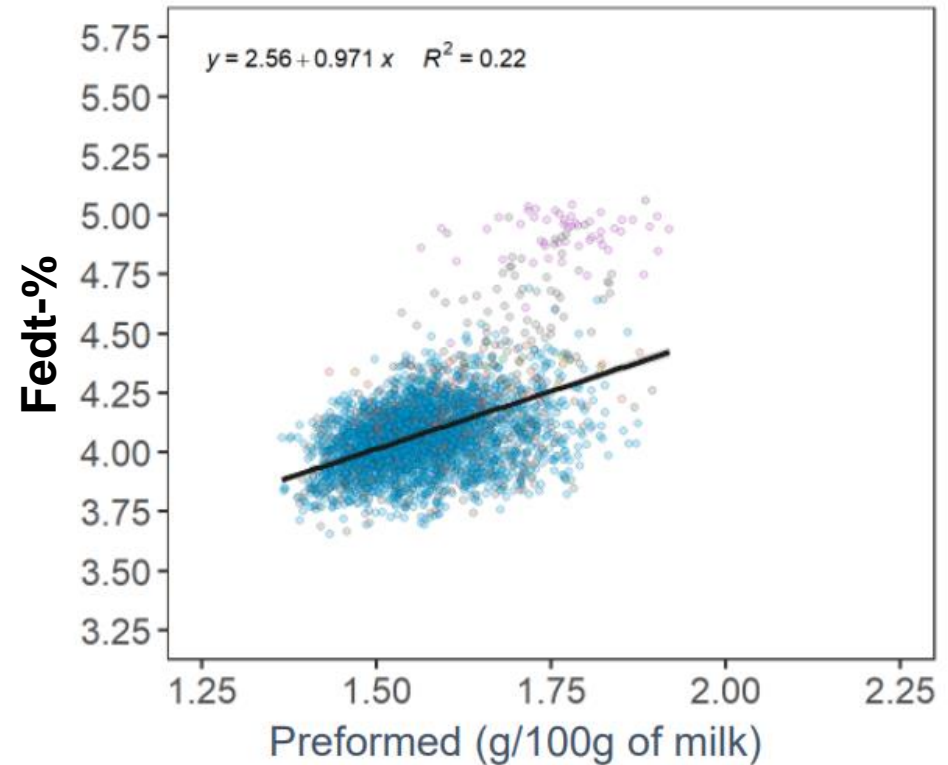


# De Novo explains changes in fat %

## De novo



## Preformed



# Herds with higher de Novo gives higher production

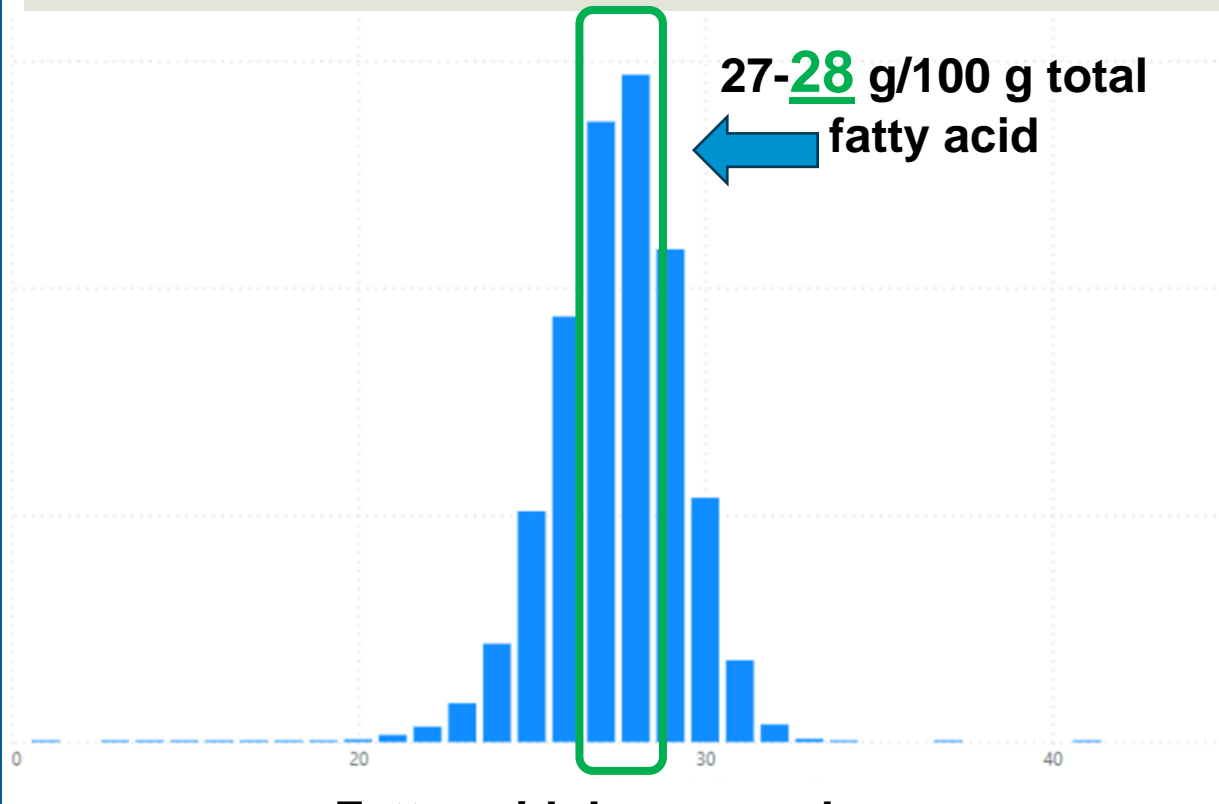
- Average from Quebec, Canada, march 2021 – app. 3380 herds

	De novo kategori			P-værdi
	Low	Medium	High	
De novo konc., g/100 g fatty acids	24.22	25.85	27.08	
<b>Herd-parametre</b>				
Milk, kg/d	32.5	33.8	34.2	<0.001
Fat, %	4.10	4.13	4.14	<0.001
Fat, kg/d	1.30	1.34	1.40	<0.001
Protein, %	3.12	3.20	3.27	<0.001
Protein, kg/d	1.04	1.10	1.16	<0.001
Cell count, x1000	176	164	159	<0.001

# Distribution of de Novo fatty acids in DK

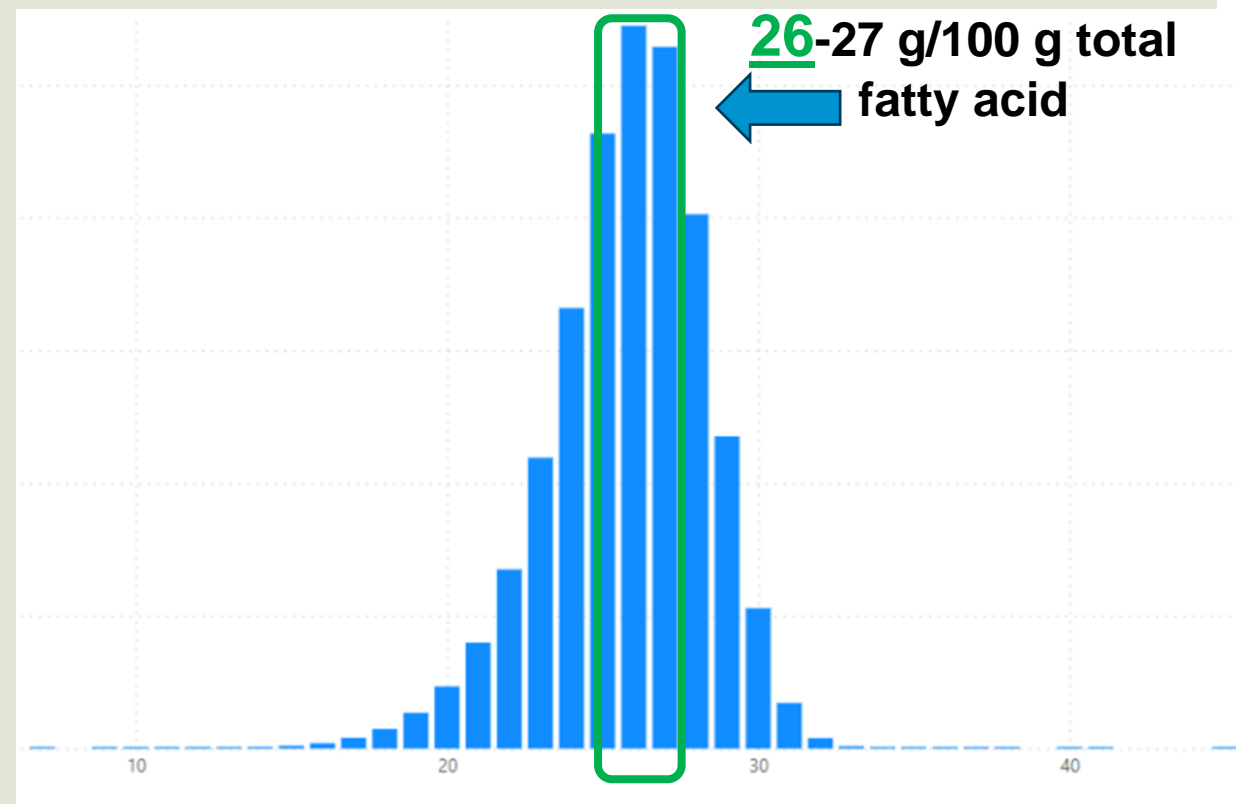
Data from milk recording on herd level

JERSEY



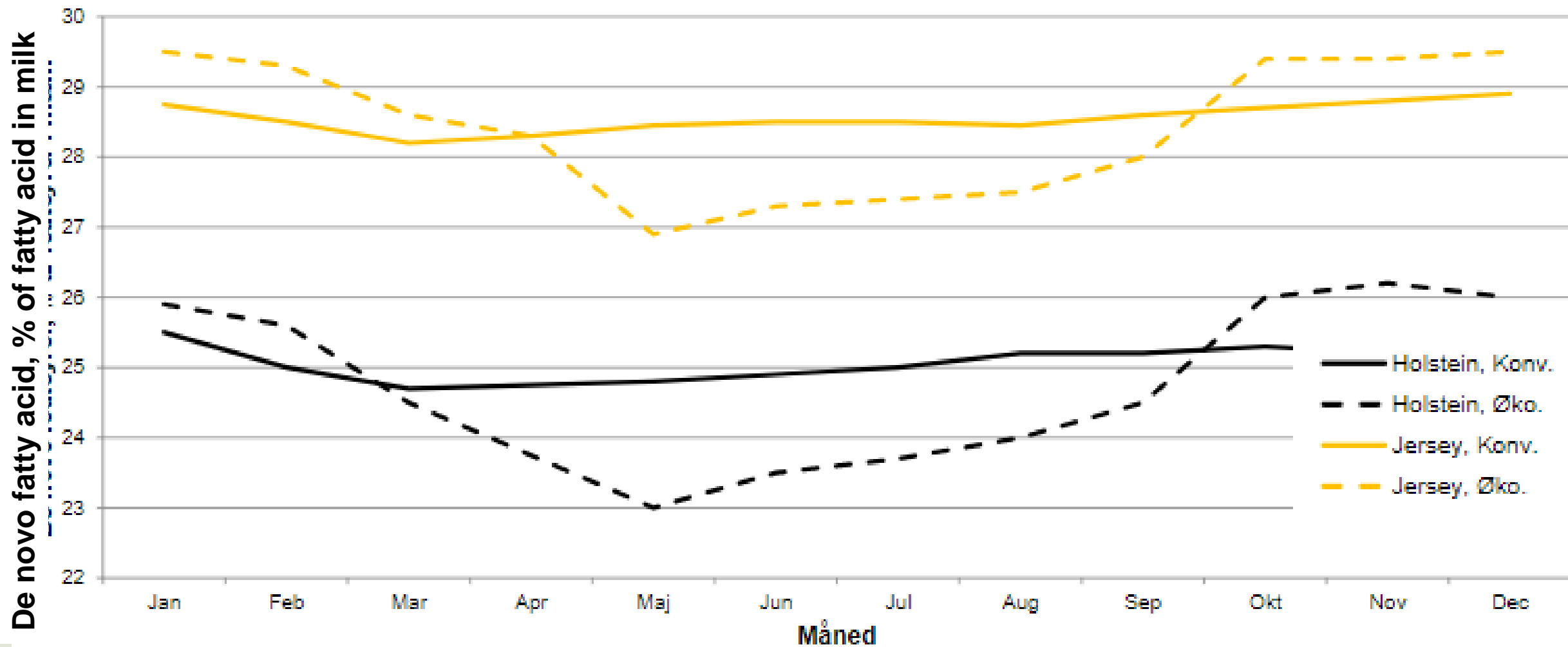
Fatty acid de novo value

HOLSTEIN



Fatty acid de novo value

# Distribution in de Novo fatty acid over the year and distributed pr race and konventionel/organic



## Fedtsyre målinger

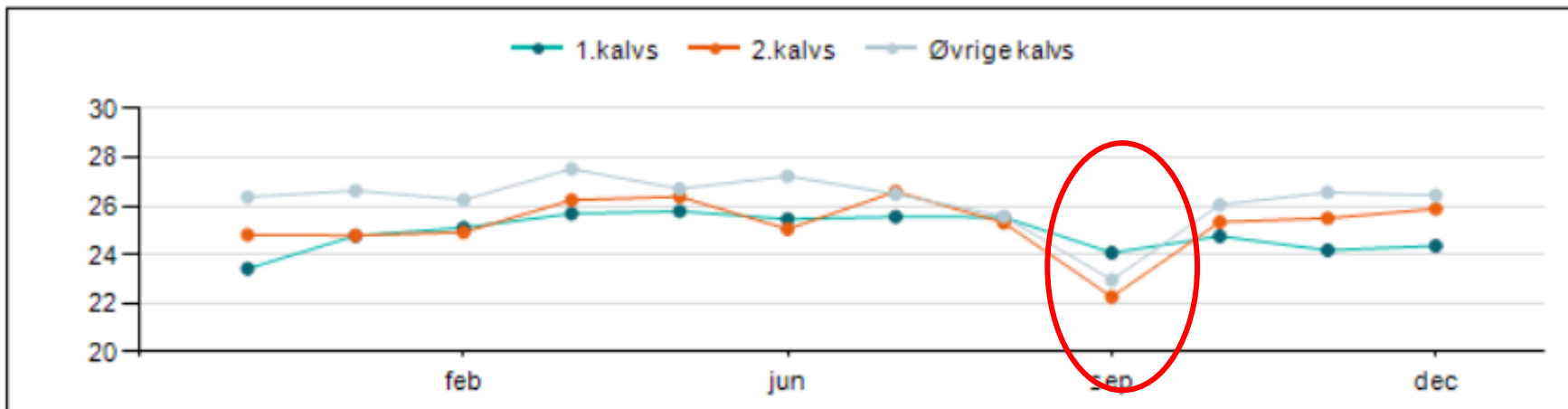
De novo fedtsyre målinger (g fedtsyrer / 100 g totale fedtsyrer) på kontrolldato

	9/8	20/9	12/10		Alarmgrænse
Kritiske køer % 120-250 dage	1 % (1)	17 % (12)	1 % (1)		
Gns. de novo, alle køer 120-250 dage	25,5 (73)	23,2 (69)	25,4 (70)		
- 1. kalvs 120-250 dage	25,5 (22)	24,1 (25)	24,8 (25)	✓	23
- 2. kalvs 120-250 dage	25,3 (21)	22,3 (18)	25,3 (16)	✓	24
- Øvrige kalvs 120-250 dage	25,6 (30)	23,0 (26)	26,1 (29)	✓	24

Andel kritiske køer med De novo fedtsyremåling under 20 g fedtsyrer / 100 g fedtsyrer

Decrease in fat %  
connected with  
low de Novo  
Many cows  
under 20 g de novo  
→

De novo fedtsyre målinger (g fedtsyrer / 100 g totale fedtsyrer) seneste 12 måneder, alle køer 120-250 dage



# Perspectives

- Genetic potential
- Feed effect – the farmer have influence
- Indirect survaillence system – better feed effeciency
- Herd health
- Healthier products "the story".
- Methane?
- Increased payment to farmers (Licens to produce).
- ??

# Thank You to:

- Lisa Hein, SEGES
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