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# DIET SUPPLEMENTATION WITH 18:0 DOES NOT PROVE USEFUL TO ALLEVIATE FISH-OIL INDUCED MILK FAT DEPRESSION IN DAIRY EWES

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## PRACTICAL APPLICATION

~~Addition of **marine lipids**  
to dairy ewe diet~~



Potentially positive effects on the  
**nutritional value of milk fat**  
(n-3 PUFA, CLA,  $\omega$ 11-18:1...)



Negative effects on  
animal performance

**Milk fat depression (MFD)**

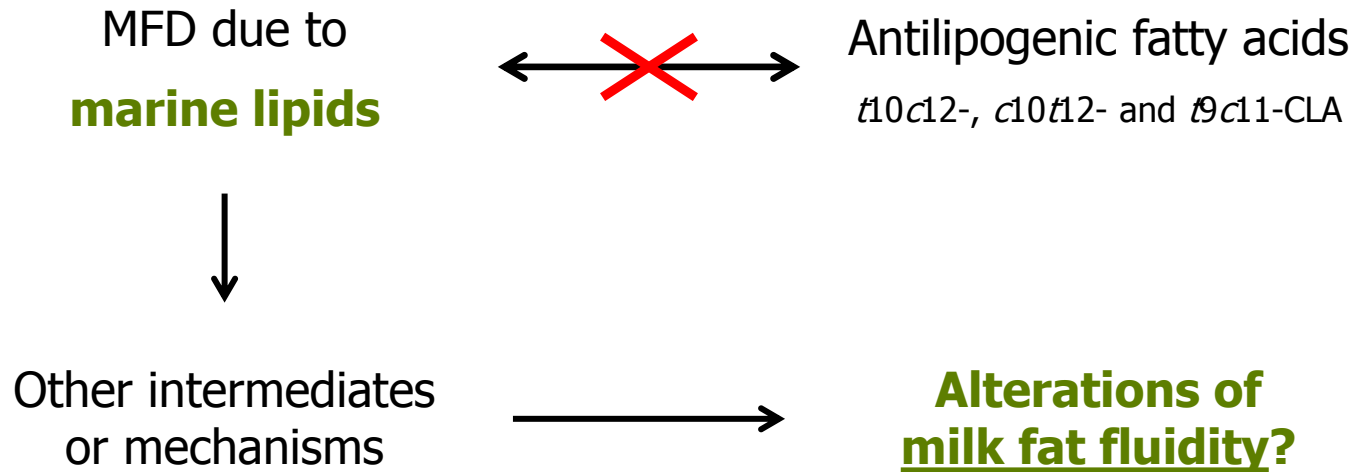
# BIOHYDROGENATION (BH) THEORY

(Bauman and Griinari, 2001)

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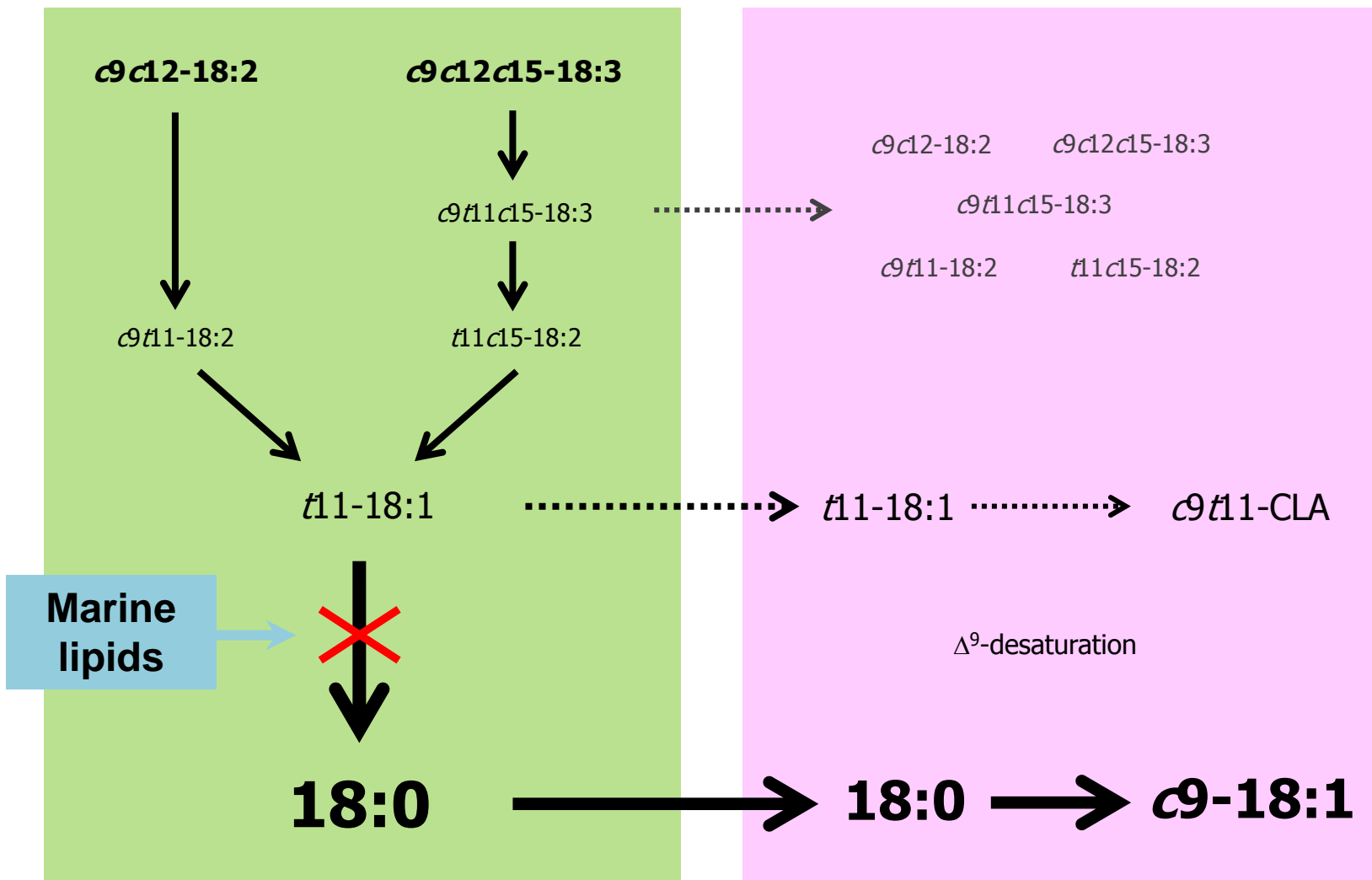
Under certain dietary conditions, the pathways of rumen BH are altered, producing unique **fatty acid intermediates** that are potent inhibitors of milk fat synthesis

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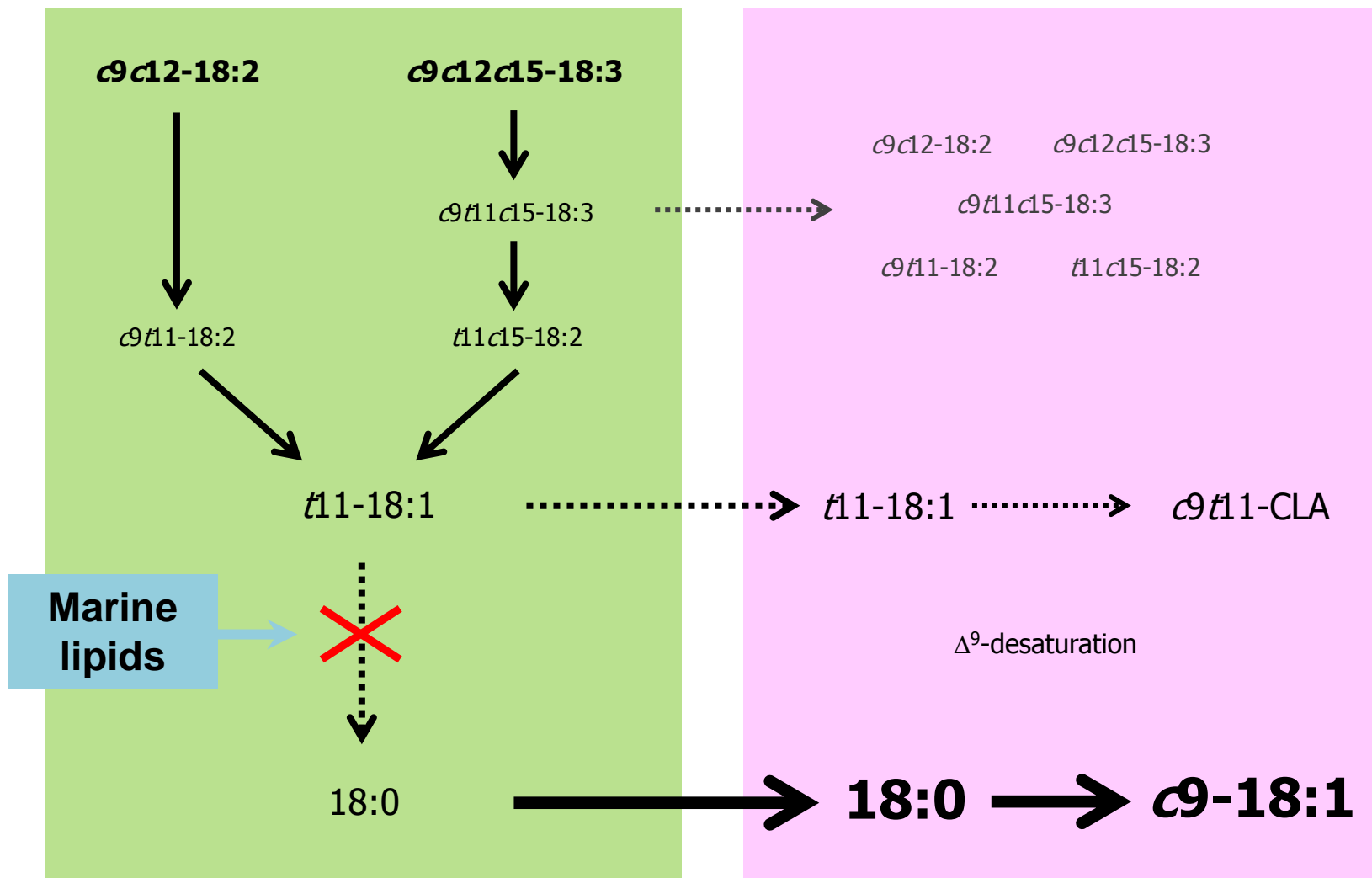
## RUMEN

## MAMMARY GLAND



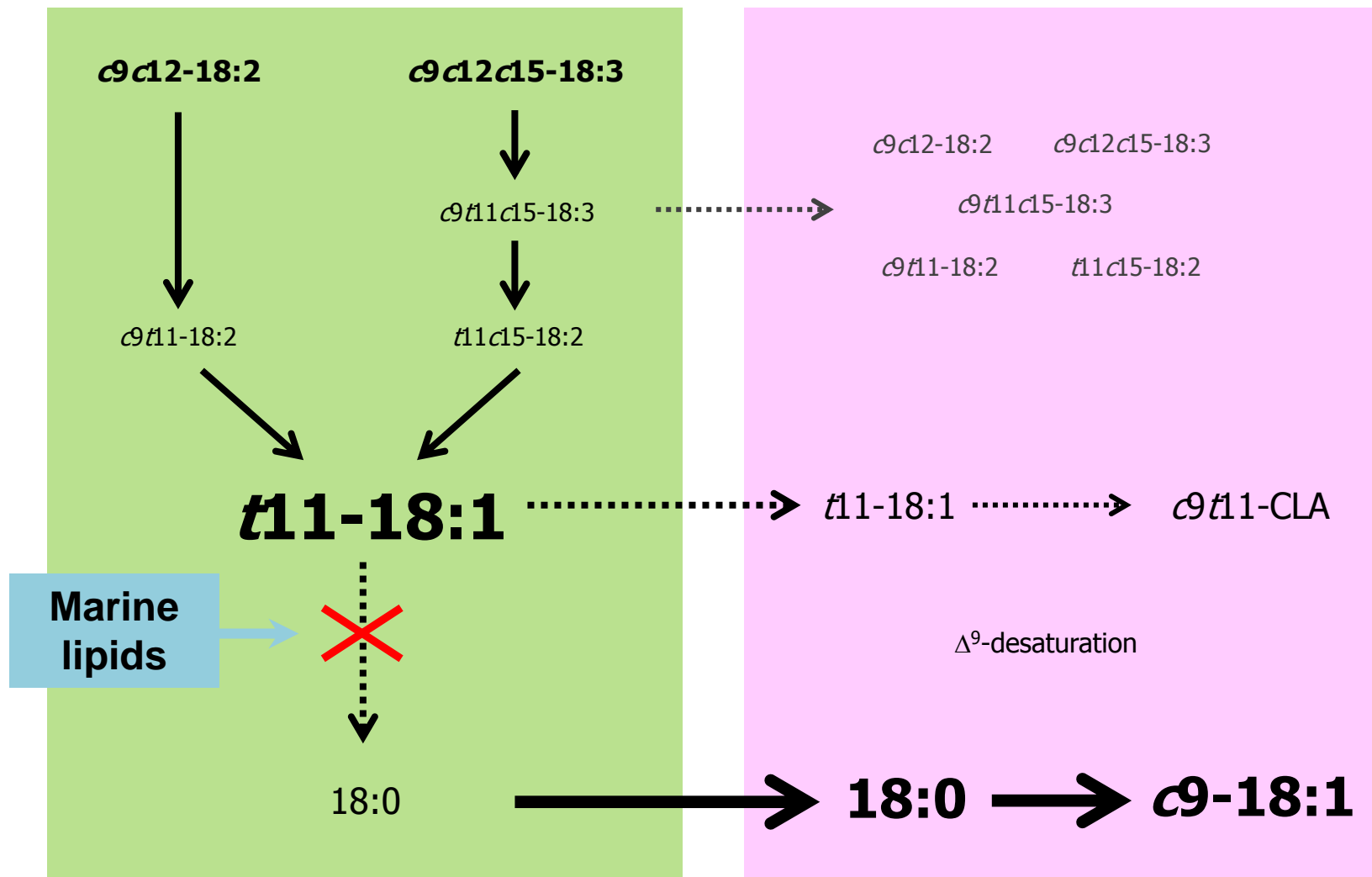
## RUMEN

## MAMMARY GLAND



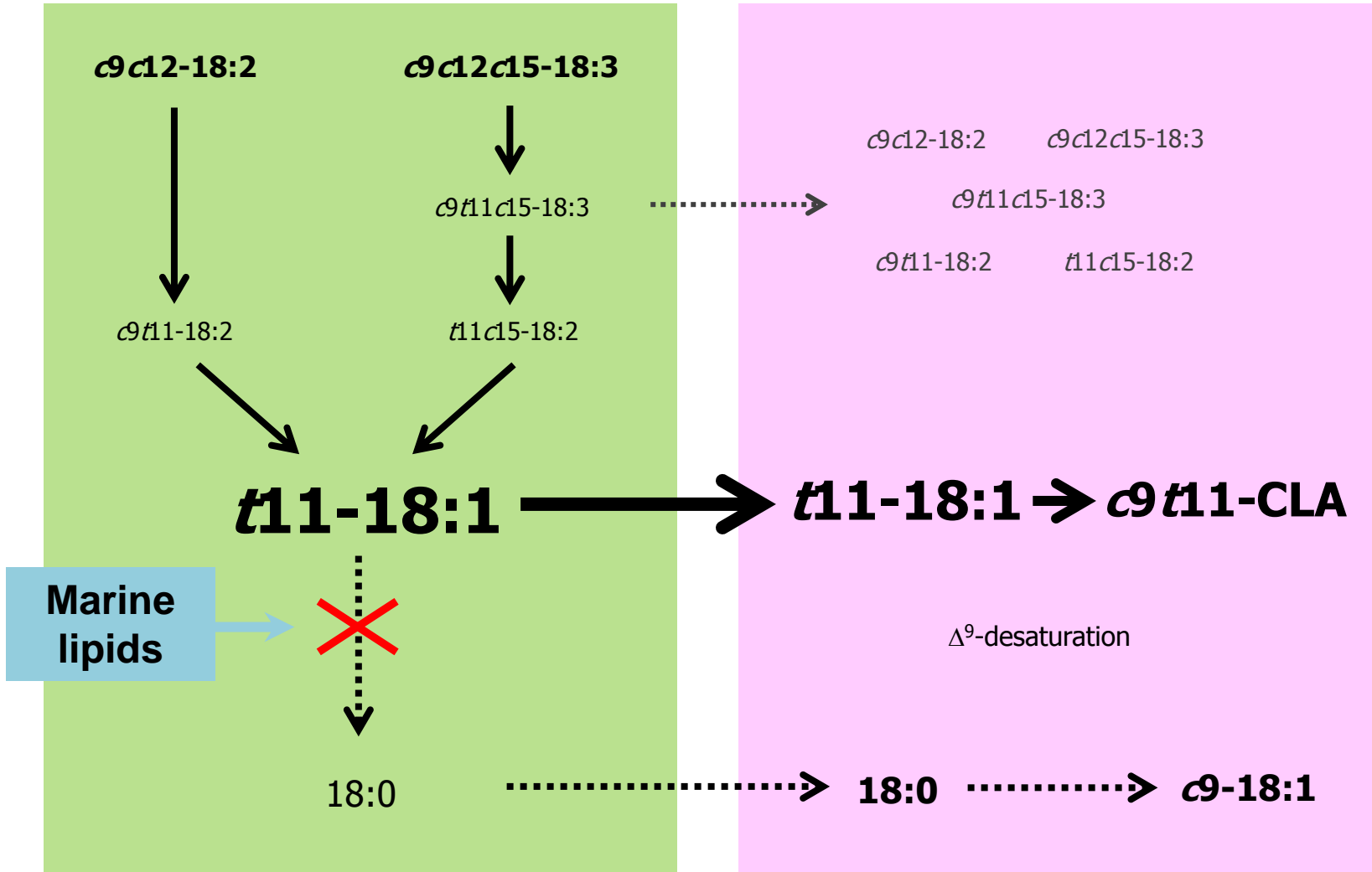
## RUMEN

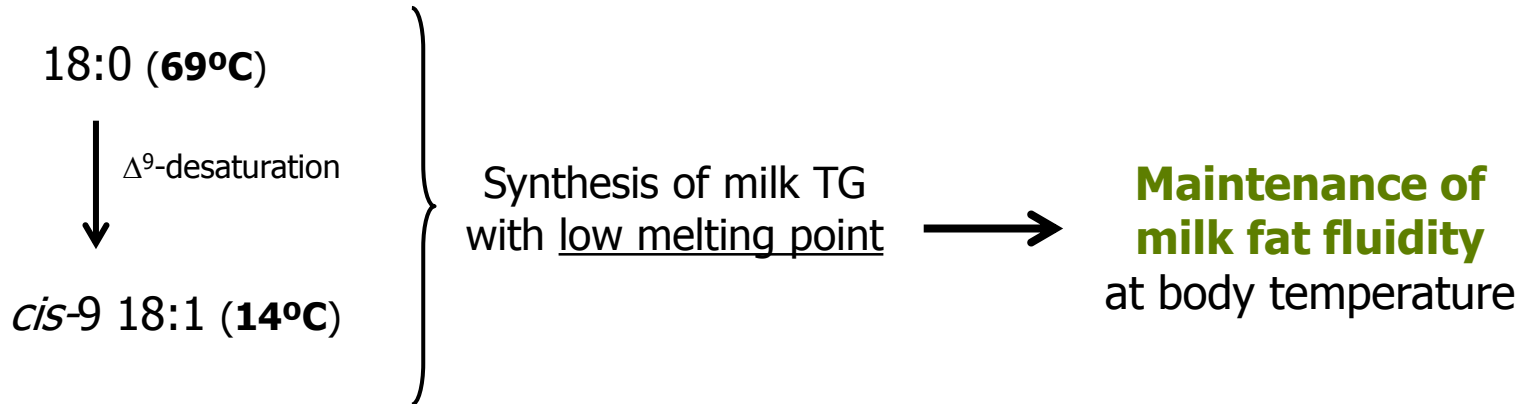
## MAMMARY GLAND



# RUMEN

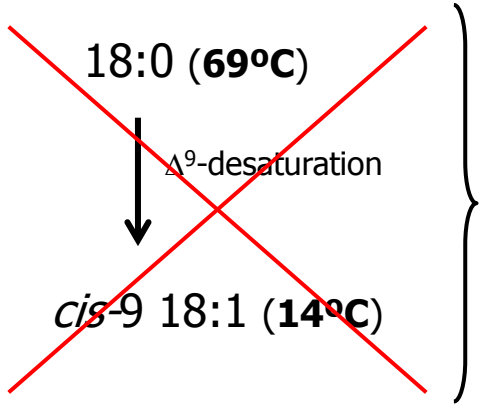
# MAMMARY GLAND





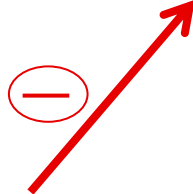


**+ Marine lipid supplements**



Synthesis of milk TG with low melting point

+ ↑ *trans* 18:1 (40-66°C)



~~Maintenance of milk fat fluidity at body temperature~~



**MILK FAT DEPRESSION ?**

## OBJECTIVE

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To test the hypothesis that **supplemental 18:0** could contribute to **alleviate fish oil-induced MFD** in dairy sheep

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**12 Assaf ewes** → **3 lots** (n = 4)



## 3 x 3 Latin square design

### 3 experimental diets

TMR (F:C ratio 40:60)

Non supplemented



**Control**

+2% fish oil



**FO**

+2% fish oil  
+2% 18:0



**FOSA**

### 3 periods (28 d/period)

Measurements and samplings  
(days 25-27)

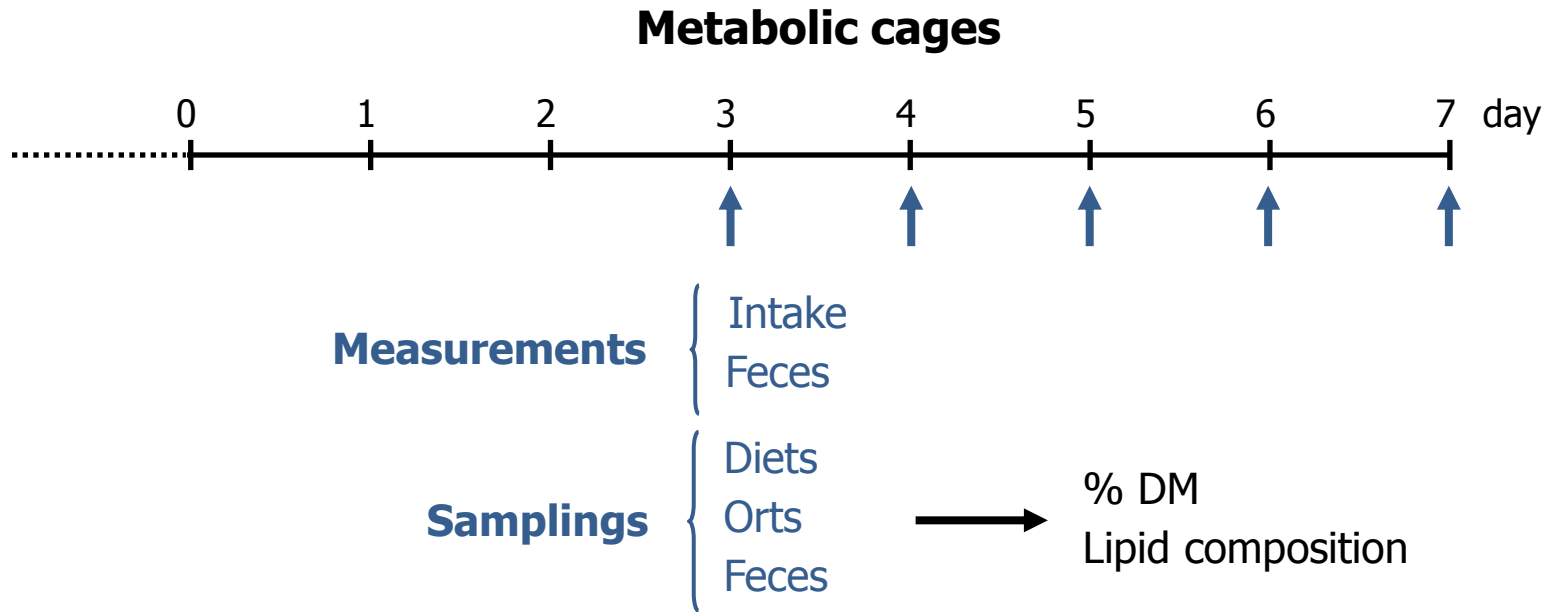
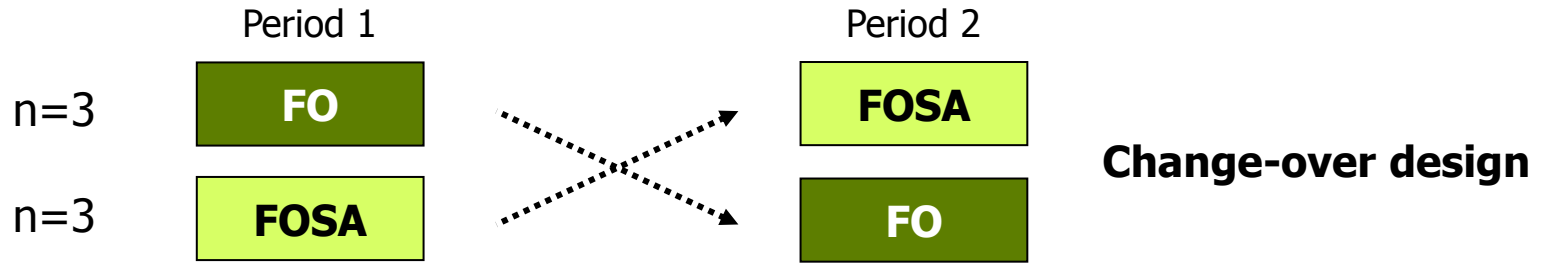
DM intake (lot)

Milk production (individual)

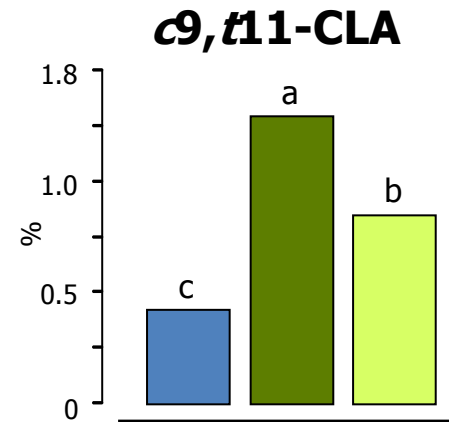
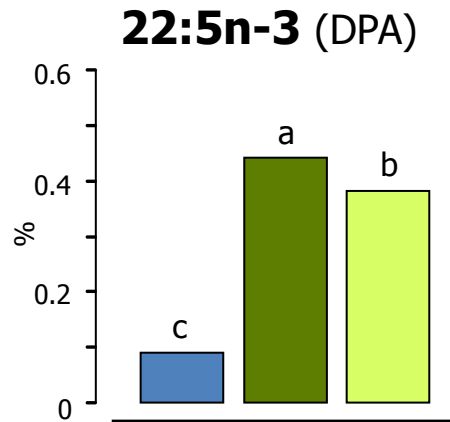
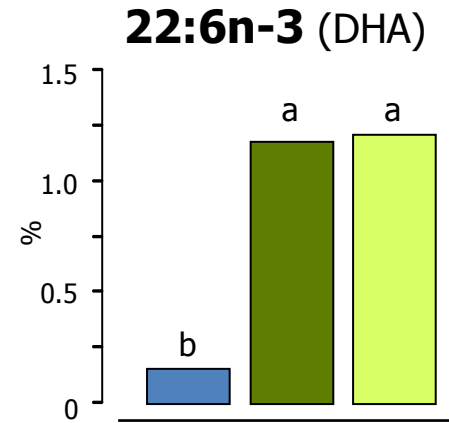
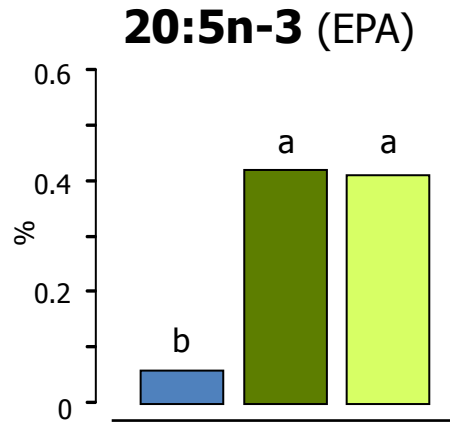
Milk fat, protein and lactose % (individual)

Milk fatty acid profile (lot)

# Digestibility of the 18:0 supplement

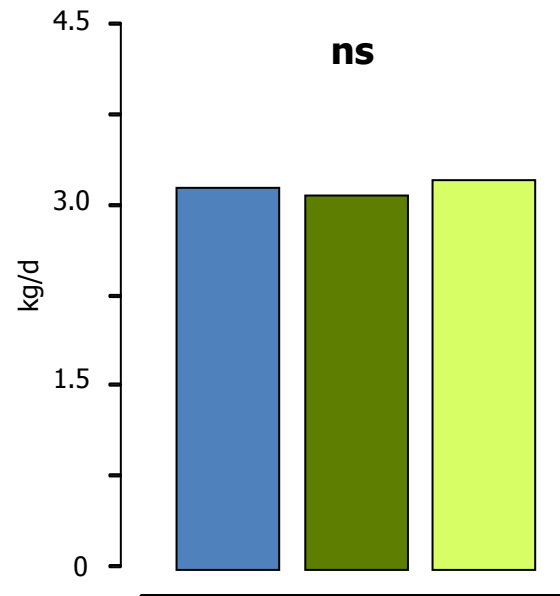


# Milk fatty acid profile

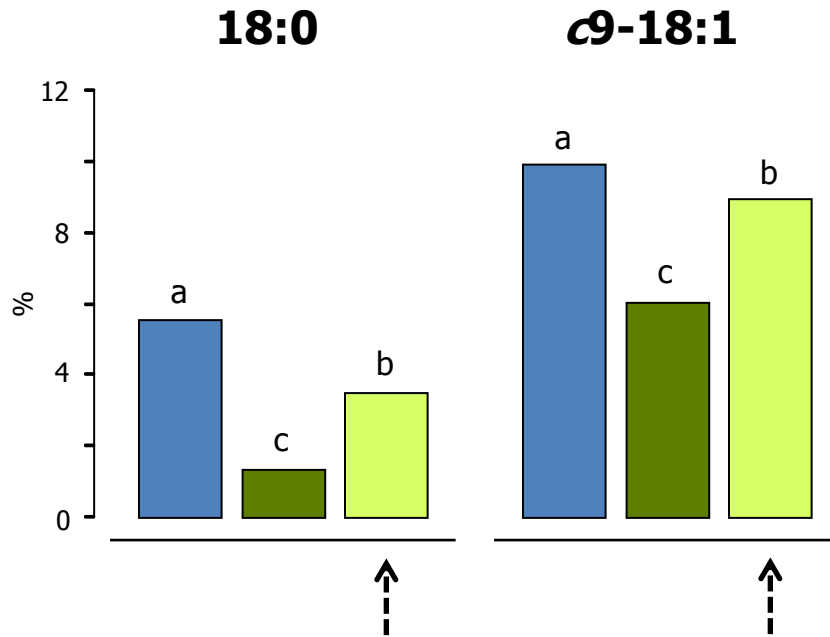
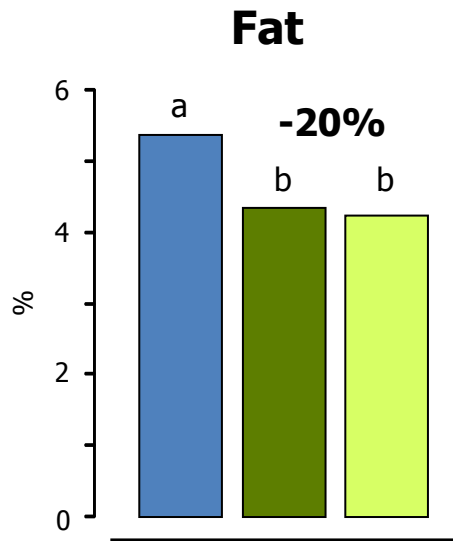


Control FO FOSA

## Milk production



Control FO FOSA



↑ **18:0 availability**

**did not prove useful to alleviate MFD**

Control values could not be attained

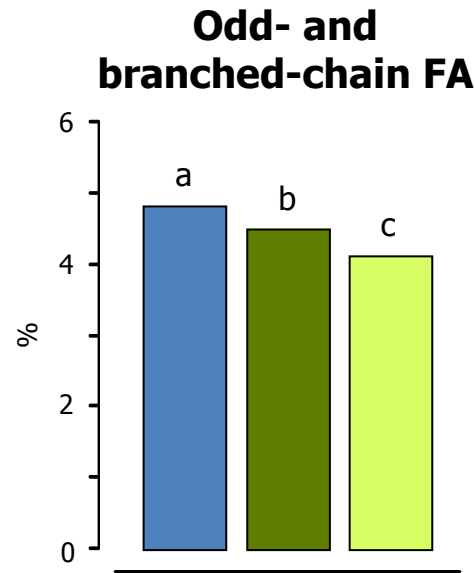
- **Digestibility** coefficient of 18:0 = **48%**
- Low **mammary uptake ?**
- **Other factors** that counteract 18:0 supplementation?

Control FO FOSA

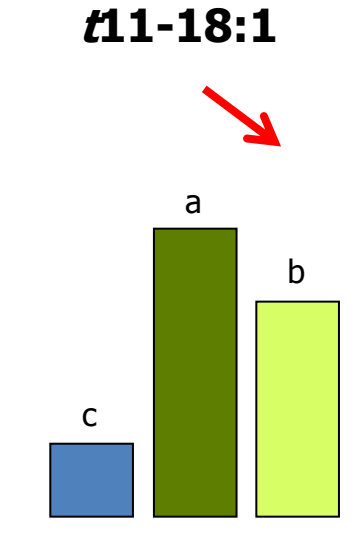
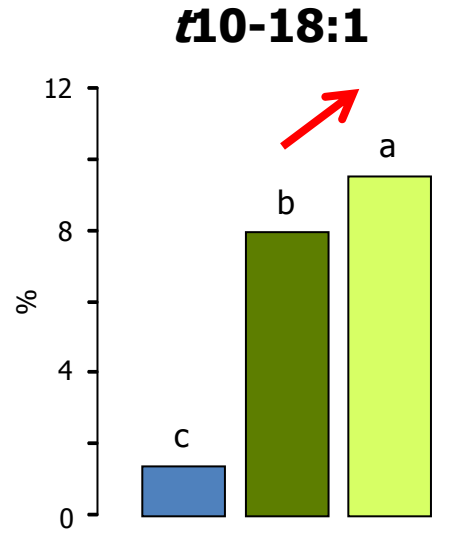


# Milk fatty acid profile

## Ruminal alterations?



Differences in microbial **diversity** and **activity**?

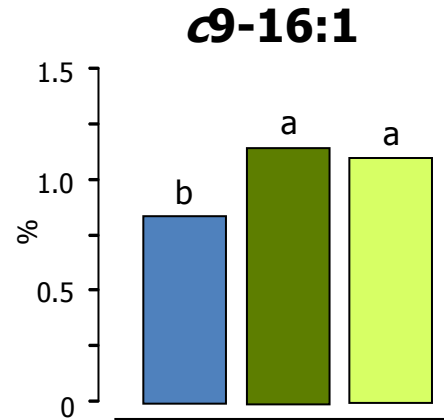
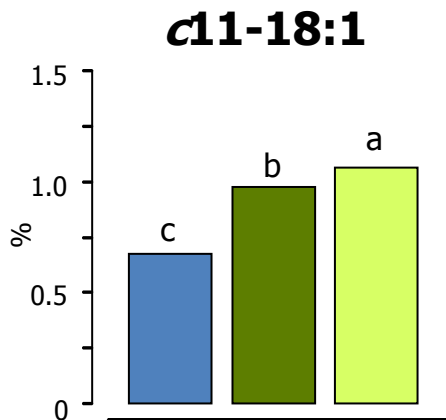
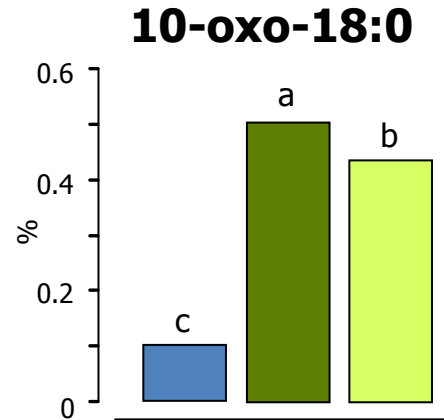
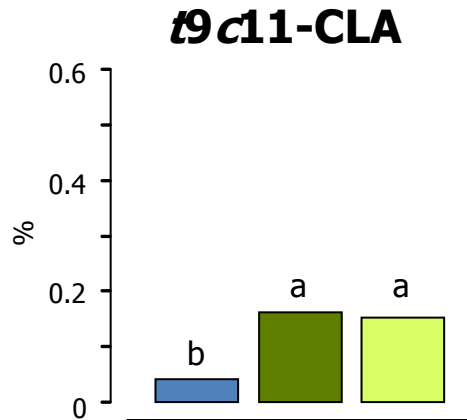


Shift in **ruminal biohydrogenation** pathways?

## MFD?

Control    FO    FOSA

# Candidate milk fat inhibitors



**Antilipogenic**  
effects in  
adipocytes

Control    FO    FOSA

## CONCLUSIONS

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Diet supplementation with **18:0 does not prove useful to alleviate FO-induced MFD** in dairy ewes. This result cannot be fully accounted for by the low digestibility coefficient of supplemental 18:0 and challenges the theory of a shortage of this FA as a mechanism to explain fish oil-induced MFD in sheep.

It is therefore hypothesised that increases in the concentration of some **candidate milk fat inhibitors** might play a more relevant role in this type of MFD.

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**THANK YOU VERY MUCH FOR YOUR ATTENTION!**

