EAAP 2008
59th Annual Meeting of the European Association for Animal Production
VILNIUS, LITHUANIA
August 24th - 27th, 2008

Session 18; Abstract n. 3035

Low doses of rumen-protected conjugated linoleic acid (CLA) on dairy cows in mid lactation: effects on milk yield and quality

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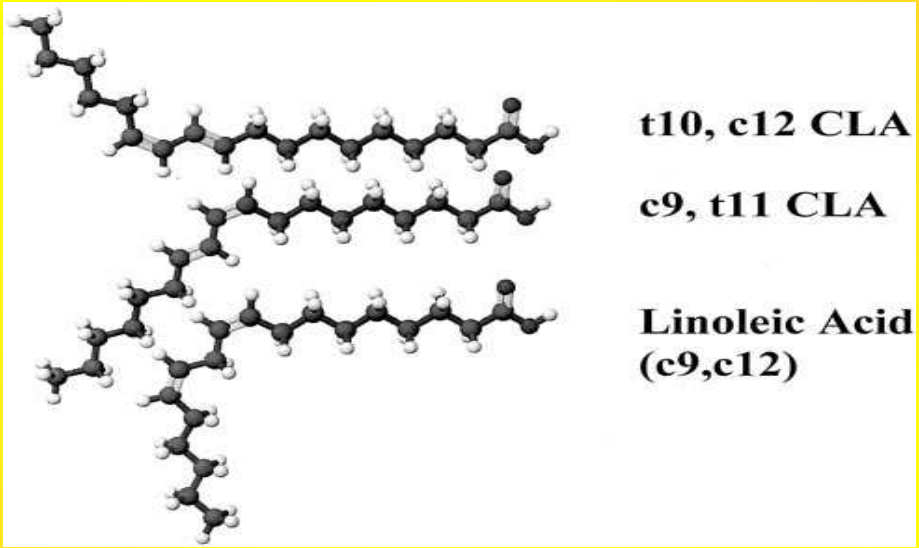
Introduction

Bioactive isomers of linoleic acid :



CLA in dairy cows:

- reduce milk fat content
- improve fatty acid profile

Aim

To investigate:

1) effects of low doses of a new encapsulated lipid mixture of CLA on milk and fatty acid yields in mid lactation cows

2) transfer of CLA trans-10, cis-12 from feed to milk.

Material and methods

- 3 groups of 4 Holstein cows balanced for:
  - milk and fat yield/ days in milk
- 3 treatments:
  - **CTR** → 80 g/d hydrogenated soybean oil (HO)
    - 0.0 g/d CLA c-9, t-11;
    - 0.0 g/d CLA t-10, c-12;
  - **CLA40** → 40 g/d HO + 40 g/d lipid encapsulated CLA*
    - 3.2 g/d CLA c-9, t-11;
    - 3.1 g/d CLA t-10, c-12;
  - **CLA80** → 80 g/d lipid encapsulated CLA*
    - 6.3 g/d CLA c-9, t-11;
    - 6.1 g/d CLA t-10, c-12;

*** Commercial formulation produced by SILA s.r.l. (Noale, Venezia, Italy)**

Material and methods

Experimental design: 3x3 Latin Square

PERIODS	GROUP 1	GROUP 2	GROUP 3
PRE-TRIAL	**ADAPTATION**		
TREATMENTS 2 Week	**CTRL**	**CLA 40**	**CLA 80**
SUSPENSION 1 Week			
TREATMENTS 2 Week	**CLA 40**	**CLA 80**	**CTRL**
SUSPENSION 1 Week			
TREATMENTS 2 Week	**CLA 80**	**CTRL**	**CLA 40**
SUSPENSION 1 Week			

Material and methods

- All the cows were fed the same corn silage based TMR;
- Supplement distribution:
  - cows were tied daily to the manger with individual bowls;
  - individual CLA or HO doses were mixed with 500g of TMR.

<u>Experimental recording:</u>

- DM intake (daily)
- Milk samples (n. 210)

Statistical analysis

Data were submitted to ANOVA using the following main plot model:

$$y_{ijkl} = \mu + T_i + P_j + G_k + e_{ijkl}$$

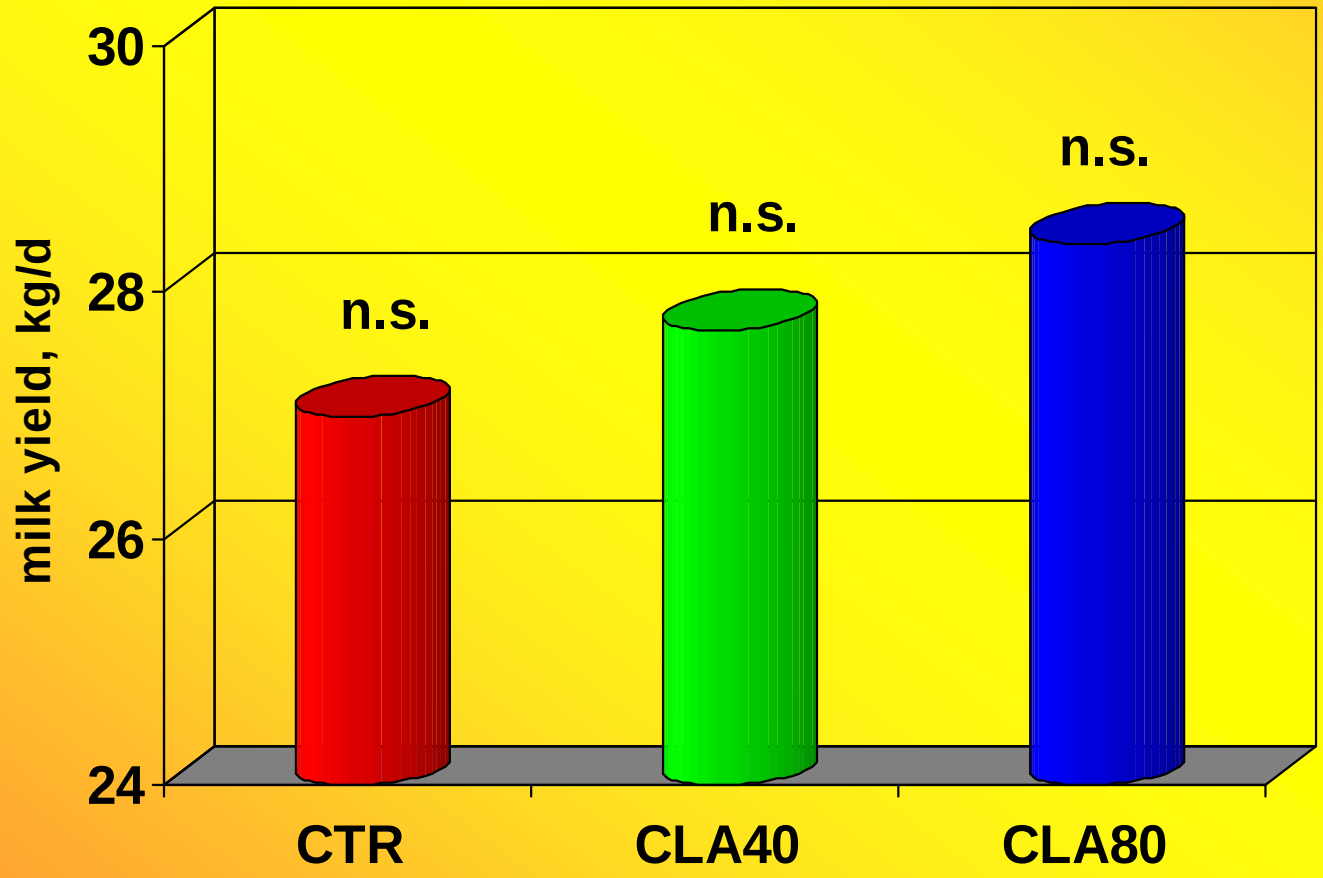
T_i = treatment (i= 1, 2 and 3)

P_j = period (j= 1, 2 and 3)

G_k = group of cow (k= 1, 2 and 3)

Results

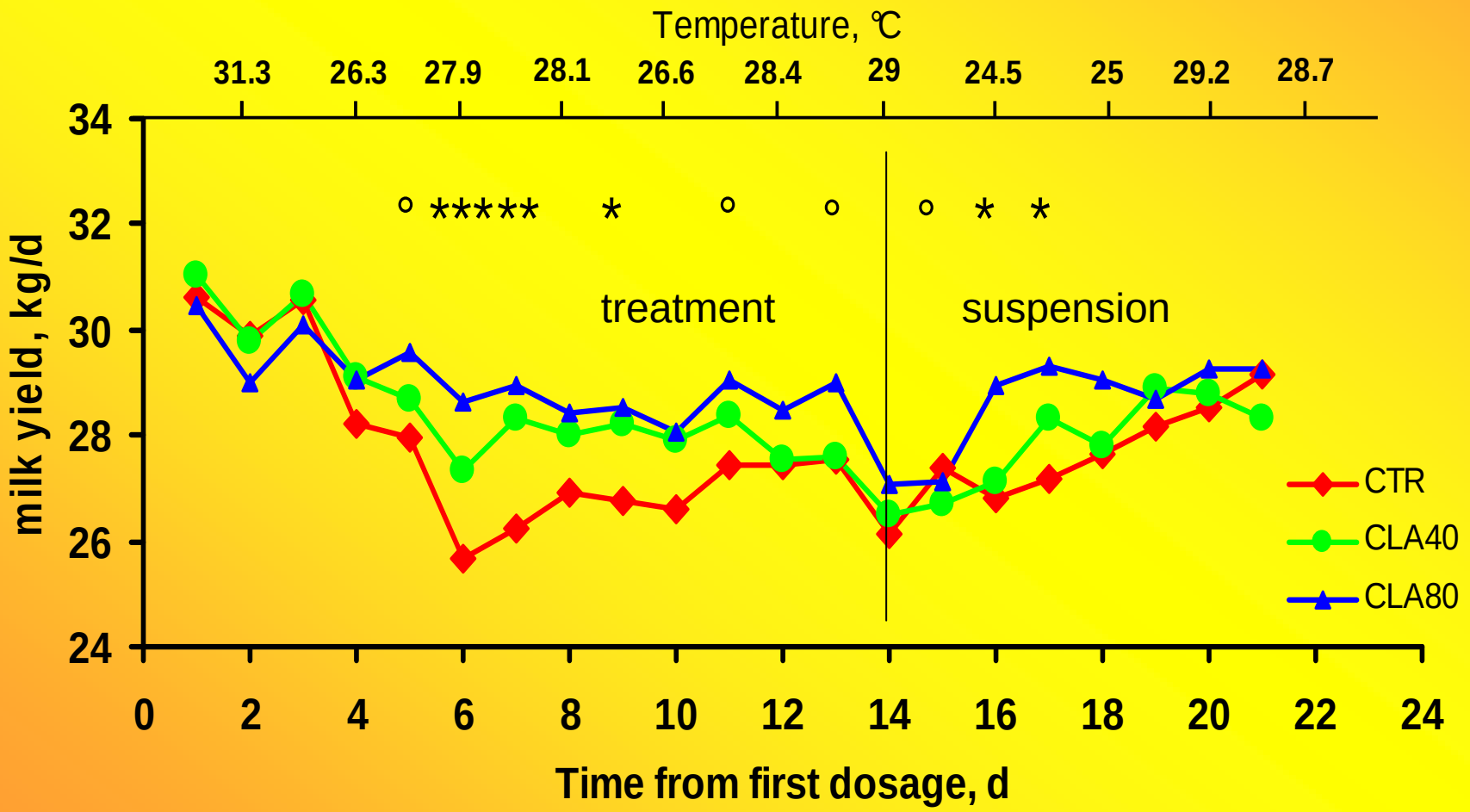
Average milk yield during the treatment



n.s. = not significant

Results

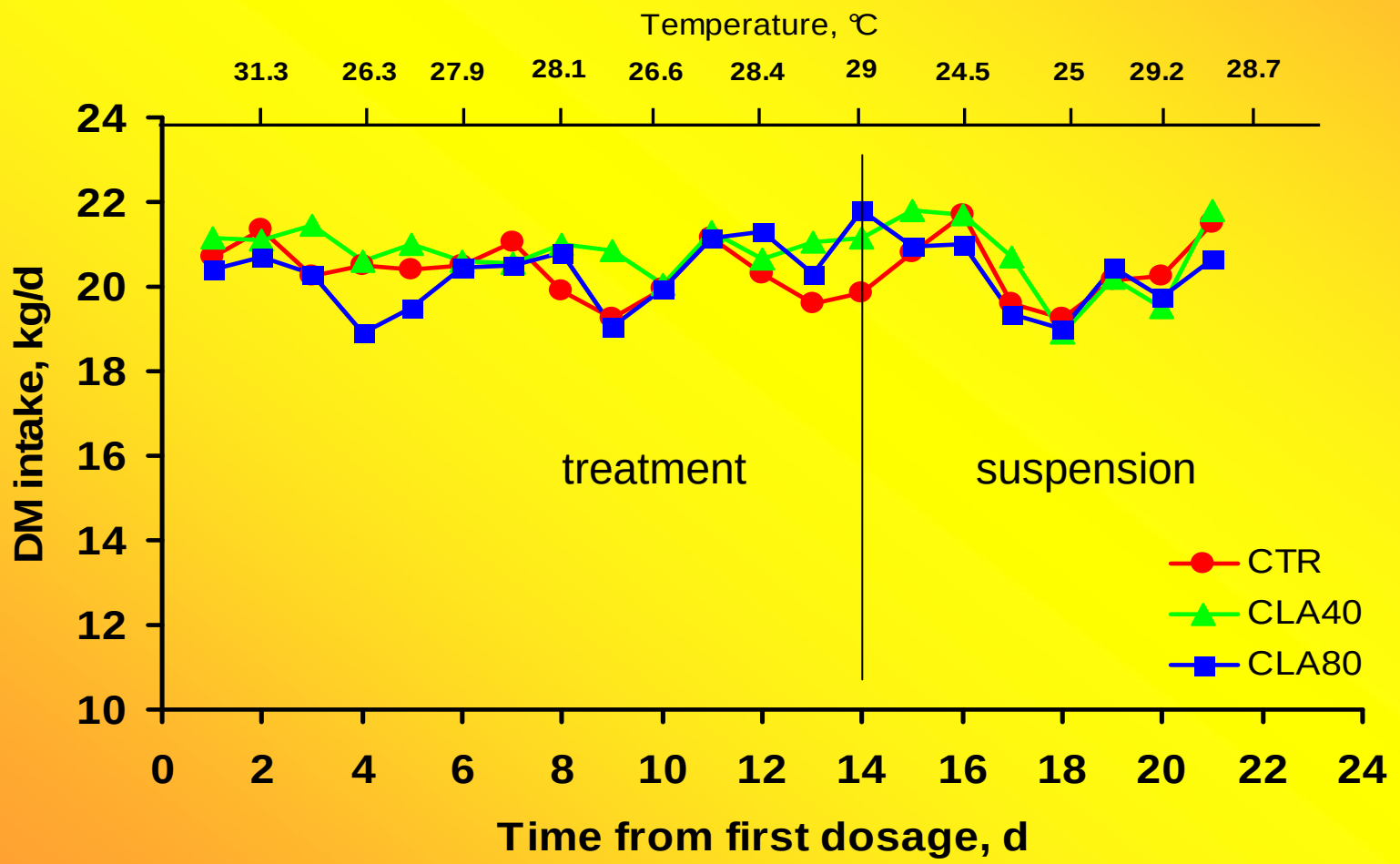
LSMeans of milk yield during the treatment and suspension periods



°= P< 0.1; * = P< 0.05; **= P< 0.01

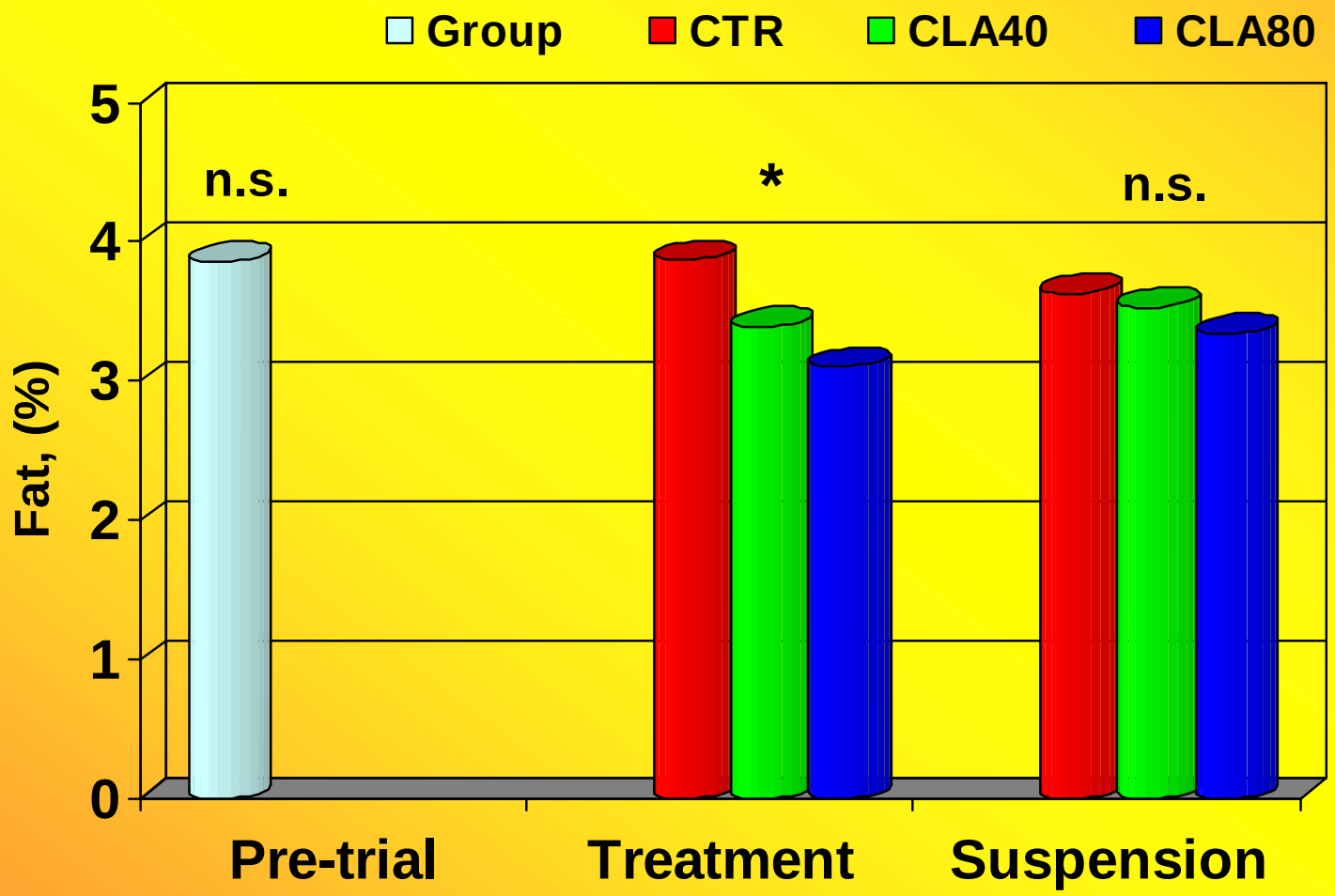
Results

LSMeans of dry matter intake during the treatment and suspension periods



Results

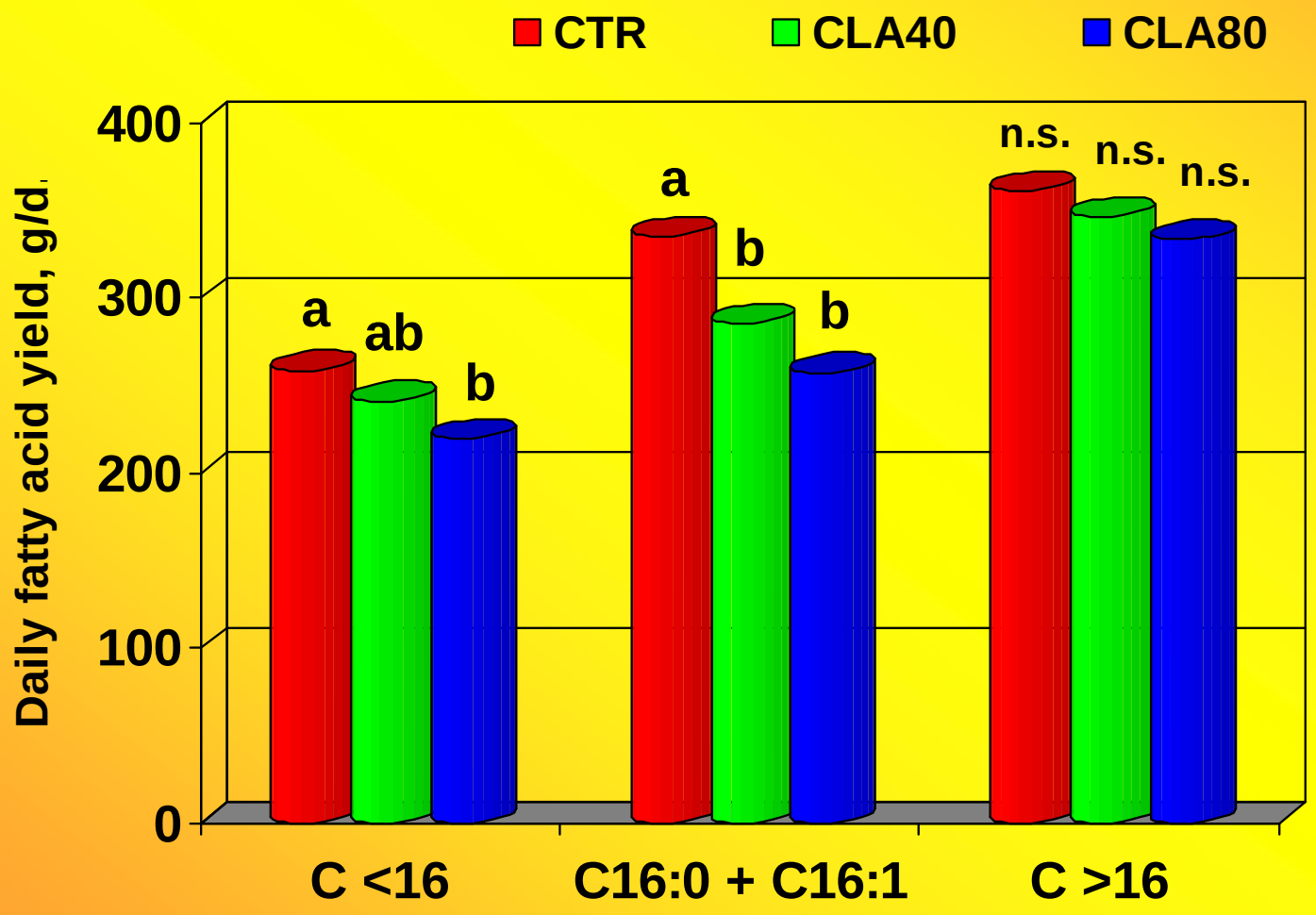
Average fat milk content (%) during the pre-trial, treatment and suspension periods



* = P< 0.05; n.s. = not significant

Results

Average fatty acid yield during the treatment



a, b = P< 0.05; n.s. = not significant

Results

Comparison of rumen-protected supplements of CLA

Rumen protection method	Daily dose of *t10, c12* *(g/d)*	Transfer to MF[1] (%)	Reduction in MFY[2] (%)	Reduction in MFY[2] for g of supplied CLA (g/g)	Study
Formaldehyde	10.0	7.0	44	34.7	De Veth, 2003
Calcium salt	10.0	3.2	34	27.1	De Veth, 2003
Amide	10.0	7.1	21	26.8	Perfield, 2004
Encaps. lipid	10.0	7.9	22	28.0	Perfield, 2004
Encaps. lipid	**6.1**	**5.6**	**15**	**25.2**	**Present, 2008**
Encaps. lipid	**3.1**	**6.5**	**9**	**25.3**	**Present, 2008**

[1] MF: Milk Fat

[2] MFY: Milk Fat Yield

Perfield et al., 2004 modified

Conclusions

- Low dosage of the new lipid encapsulated CLA:
  - had no effect on DMI / slightly increased MY;
  - reduced milk fat yield (mainly C<16 and C=16).
- Transfer of CLA t-10, c-12 ranged from 5.6 to 6.5 %.
- Low dosage of rumen protected CLA can be used to manipulate milk fat composition of mid lactating cows.
- The effects on milk composition are proportional to the dosage (a reduction of MFY around 25 g / g of CLA isomer t-10, c-12 supplied, is expected).

Thank you
for
your attention!

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