



Organic Food and Farming

Effect of clover species in grass-clover silages and concentrate supplementation on milk fatty acid composition

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Background

- Uneven production of organic milk during the year
 - More milk during the winter is needed
- Organic standard revision
 - 100% organic produced feedstuffs



High quality silage



Objective

Compare white (WC) and red clover (RC) - grass silages with and without concentrate supplementation on:

- production,
- milk quality and
- N use efficiency

in autumn calving lactating dairy cows



Methods

- WC and RC grown in mixture with grasses
- Silage (round bales) made from 2nd and 3rd cut
- Autumn calving dairy cows (48 Norwegian Red Cattle)
- Lactation weeks: 1-20



Treatments

- **Legume species**
 - **WC = White clover-grass silage**
 - **RC = Red clover - grass silage**
- **Concentrate supplementation**
 - **- C = 0 kg/cow and day**
 - **+ C = 10 kg/cow and day**



Herbage clover proportion (%)

White clover		Red clover	
2. cut	3. cut	2. cut	3. cut
42	37	58	57



Silage quality

	WC		RC	
	2. cut	3. cut	2. cut	3. cut
Dry matter, %	30.2	33.2	25.8	32.6
pH	4.5	4.7	4.4	4.7
NH3-N, % of TN	8.3	7,0	6.8	7.0
Lactic acid, % of DM	4.7	3.7	5.5	3.5

Total diet quality

	WC		RC	
	- C	+ C	- C	+ C
CP, g/kg DM	170	167	163	162
NDF, g/kg DM	415	344	426	346
Fat, g/kg DM	37.2	41.2	35.4	40.2

Milk yield

	WC		RC		Significance	
	-C	+ C	-C	+ C	Species	Conc
Milk, kg/d	20.5	27.7	22.0	29.2	(*)	***
ECM, kg/d	19.1	28.3	20.2	28.5	ns	***

ECM = energy corrected milk



Milk fat and protein

	WC		RC		Significance	
	- C	+ C	- C	+ C	Species	Conc
Fat, %	3.58	3.99	3.60	3.81	ns	**
Protein, %	3.05	3.50	3.00	3.30	*	***

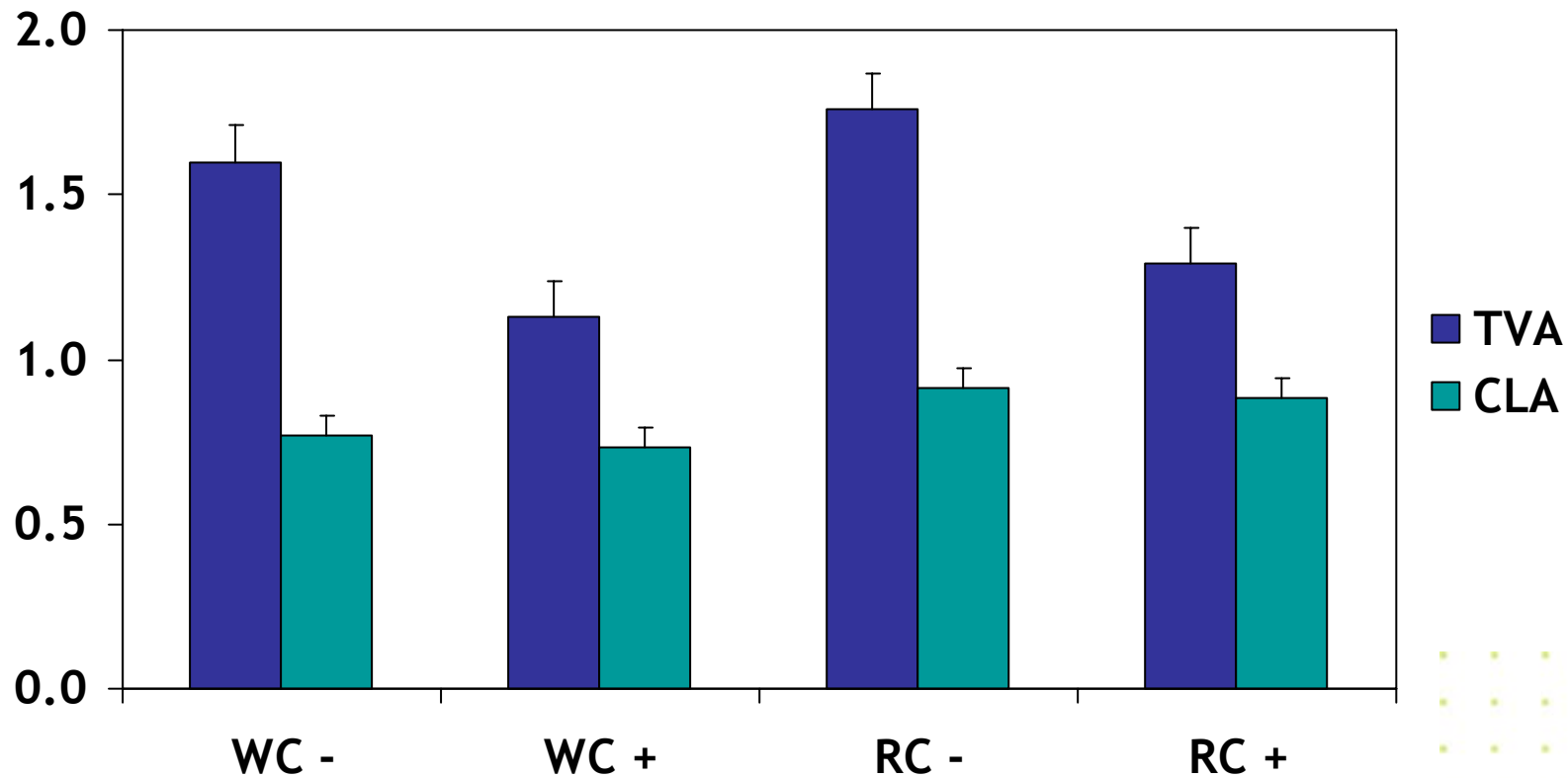


Milk fatty acid (FA) composition, g / 100 g total FA

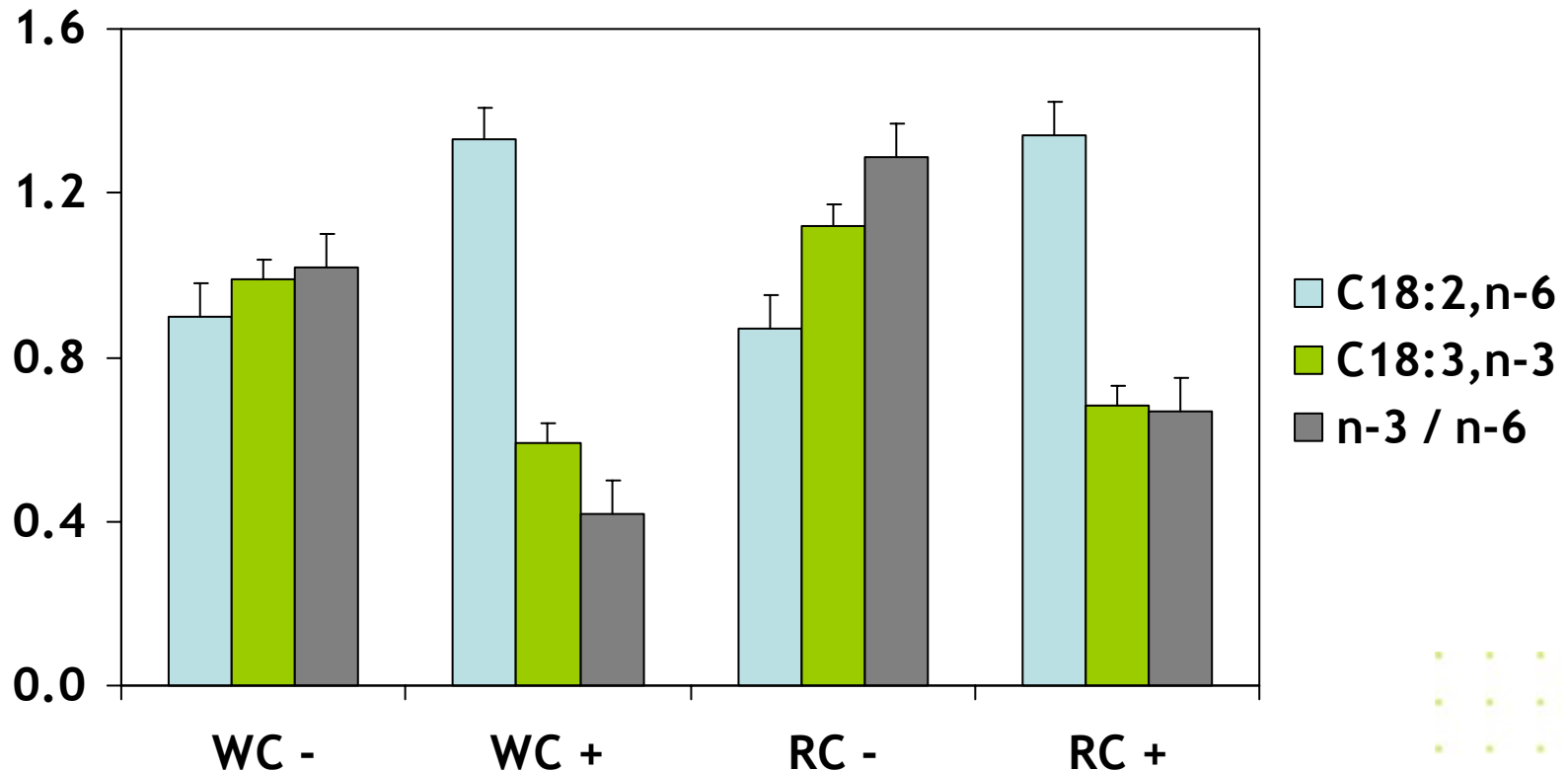
	WC		RC		Significance	
	- C	+ C	- C	+ C	Species	Conc
SFA	66.1	68.3	63.6	66.4	(*)	(*)
MUFA	23.4	21.4	25.4	23.3	ns	ns
PUFA	2.89	3.01	3.06	3.18	*	ns

SFA = saturated FA; MUFA=monounsaturated FA; PUFA=polyunsaturated FA

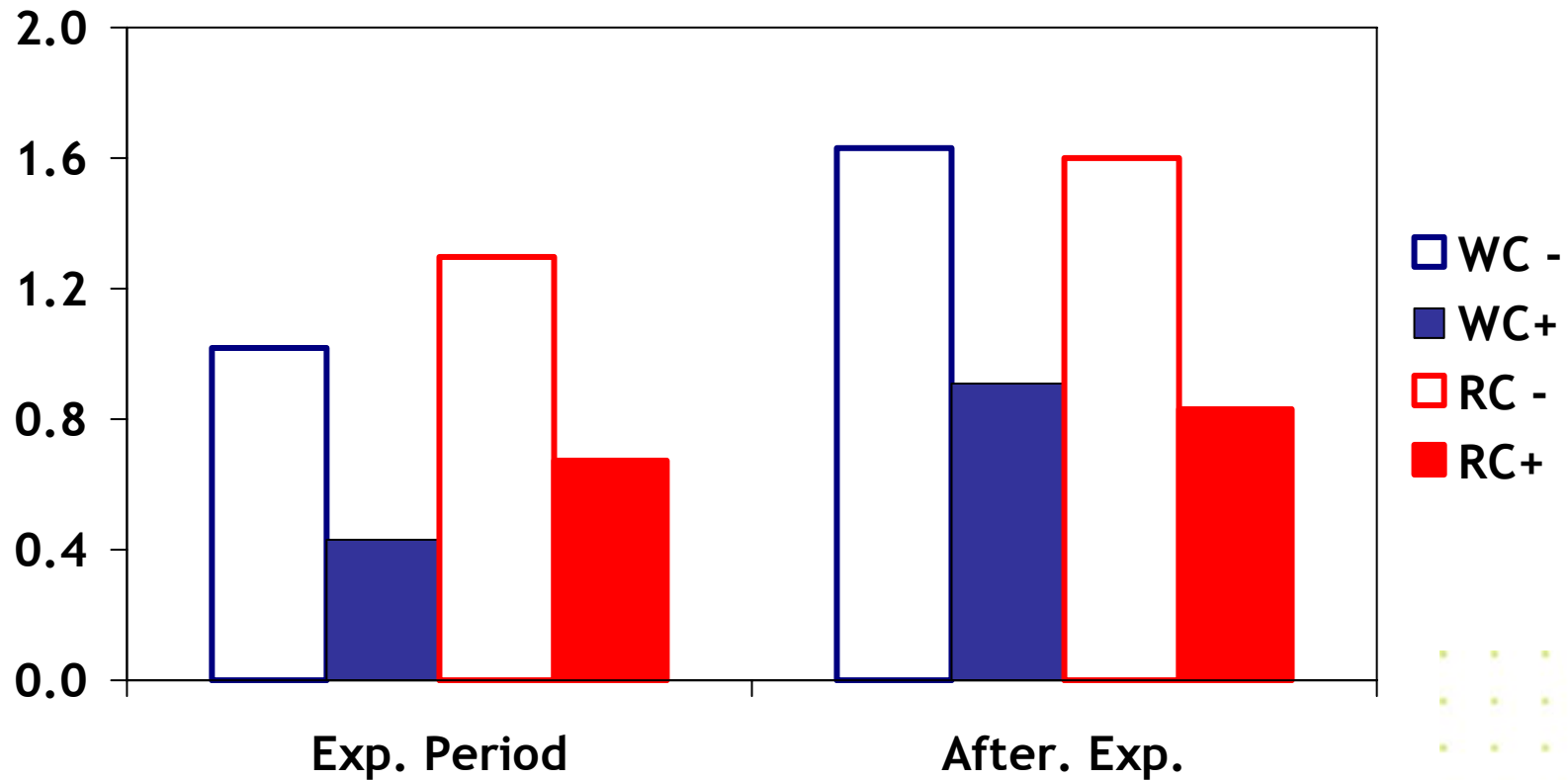
Milk TVA and CLA, g / 100 g total FA



Milk n-3 and n-6 fatty acids, g / 100 g total FA



Milk n-3/n-6 ratio during and after the experiment



Conclusions

Red clover silage gave milk with higher proportion of

- **PUFA**
- ***Trans*-vaccenic acid (C18:1,t 11)**
- **CLA (C18:2,c-9, t-11)**
- **α -linolenic acid (C18:3,n-3)**
- **n-3 / n-6**

than white clover silage



Conclusions

Concentrate supplementation

- + linoleic acid (C18:2,n-6)
- - PUFA
- - *Trans*-vaccenic acid (C18:1,t 11)
- - α -linolenic acid (C18:3,n-3)
- - n-3 / n-6





Question



Organic Food and Farming

Is it so that feeding dairy cows, or domestic ruminants in general, according to their "nature", i.e. with fibrous feed stuffs, yields food products that are healthier to us humans than feeding with feed stuffs based on starch?



Live weight change, g / dag

