Organic Food and Farming

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

Håvard Steinshamn[1], Erling Thuen[2], and Ulrik Tutein Brenøe[2]

[1]Bioforsk-Norwegian Institute for Agricultural and Environmental Research, Organic Food and Farming

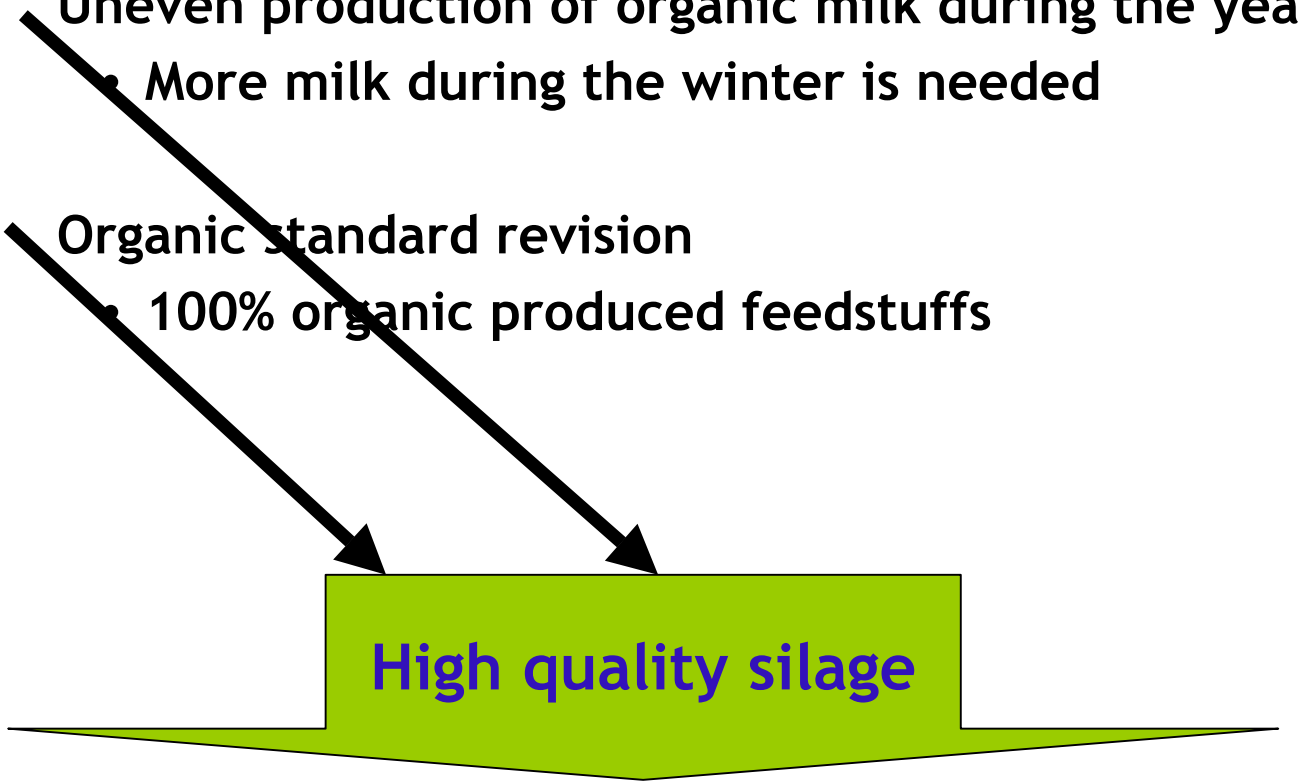
[2]Norwegian University of Life Sciences,

Department of Animal and Aquacultural Sciences

Organic Food and Farming

Background

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



Organic Food and Farming

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

Organic Food and Farming

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

Organic Food and Farming

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

Organic Food and Farming

Herbage clover proportion (%)

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

Organic Food and Farming

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

Organic Food and Farming

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

Organic Food and Farming

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

Organic Food and Farming

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	*	***

Organic Food and Farming

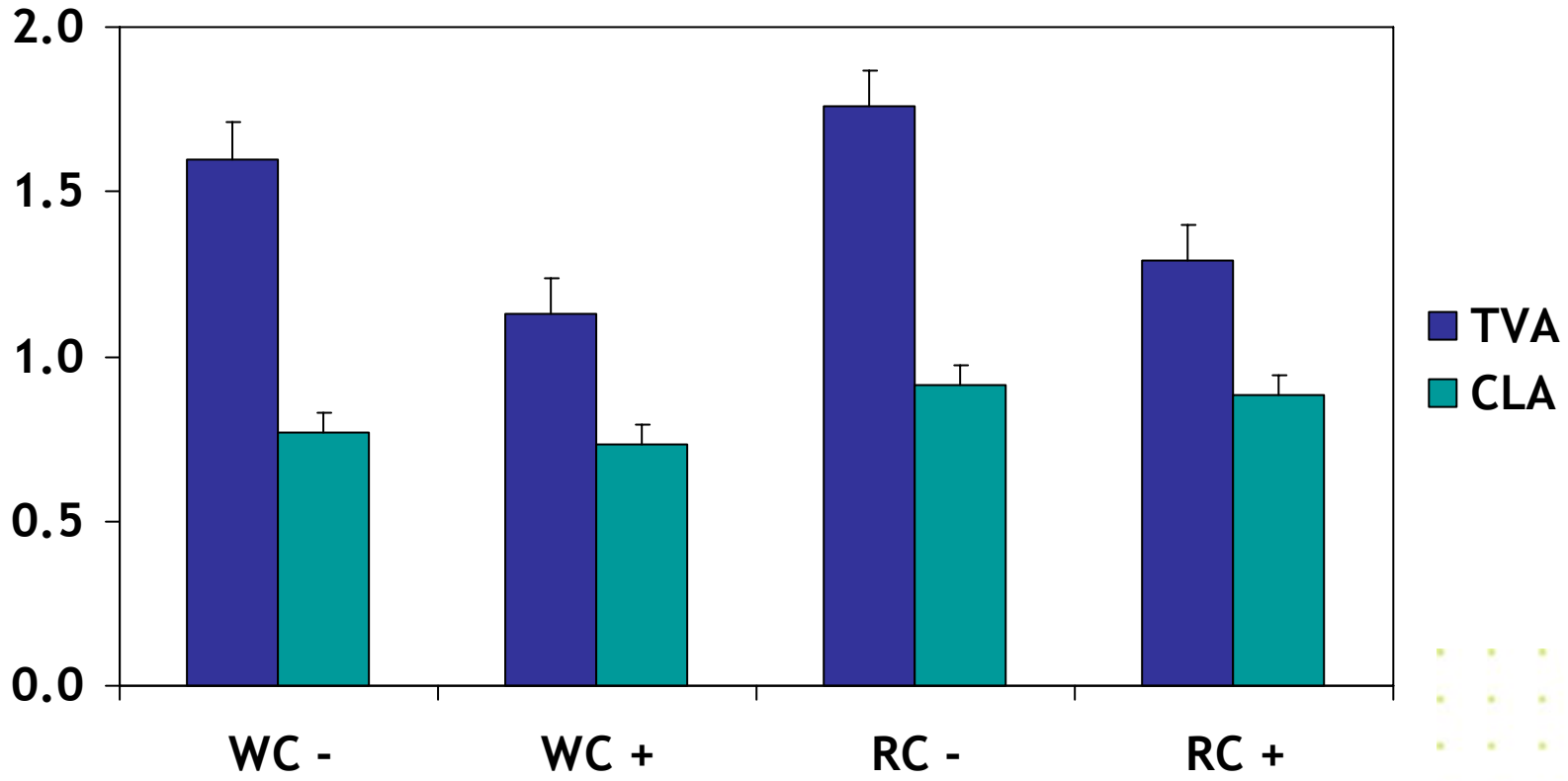
Milk fatty acid (FA) composition, g / 100 g total FA

	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

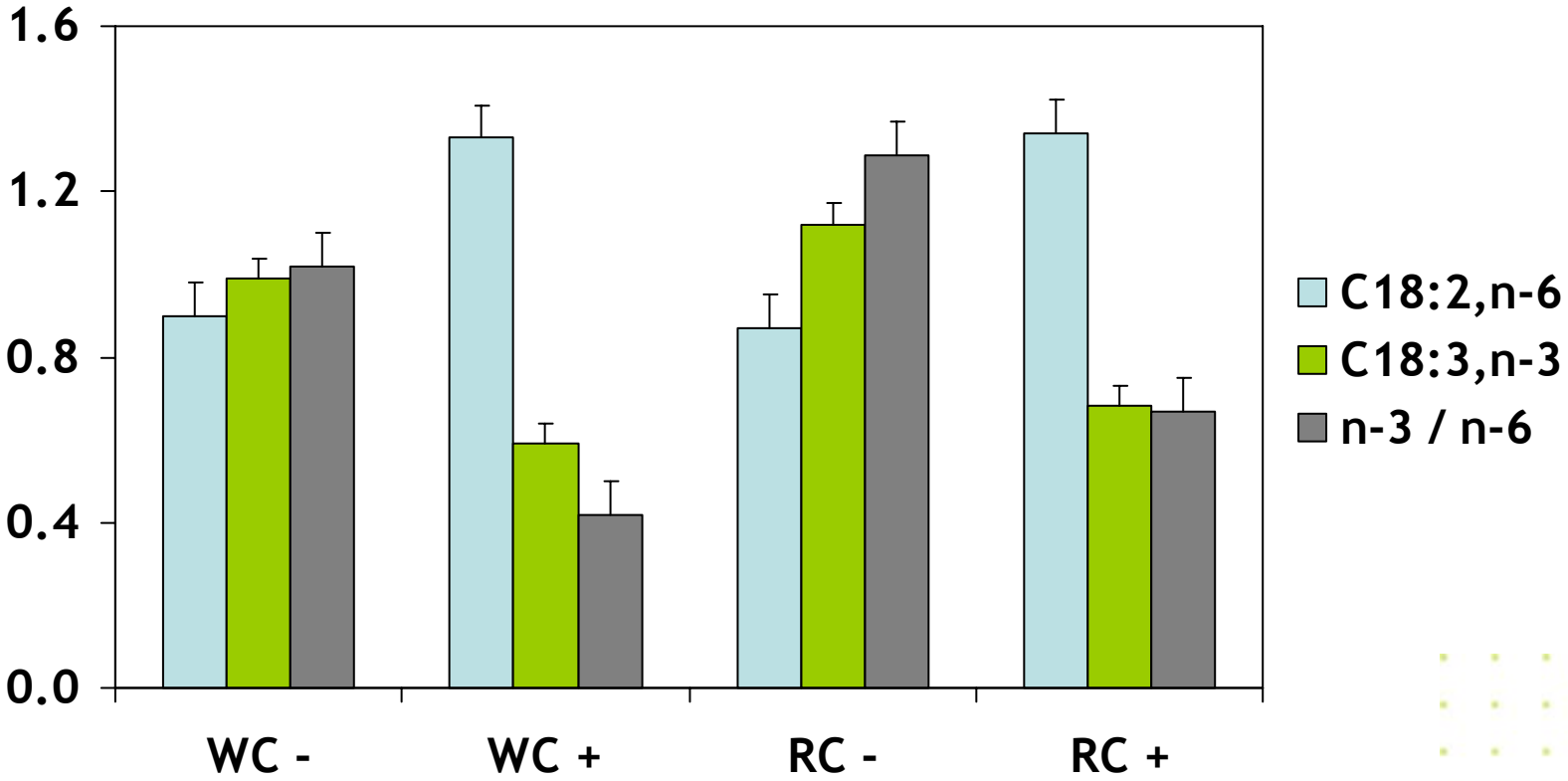
Organic Food and Farming

Milk TVA and CLA, g / 100 g total FA



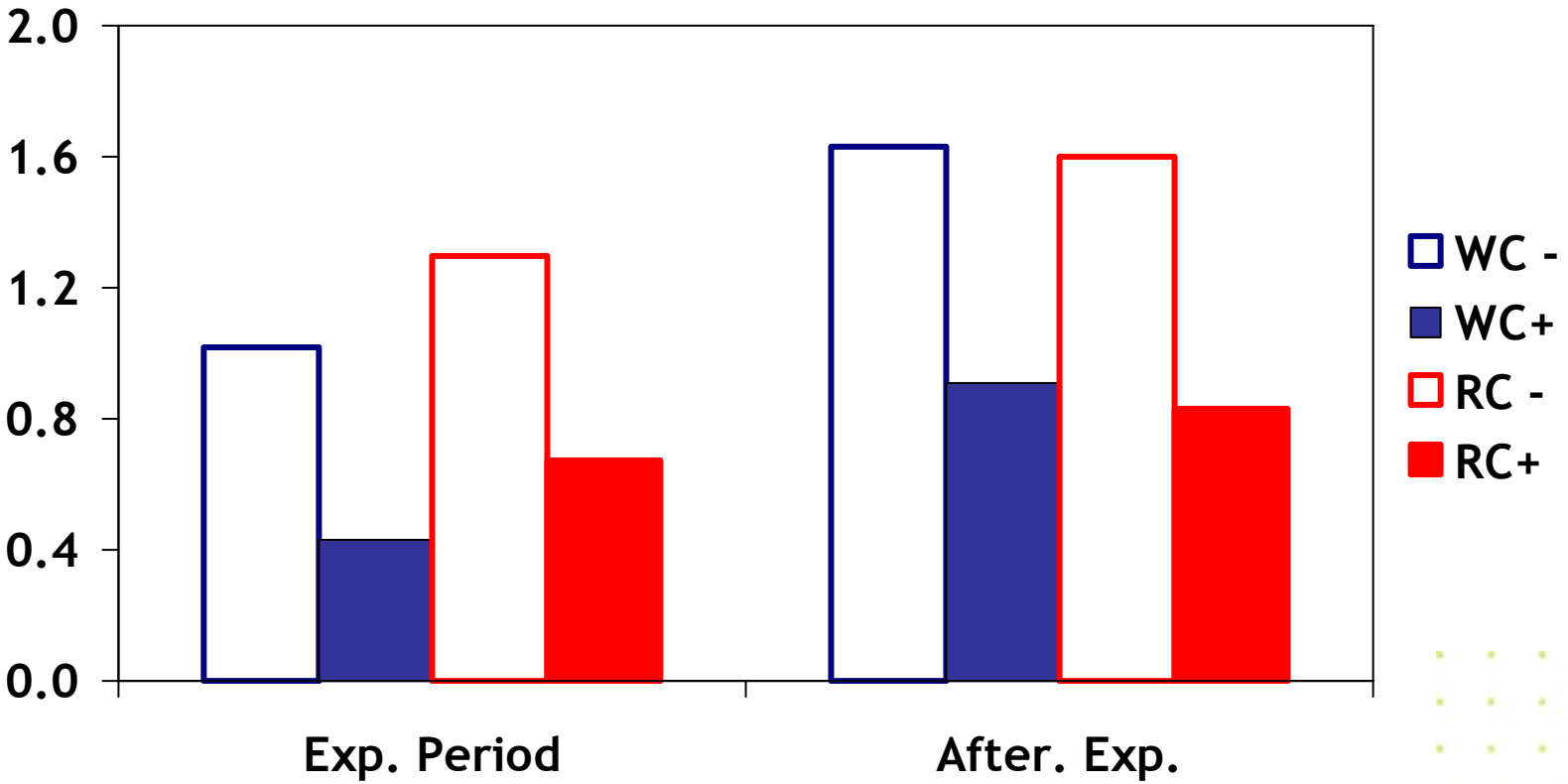
Organic Food and Farming

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



Organic Food and Farming

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



Organic Food and Farming

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

Organic Food and Farming

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

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

Live weight change, g / dag