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# The effect of dry period management and nutrition on milk production

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# The objective of the study

- Evaluate the effect of **shortened dry** period length (**35 d**) and type of a diet on **dry matter intake, milk production** and **metabolic status** of the cows in comparison with widely adopted **conventional dry period** (**60 d**)



# Material and Methods

- 29 multiparous dairy cows - 3 Czech Fleckvieh, 22 Holstein-Friesian and 4 crossbreds
- $2 \pm 0.86$  lactation, milk production  $8939 \pm 2063$  kg of milk in the previous lactation ( $299 \pm 11$  days), average live body weight (LW) was  $607 \pm 72$  kg.
- **Control group (C)** - conventional dry period ( $57 \pm 5.9$  d)
- **Experimental group (S)** – shortened dry period ( $35 \pm 6.3$  d)



# Material and Methods

- Daily consumption of feed
- Daily milk yield
- Milk composition (fat, protein, lactose, urea)
- Concentrations of plasma metabolites (glucose, total protein, albumin, urea, NEFA, BHB)
- Average parameters of rumen fluid
- Statistical analyses by the procedure ANOVA (Quattro - Corel Wordperfect Office)



# Material and Methods

## Composition of diets

Diet	Prepartum			Postpartum	
	C		S	C + S	
Ingredients (kg as fed)	TMRS	TMRS2	TMR2	TMR1	TMR2
<i>Maize silage</i>	6.35	7.81	8.48	13.27	8.92
<i>Lucerne silage</i>	5.84	7.27	13.50	13.94	16.54
<i>Ensiled maize cobs (LKS)</i>			4.87	6.24	5.31
<i>Brewery grain</i>			6.00	8.00	6.00
<i>Legumino-cereal silage (LOS)</i>	9.70	1.22	6.87	0.61	3.08
<i>Lucerne hay</i>	1.85	0.78	1.14	1.06	1.31
<i>Meadow hay</i>	0.15	0.78			
<i>Straw</i>	0.61	1.09	0.70	0.31	
<i>DO1</i>		3.00		9.20	
<i>DO2</i>			7.00		7.00
<i>Premin EX28<sup>1</sup></i>		0.20	0.22		
<i>Premin Porod<sup>2</sup></i>			0.30		

<sup>1</sup>VVS Verměřovice, s.r.o., (Verměřovice, Czech Republic); contained per 1 kg: Ca 10 g, P 100 g, Mg 50 g, Na 60 g, Cu 1300 mg, Zn 6000 mg, Mn 9000 mg, Co 40 mg, I 100 mg, Se 35 mg, vitamin A 900000 M.J., vitamin D3 120000 M.J., vitamin E 3000 mg

<sup>2</sup>VVS Verměřovice, s.r.o., (Verměřovice, Czech Republic); contained per 1 kg: Ca 100 g, P 20 g, Mg 25 g, Na 25 g, Cu 500 mg, Zn 2500 mg, Mn 2000 mg, Co 10 mg, I 60 mg, Se 10 mg, vitamin A 200000 M.J., vitamin D3 41000 M.J., vitamin E 1000 mg

# Material and Methods

## Composition of concentrate mixtures (%)

Ingredient	DO1	DO2
Wheat	21.23	26.67
Barley	5.06	16.67
Rapeseed meal	16.70	14.55
Soybean meal	13.25	20.00
Triticale	12.93	4.55
Pea meal	0.86	5.91
DDGS <sup>1</sup>	0.00	6.06
Lupin seed	7.97	0.00
Premin DO1 <sup>2</sup>	0.00	1.52
Premin DO2 <sup>3</sup>	7.97	0.00
Limestone	4.53	0.00
AminoPlus <sup>4</sup>	2.26	0.00
Lodestar C16 <sup>5</sup>	7.22	4.09

<sup>1</sup>Dried distillers grains

<sup>2</sup>VVS Verměřovice, s.r.o. (Verměřovice, Czech Republic); contained per 1 kg: crude protein 127 g, Ca 133 g, P 33 g, Mg 40 g, Na 52 g, Cu 630 mg, Zn 3160 mg, Mn 4860 mg, Co 21 mg, I 53 mg, Se 18 mg, vitamin A 403000 M.J., vitamin D3 73500 M.J., vitamin E 1200 mg, Niacinamid 4700 mg

<sup>3</sup>VVS Verměřovice, s.r.o. (Verměřovice, Czech Republic); contained per 1 kg: Ca 175 g, P 31 g, Mg 43 g, Na 91 g, Cu 1000 mg, Zn 5300 mg, Mn 4800 mg, Co 20 mg, I 47 mg, Se 27 mg, vitamin A 667000 M.J., vitamin D3 86500 M.J., vitamin E 1440 mg, Niacinamid 4700 mg

<sup>4</sup>Ag Processing Inc (Omaha, Nebraska)

<sup>5</sup>Berg+Schmidt Malaysia Sdn. Bhd. (Selangor Darul Ehsan, Malaysia)

# Results and Discussion

- DMI and nutrients consumption per cow and day (weighted mean)

Nutrient	Period/Group			
	Prepartum		Postpartum	
	C	S	C	S
DM (kg)	13.02	17.13	21.57	20.89
Crude protein (kg)	1.91	2.96	3.82	3.70
Fat (kg)	0.31	0.54	0.99	0.96
Crude fibre (kg)	3.51	3.41	3.89	3.76
PDIA (kg)	0.63	0.97	1.41	1.37
PDIE (kg)	1.09	1.68	2.27	2.19
PDIN (kg)	1.17	1.87	2.48	2.40
NEL (MJ)	73.48	107.17	143.32	138.79
ADF (kg)	4.28	4.37	5.00	4.84
NDF (kg)	6.01	6.73	8.03	7.77
Ca (g)	164.29	165.30	245.53	237.88
P (g)	40.02	63.03	88.19	85.44
Na (g)	26.79	74.39	67.15	65.08
K (g)	207.52	235.50	300.48	291.27
Mg (g)	38.89	51.54	75.44	73.11
Ash (g)	1.14	1.40	1.78	1.72

# Results and Discussion

- Average parameters of milk production of cows with shortened dry period prepartum

<b>Days prepartum</b>	<b>Milk yield Kg/cow/d</b>	<b>Fat %</b>	<b>Protein %</b>	<b>Lactose %</b>	<b>Urea mg/l</b>
<i>60th day</i>	18.16	4.50	3.86	4.86	302.53
<i>40th day</i>	15.29	4.68	4.12	4.83	348.25
<i>Average</i>	<b>15.84</b>	<b>4.59</b>	<b>3.99</b>	<b>4.84</b>	<b>325.39</b>



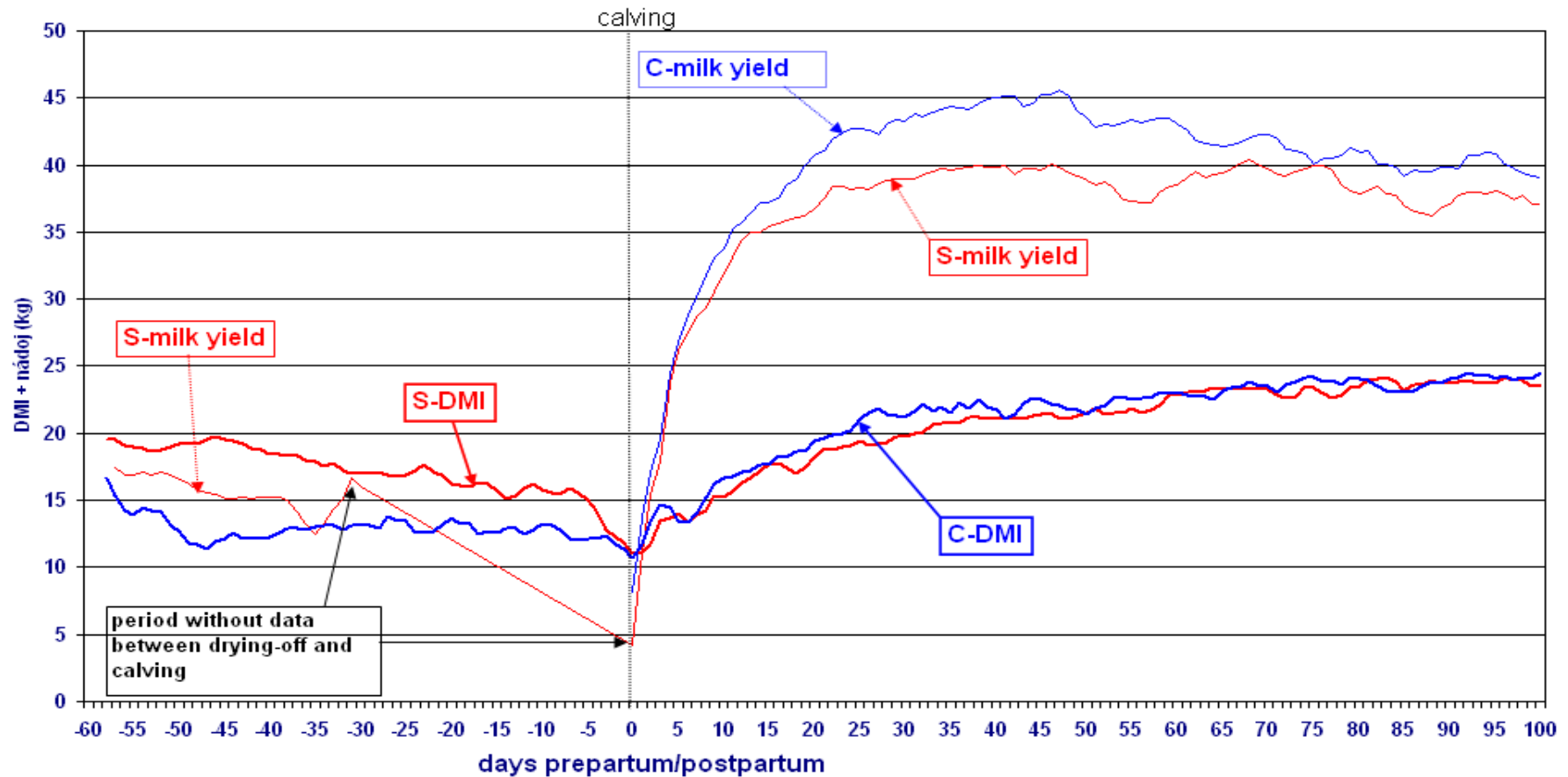
# Results and Discussion

- **Average parameters of milk production 100 DIM**

DIM	Milk yield		Fat		Protein		FCM	
	kg/cow/d		%		%		kg/cow/d	
	C	S	C	S	C	S	C	S
14	37.62	35.17	4.79	5.45	3.25	3.34	42.07	42.82
28	45.19	38.36	4.31	4.65	2.94	2.99	47.28	42.08
42	44.28	37.88	4.33	4.27	2.92	3.01	46.44	39.44
56	43.01	38.2	4.06	3.89	2.96	3.06	43.42	37.58
70	40.96	39.64	4.29	3.94	3.05	3.14	42.77	39.26
84	39.43	37.46	4.29	4.41	3.17	3.2	41.15	39.76
98	38.54	38.46	4.16	4.13	3.24	3.28	39.45	39.19
<b>Average</b>	<b>40.59</b>	<b>37.36</b>	<b>4.32</b>	<b>4.38</b>	<b>3.08</b>	<b>3.16</b>	<b>42.54</b>	<b>39.49</b>

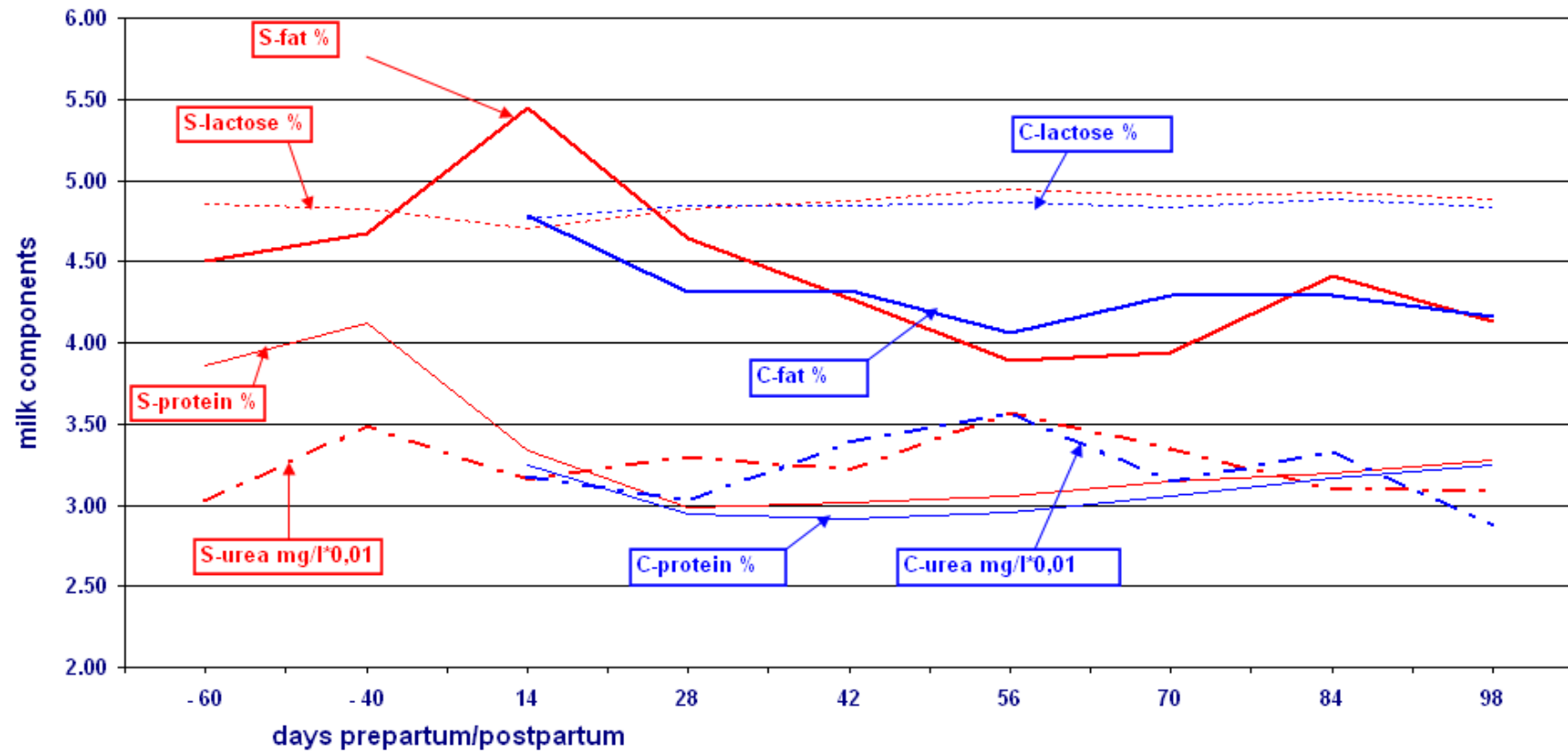
# Results and Discussion

## DMI and MILK YIELD (moving average)



# Results and Discussion

## MILK COMPOSITION



# Results and Discussion

Average parameters of plasma metabolites concentrations of cows with shortened (S) and conventional (C) dry period

Period	Group	Total protein	Albumin	Glucose	Urea	NEFA	BHB
		g/l	g/l	mmo/l	mmol/l	mmol/l	mmol/l
Prepartum	C	71.62	33.13	3.42	4.01	0.22	0.43
	S	72.30	33.15	3.43	3.99	0.22	0.40
	SEM	3.26	1.26	0.16	0.37	0.06	0.09
	P	ns	ns	ns	ns	ns	<b>&lt;0.05</b>
Postpartum	C	73.37	33.39	3.06	5.20	0.46	0.73
	S	73.10	33.11	3.05	5.43	0.50	0.79
	SEM	2.85	1.31	0.24	0.43	0.20	0.33
	P	ns	ns	ns	<b>&lt;0.05</b>	ns	ns
Average prepartum + postpartum	C	72.52	33.26	3.24	4.62	0.34	0.58
	S	72.69	33.13	3.24	4.72	0.36	0.60
	SEM	3.12	1.28	0.28	0.78	0.20	0.30
	P	ns	ns	ns	ns	ns	ns

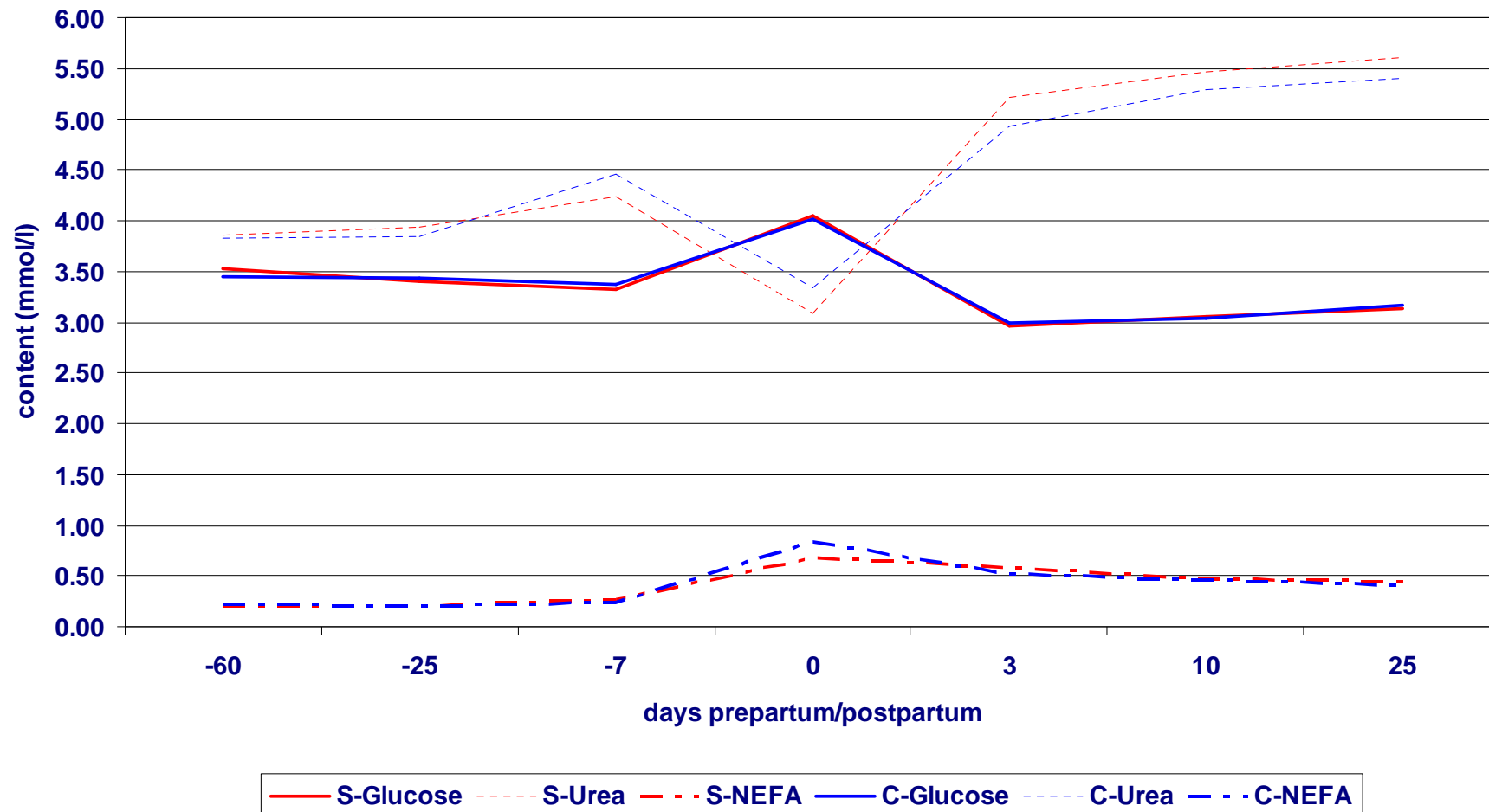
# Results and Discussion

## Average parameters of plasma metabolites prepartum vs. postpartum

Group	Period	Total protein	Albumin	Glucose	Urea	NEFA	BHB
		g/l	g/l	mmo/l	mmol/l	mmol/l	mmol/l
<b>C</b>	Prepartum	71.62	33.13	3.06	4.01	0.22	0.43
	Postpartum	73.37	33.39	3.42	5.20	0.46	0.73
	SEM	3.12	1.29	0.22	0.45	0.13	0.16
	P	<b>&lt;0.05</b>	ns	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>&lt;0.001</b>
<b>S</b>	Prepartum	72.28	33.14	3.43	3.99	0.22	0.40
	Postpartum	73.10	33.11	3.05	5.43	0.50	0.79
	SEM	3.00	1.28	0.19	0.35	0.17	0.30
	P	ns	ns	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>&lt;0.001</b>

# Results and Discussion

Average parameters of blood plasma



# Results and Discussion

Parameters of rumen fluid of cows with shortened and typical dry period

Day regarding the calving	Period	Lactic acid	Acetic acid	Propionic acid	Butyric acid	Valeric acid	VFA sum	pH	NH3
		mmol/l	mmol/l	mmol/l	mmol/l	mmol/l	mmol/l	mmol/l	(mg N/100g)
Prepartum	<b>C</b>	0.46	63.03	18.51	12.80	0.47	94.91	6.97	16.08
	<b>S</b>	0.54	71.54	21.13	15.39	0.47	108.96	6.75	15.75
	<b>SEM</b>	0.14	11.30	4.25	3.87	0.11	18.39	0.27	3.85
	<b>P</b>	<b>&lt;0.05</b>	<b>&lt;0.001</b>	<b>&lt;0.01</b>	<b>&lt;0.01</b>	ns	<b>&lt;0.001</b>	<b>&lt;0.001</b>	ns
Postpartum	<b>C</b>	0.65	78.61	23.62	17.08	0.55	120.03	6.42	21.1
	<b>S</b>	0.61	76.10	22.29	16.66	0.53	116.09	6.56	18.63
	<b>SEM</b>	0.20	9.57	4.64	3.83	0.23	17.07	0.38	6.74
	<b>P</b>	ns	ns	ns	ns	ns	ns	ns	ns
Average prepartum + postpartum	<b>C</b>	0.45	70.82	21.06	14.91	0.41	107.47	6.69	18.59
	<b>S</b>	0.52	73.82	21.71	16.02	0.45	112.52	6.65	17.19
	<b>SEM</b>	0.19	11.84	4.78	4.13	0.19	19.83	0.39	5.82
	<b>P</b>	<b>&lt;0.05</b>	ns	ns	ns	ns	ns	ns	ns

# Results and Discussion

Average parameters of rumen fluid prepartum vs. postpartum

Group	Period	Lactic acid	Acetic acid	Propionic acid	Butyric acid	Valeric acid	VFA sum	pH	NH3
		mmol/l	mmol/l	mmol/l	mmol/l	mmol/l	mmol/l		(mg N/100g)
<b>C</b>	Prepartum	0.46	63.03	18.51	12.80	0.47	94.91	6.97	16.08
	Postpartum	0.65	78.61	23.62	17.07	0.55	120.03	6.42	21.1
	SEM	0.20	11.55	4.93	4.13	0.18	19.49	0.34	5.73
	P	<0.001	<0.001	<0.001	<0.001	ns	<0.001	<0.001	<0.001
<b>S</b>	Prepartum	0.54	71.54	21.13	15.39	0.47	108.96	6.75	15.75
	Postpartum	0.61	76.10	22.29	16.66	0.53	116.09	6.56	18.63
	SEM	0.16	9.41	3.97	3.58	0.19	16.03	0.32	5.27
	P	<0.05	<0.05	ns	ns	ns	<0.05	<0.01	<0.05



# Conclusion

- Shortening the dry period length ( $35 \pm 6.3$  d) increased dry matter intake prepartum
- Decreased dry matter intake and reduced milk production after calving
- No effect on plasma metabolites concentrations
- Shortening the dry period and feeding different type of diet decreased rumen pH and increased concentrations of VFA prepartum
- Prepartum and postpartum parameters of plasma and rumen fluid of the cows in both groups were different



Thank you for your attention!

